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FOREWORD

Message from Hon. Minister for Health

As Minister for Health, I wish to acknowledge the hard work rendered by the national drug and therapeutic committee. Fakafetai lasi to all who have contributed to the development of this edition. Especially I wish to thank Dr Stephen Homasi and his team for their outstanding efforts, well done. Tuvalu now stands together with others in the region as a country having its own treatment guidelines and we should be proud of it.

To support and achieve the health-related Millennium Development Goals (MDGs) the ministry of health had endeavoured to develop treatment guidelines. The first edition now published is evident that this ministry had achieved this and will work towards achieving the health-related MDGs. It is by principle that these guidelines will ensure appropriate, efficient, and cost-effective prescribing.

Therefore, I wish to thank again the committee for their efforts and hope that the guidelines will assist all health workers in their routine work daily.

Tuvalu mote Atua

Hon. Sir Tomu M Sione GCMG, OBE, EP, MP
Hon. Minister of Health
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>β</td>
<td>Beta</td>
</tr>
<tr>
<td>‘o’</td>
<td>Oral or orally</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less than</td>
</tr>
<tr>
<td>&gt;</td>
<td>More than</td>
</tr>
<tr>
<td>≥</td>
<td>More than or equal to</td>
</tr>
<tr>
<td>↑</td>
<td>Increase</td>
</tr>
<tr>
<td>↓</td>
<td>Decrease</td>
</tr>
<tr>
<td>®</td>
<td>Trade name</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Accidents and Emergencies</td>
</tr>
<tr>
<td>ACEI</td>
<td>Angiotensin Converting Enzyme Inhibitor</td>
</tr>
<tr>
<td>AFB</td>
<td>Acid Fast Bacilli</td>
</tr>
<tr>
<td>bd</td>
<td>Twice a day (sometimes ‘bid’ is used)</td>
</tr>
<tr>
<td>CMV</td>
<td>Cytomegalovirus</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CPAP</td>
<td>Continuous Positive Airways Pressure</td>
</tr>
<tr>
<td>CPR</td>
<td>Cardio-pulmonary Resuscitation</td>
</tr>
<tr>
<td>CSF</td>
<td>Cerebro-spinal fluid</td>
</tr>
<tr>
<td>DOT</td>
<td>Directly Observed Treatment</td>
</tr>
<tr>
<td>dpm</td>
<td>Drops per minute</td>
</tr>
<tr>
<td>EBM</td>
<td>Expressed breast milk</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiography</td>
</tr>
<tr>
<td>EDL</td>
<td>Essential Drugs List</td>
</tr>
<tr>
<td>EML</td>
<td>Essential Medicines List</td>
</tr>
<tr>
<td>EMLc</td>
<td>Essential Medicines List for Children</td>
</tr>
<tr>
<td>FBC</td>
<td>Full Blood Count</td>
</tr>
<tr>
<td>FEV1</td>
<td>Forced expiratory volume in one second</td>
</tr>
<tr>
<td>GDM</td>
<td>Gestational diabetes mellitus</td>
</tr>
<tr>
<td>GTT</td>
<td>Glucose tolerance test</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>hr</td>
<td>Hour(s)</td>
</tr>
<tr>
<td>IMI</td>
<td>Intra-muscular</td>
</tr>
<tr>
<td>IU</td>
<td>Units</td>
</tr>
<tr>
<td>IUFD</td>
<td>Intrauterine foetal death</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>K+</td>
<td>Potassium ions</td>
</tr>
<tr>
<td>KCL</td>
<td>Potassium chloride</td>
</tr>
<tr>
<td>L</td>
<td>Litre</td>
</tr>
<tr>
<td>LA</td>
<td>Local anaesthetics</td>
</tr>
<tr>
<td>max.</td>
<td>Maximum</td>
</tr>
<tr>
<td>min</td>
<td>Minute(s)</td>
</tr>
<tr>
<td>ml</td>
<td>Milliliters(s)</td>
</tr>
<tr>
<td>MO</td>
<td>Medical Officer</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>N/S</td>
<td>Normal saline solution</td>
</tr>
<tr>
<td>Na+</td>
<td>Sodium ions</td>
</tr>
<tr>
<td>NaHCO3</td>
<td>Sodium Bicarbonates</td>
</tr>
<tr>
<td>NGT</td>
<td>Nasogastric tube</td>
</tr>
<tr>
<td>Obs &amp; Gyn</td>
<td>Obstetrics and Gynaecology</td>
</tr>
<tr>
<td>PEFR</td>
<td>Peak expiratory flow rate</td>
</tr>
<tr>
<td>prn</td>
<td>When required or when necessary</td>
</tr>
<tr>
<td>q12h</td>
<td>Every 12 hours</td>
</tr>
<tr>
<td>q4h</td>
<td>Every 4 hour</td>
</tr>
<tr>
<td>q6h</td>
<td>Every 6 hour</td>
</tr>
<tr>
<td>q8h</td>
<td>Every 8 hour</td>
</tr>
<tr>
<td>qh</td>
<td>Every hour</td>
</tr>
<tr>
<td>qid</td>
<td>Four times a day</td>
</tr>
<tr>
<td>SAH</td>
<td>Sub-arachnoid haemorrhage</td>
</tr>
<tr>
<td>SaO2</td>
<td>Saturation of Oxygen</td>
</tr>
<tr>
<td>SC</td>
<td>Subcutaneous</td>
</tr>
<tr>
<td>SL</td>
<td>Sub-lingual</td>
</tr>
<tr>
<td>STEMI</td>
<td>ST elevation myocardial infarction</td>
</tr>
<tr>
<td>STG</td>
<td>Standard Treatment Guideline</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually Transmitted Infection(s)</td>
</tr>
<tr>
<td>SVT</td>
<td>Supraventricular Tachycardia</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>tds</td>
<td>Three times a day (sometimes ‘tid’ is used)</td>
</tr>
<tr>
<td>TFT</td>
<td>Thyroid function test</td>
</tr>
<tr>
<td>TMJ</td>
<td>Temporo-mandibular joint</td>
</tr>
<tr>
<td>UEC</td>
<td>Urea electrolyte and creatinine</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>VF</td>
<td>Ventricular Fibrillation</td>
</tr>
<tr>
<td>VSD</td>
<td>Ventricular Septal Defect</td>
</tr>
<tr>
<td>VT</td>
<td>Ventricular Tachycardia</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENT

This is the first edition of the Standard Treatment Guidelines for the Ministry of Health, Tuvalu. National Drug and Therapeutic Committee is the committee that had reviewed guidelines from neighbouring pacific island countries.

Tuvalu National Drug and Therapeutic Committee (NDTC) wishes to acknowledge Tonga Ministry of Health and Fijis’ National drug and therapeutic committee for granting permission to use their materials for the development of these guidelines.

Also, special acknowledgement goes to all members of the committee who have tirelessly been involved in the reviewing and commenting of these guidelines and are commended for a job well done. In particular, special thanks goes to these individuals for their professional advice and input to this first edition: Dr Stephen Homasi (Chairman NDTC, surgeon), Dr Nese Conway (Chief public health), Dr Puakena Boreham (anaesthetists), Dr Maliesi Latasi (paediatrician), Dr Miliama Simeona (obstetrician and gynaecologist), Dr Ileana Del (paediatrician), Dr Livan Rodriguez (internal medicines), Dr Rolando Garcia (obstetrician and gynaecologist), Dr Nokise Simeona (obstetrician and gynaecologist), Natano Elisala (pharmacist), Irata Pulusi (pharmacist), Kelvin Suli Ratu (dental officer), Galiva Teava (dental officer), Silvia Rasova (laboratory technician).

A special thanks also goes to Dr Patt Phillips (endocrinologists) and Jane Charles (diabetic nurse) visiting Diabetes Team from Australia for their valuable comments on the diabetes management guidelines.

The committee also wishes to acknowledge Dr Lkhagvadorj Vanchisuren, World Health Organisation, pharmaceutical adviser, Dr Brigette. WHO Suva for their support and assistance in reviewing of the final draft.

Finally, the Ministry of Health wishes to thank European Community and World Health Organisation for their support and funding this project.
INTRODUCTION

This is the first edition of the Standard treatment guidelines published 2010. It has been prepared with the assistance and collaboration of members of the national drug and therapeutic committee. The committee consists of doctors, the matron, dental officers and pharmacists whom have sat through meetings and discussions on the development of the guidelines using external sources from early 2009. The guideline contains eight chapters seven of which are treatment guidelines and the other essential medicines and essential medicines for children.

These guidelines are the current best evidence-based practiced at the time of review and is intended to be used by doctors, nurses, dental officers, pharmacy staff and health care workers in the Tuvalu health sector. The committee is aware of the constant changes of practices and endeavor’s to update stakeholders through workshops, disseminations of literatures and bulletins.

The treatment guidelines have somewhat been included as comprehensive and inclusive of all aspects of therapy and not merely a simple list of medications and recommended doses. Each chapter addresses the conditions, its non-drug treatments, the medicines that are used to treat the conditions, doses and others may have algorithms to simplify the treatment protocols.

Other information provided in this edition would also assist the users are a list of sources that would greatly assist them should they wish to further research on each topic or treatment(s).

The last two chapters are the endorsed national essential medicines list and the essential medicines for children. These essential medicines were selected according to the recommended WHO guidelines on selection of essential medicines. The list was recently revised and these medicines are reflected in the recommended guidelines however some medicines recommended may not be available and the committee endeavor’s to approve these. One of the highlights also for this edition on treatment guidelines is the list of essential medicines for children. WHO advocacy on making child size medicines available in the world has found its place in Tuvalu. The committee for the first time endorsed a list of medicines for children and they as well are reflected in the recommended treatment guidelines. Some restrictions on the availability of these medicines to the outer islands are also reflected in the document.

The committee welcomes any feedback or comments on these guidelines. Please send all comments to the National Drug Therapeutic Committee Secretary <pharmacyintuvalu@yahoo.com>. The committee will endeavor to address any arising issues pertaining to the treatment guidelines.
MANAGING DIABETES MELLITUS

Major drugs used in the management of diabetes and its complications

Drugs used in the management of diabetes

**Biguanides**

Metformin is the only drug of the biguanide group in the Tuvalu Essential Drug List (EDL).

- lowers blood glucose by suppressing hepatic glucose production and increasing tissue sensitivity to insulin.

- used as a first-line drug in obese type 2 diabetics.

- cleared from the body predominantly by renal excretion. It accumulates in renal impairment and should seldom be used in patients with serum creatinine more than 200 µmol/L. Patients receiving long-term metformin should have 6-monthly monitoring of renal function.

-- contraindicated in pregnancy and breastfeeding mothers.

- can cause **lactic acidosis** in situations such as ischemic heart disease, congestive heart failure and renal impairment. Should be stopped for 48 hours before surgery or administration of contrast radiography and only resumed once urine output and renal function have returned fully to normal.

- no risk of hypoglycaemia when used alone.

- major adverse effects: anorexia, nausea, abdominal discomfort and diarrhoea.

Metformin is given orally 2-3 times a day and taken with or after meals. The dose ranges from 500 mg BD to a maximum of 3 g/day in divided doses. Most physicians limit the dose to 2g daily because at higher doses, gastrointestinal side effects are more common.

**Sulphonylureas**

Glibenclamide is available on the Tuvalu Essential Medicine List.

- acts on pancreatic beta-cells to induce insulin secretion.

- metabolized by the liver and predominantly cleared by the kidneys. Older patients and others with declining hepatic and renal function may be at risk of accumulation and hypoglycaemia.
- used in lean type 2 diabetics. Can be combined with metformin if diabetes control inadequate.

- not recommended in pregnancy and lactating mothers.

- hypoglycaemia the major adverse effect especially when there is significant hepatic and renal impairment.

- dosage of glibenclamide varies from 2.5 mg to 20 mg daily orally with meals and in two divided doses above 10 mg up to a maximum of 20 mg/day.

Glipizide is available on the Tuvalu Essential Medicines List

- acts on pancreatic beta-cells to induce insulin secretions.

- metabolized by the liver and predominantly cleared by the kidneys. Older patients and others with declining hepatic and renal function may be at risk of accumulation and hypoglycaemia.

- used in type 2 diabetic. Can be combined with metformin if diabetes control inadequate.

- not recommended in pregnancy and lactating mothers.

- hypoglycaemia the major adverse effect especially when there is significant hepatic and renal impairment.

- dosage of glipizide varies from 2.5 to 40 mg daily in 1 to 2 doses orally with meals.

**Insulins**

There are three insulin preparations available in the Tuvalu EML. In this section, the pharmacokinetics of these preparations is discussed. Their usage is discussed on pages 16 & 16.

Insulin is given using conventional disposable insulin syringes.

The preferred sites of injection are the abdominal wall, the deltoids and the thighs. It is recommended that these sites be rotated regularly.

**Table 1. Characteristics of available insulins.**

<table>
<thead>
<tr>
<th>Insulin Type</th>
<th>Effect onset (h)</th>
<th>Maximum effect (h)</th>
<th>Duration (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-acting soluble insulin, 100 u/ml (Actrapid HM)</td>
<td>0.5</td>
<td>2-5</td>
<td>6-8</td>
</tr>
<tr>
<td>Intermediate-acting isophane insulin, 100 u/ml (Protaphane HM)</td>
<td>1-2.5</td>
<td>4-12</td>
<td>16-24</td>
</tr>
<tr>
<td>Biphasic isophane insulin, 100 u/mL (Mixtard 30/70)</td>
<td>0.5-1</td>
<td>2-12</td>
<td>16-24</td>
</tr>
</tbody>
</table>
**Drugs for treating complications and coexisting conditions**

* Amitriptyline

This compound, used for the treatment of depression, is also of value in a variety of pain syndromes. It may play a role in modifying the activity of the descending, adrenergic pathway in the spinal cord – possibly by limiting the re-entry of catecholamines into the sympathetic nerve endings.

In doses for the relief of pain in diabetic neuropathy, the major adverse drug effects are dry mouth and blurring of vision.
- usual dose 50 to 75 mg at night.

* Carbamazepine

Carbamazepine has a place in the treatment of several pain syndromes. The mode of action is unknown: good evidence exists from clinical trials to support its use. In the dose used for diabetic neuropathy, major adverse effects are less likely to occur. However, drowsiness, skin rash and slurred speech or mild ataxia should be looked for.

* Angiotensin-converting enzyme inhibitors (ACEIs)

ACEIs play a vital role in the treatment of microalbuminuria and control of hypertension in diabetic patients. Enalapril is the only preparation available in the Tuvalu EML.

**Classification, diagnosis and general management of diabetes**

**Types of diabetes**

* **Type 1 diabetes**

Previously known as insulin-dependent diabetes mellitus (IDDM), type 1 diabetes is caused by destruction of pancreatic beta-cells usually by autoimmune mechanism. Patients require life-long insulin treatment. Type 1 diabetes is commonly seen in young patients but can also be present in older patients. They have lean bodies and are prone to ketoacidosis.

* **Type 2 diabetes**

Previously known as non-insulin dependent diabetes mellitus (NIDDM), type 2 diabetes is the commonest type seen in Tuvalu and is increasing worldwide. Onset usually later in life but recent epidemiologic studies show that there is increasing trend in younger patients. Type 2 diabetes is often associated with hypertension, hyperlipidaemia and truncal obesity. This is referred to as syndrome X or the “metabolic”syndrome.

Abnormalities in pancreatic insulin secretion, abnormal regulation of hepatic glucose production and tissue resistance to the action of insulin have all been demonstrated in Type 2 diabetes.
Patients with Type 2 diabetes commonly have a family history of the condition, are often over 40 years of age, often have a body mass index (BMI) over 25 kg/m², and may have history of gestational diabetes.

Sometimes, differentiating between the two types can be difficult. In such cases, an initial trial of oral hypoglycaemic agents can be given. If the response is unsatisfactory, then insulin therapy should be instituted.

**Secondary diabetes**

Secondary diabetes occurs in the following situations:

- endocrine disorders - acromegaly, Cushing’s disease, thyrotoxicosis and sometimes in phaeochromocytoma (an adrenal medullary tumour producing catecholamines in excess)
- during treatment with corticosteroids
- thiazide diuretic therapy (usually impaired glucose tolerance not full diabetes)
- pancreatic destruction due to surgery, cancer and chronic diseases of the pancreas.

**Screening for diabetes**

Early detection of diabetes in our population is vital in order to reduce the disease burden of diabetes in our community. A high index of suspicion in certain categories of the population is important. However, the definitive diagnosis is based on the blood sugar levels.

One should suspect diabetes in the following categories of patients:

**Patients at risk**

- positive family history
- hyperlipidemia
- hypertension
- ≥ 40 years old
- obesity
- history of gestational diabetes

**Patients with typical symptoms of diabetes have -**

- weight loss
- polyuria
- lethargy
- pruritus vulvae
- balanitis

**Patients suffering from conditions suggestive of diabetes**

- foot sepsis
- multiple abscesses
- delayed wound healing
- neuropath
Diagnosis of diabetes mellitus

Figure 1. Diagnosis of diabetes mellitus based on blood sugar levels.

Impaired fasting glycaemia and impaired glucose tolerance

Impaired fasting glycaemia (IFT) and impaired glucose tolerance (IGT) are both regarded as pre-diabetic states. Patients identified by screening should be reviewed by a medical practitioner, advised to follow an appropriate diet and then followed up at 6 months with further measurements of fasting and 2-hour postprandial blood sugars. About 30% of pre-diabetic patients develop overt diabetes in five years.

Management of established diabetes

Diabetes mellitus is a complex disease to treat, and as such, it needs a holistic approach in its management.

There should be an explicit management plan to include:

- adequate blood glucose control – food intake, weight control, physical activity and drug therapy;
- risk factor modification particularly hypertension, obesity, smoking and hyperlipidemia;
- screening and management of complications;
- regular follow-up; and
- a comprehensive and repeated educational program.

The aims of treatment for diabetes are:
• to relieve symptoms of the disease,
• to avoid immediate complications (i.e. hypoglycemia and hyperglycemia), and
• to delay the onset of long-term complications (i.e. retinopathy, neuropathy, nephropathy, and cardiovascular diseases).

There is good evidence that very good long-term control of blood glucose reduces the likelihood of development of microvascular complications of diabetes.

**Adequate blood sugar control**

Blood sugar control is affected by five factors such as:

• food intake,
• physical activity,
• stress, and
• drug treatment
• co-existing medical conditions

**a. Food intake**

Refer all newly diagnosed diabetics to a dietician or if not available to a diabetic clinic.

Diet should include plenty of breads, cereals, vegetables and fruits, moderate amounts of low-fat meat, poultry, fish, eggs and dairy products and only a small intake of foods high in fats, added sugar and salt.

A dietitian will be able to point out ways in which variety may be achieved without losing control of the blood glucose. **Avoidance of sugar in the diet alone is not an adequate dietary measure.**

Patients with Type 1 diabetes must eat regularly to avoid hypoglycemia due to insulin therapy.

Artificial sweeteners such as saccharine and cyclamate can be used as substitutes. Sorbitol should not be used as a sweetener.

**Alcohol should be no more than two standard drinks\(^1\) daily. There is a risk of severe hypoglycaemia if excessive alcohol is consumed. Alcohol should be taken with a meal and not by itself.**

The effects of *yaqona* are unclear. Prolonged drinking sessions may lead to missing meals. There is anecdotal evidence that yaqona may have hyperglycemic effects.

**b. Weight control**

---

\(^1\) One standard alcohol drink is equivalent to 10 g of alcohol (285 ml of regular beer, 100 ml of wine, and 30 ml of spirits).
Many Type 2 diabetics are overweight. They should be encouraged to achieve as close as possible to their ideal body weight (BMI between 20 to 25 kg/m²). This will also assist in the control of hyperlipidemia and blood pressure.

c. **Physical activity**

Physical activity is important for all diabetics and can assist in weight reduction and improve cardiovascular fitness. The common health goal should be to achieve at least 30 minutes of moderate-intensity physical activity every day. This includes activities such as brisk walking, cycling, and physical work. Additional health benefits can be obtained by more vigorous activities (such as dancing or jogging,) or through longer duration moderate-intensity activities.

d. **Drug therapy**

Drug treatment of diabetes modifies the tissue production of glucose or its uptake from the blood into cells.

**Risk factor modification**

a. **Smoking**

Diabetics should not smoke.

b. **Hypertension**

-a major risk factor for both cardiovascular diseases and renal complications.

**Blood pressure control is more important than the choice of anti-hypertensive drugs.** However, angiotensin converting enzyme inhibitors (ACEIs) are the first line drugs in controlling hypertension. Other anti-hypertensive drugs such as beta-blockers (e.g. atenolol) and slow release calcium channel blockers (e.g. nifedipine), can also be used. Methyldopa is available and, while usually reserved for controlling blood pressure in pregnancy, can be used if the above drugs are not available. A combination of drugs is often needed to achieve desired blood pressure control.

When ACEIs are used to control hypertension, it is important to monitor the renal function two weeks later. A slight increase in serum creatinine is generally expected and is usually less than 30% of baseline values. If there is a significant rise in serum creatinine, it is recommended that ACEIs should be stopped and replaced by another anti-hypertensive drug. This might indicate underlying renal artery stenosis.

The level of blood pressure control is dependent on the patient’s renal function and the amount of protein in the urine. Targets are :-

i. If renal function is normal (regardless of blood pressure) but microalbuminuria is present, start *enalapril 5-40 mg daily.* The target of BP control is less than 130/85 mm Hg.

ii. In the presence of renal impairment and/or significant proteinuria (>1 g/day or ++++ on dipstick), the BP should be lower than 120/80 mm Hg.
Caution is required with ACEIs therapy because of the risk of development of hyperkalemia. When possible, it is advisable to monitor electrolytes at least once every six months. Regular monitoring of electrolytes is advisable.

c. **Hyperlipidemia**

This is a common occurrence in diabetics.

Elevated triglycerides and LDL (low-density lipoprotein)-cholesterol with reduced HDL (high density lipoprotein)-cholesterol is a common pattern and warrants treatment.

Getting the best possible control of blood glucose is an important first strategy.

If lipid abnormalities persist despite this, they may need to be treated in their own right. The recommended drug is simvastatin.

**Targets of diabetes control**

It is important to have a set of targets for diabetes control. These targets should be discussed between the patient and the doctor before starting treatment and during each follow-up visit.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Very good Control</th>
<th>Fair Control</th>
<th>Could be better</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Blood glucose (mmol/L)</td>
<td>4.0 - 6.0</td>
<td>6.1 - 7.0</td>
<td>≥ 7.1</td>
</tr>
<tr>
<td>2-hour post-prandial (mmol/L)</td>
<td>4.0 – 8.0</td>
<td>8.1 - 10.0</td>
<td>≥ 10.1</td>
</tr>
<tr>
<td>HbA 1c (%)</td>
<td>&lt; 6.0</td>
<td>6.0 – 7.0</td>
<td>≥ 7.0</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>&lt; 4.0</td>
<td>4.1 – 4.9</td>
<td>≥ 5.0</td>
</tr>
<tr>
<td>HDL-cholesterol (mmol/L)</td>
<td>&gt; 1.0</td>
<td>≤ 1.0 – 0.9</td>
<td>&lt; 0.9</td>
</tr>
<tr>
<td>LDL-cholesterol (mmol/L)</td>
<td>&lt; 3.0</td>
<td>3.0 – 4.0</td>
<td>&gt; 4.0</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>&lt; 1.5</td>
<td>1.6 – 2.0</td>
<td>&gt; 2.0</td>
</tr>
<tr>
<td>Blood pressure (mm Hg)</td>
<td>&lt;130/80</td>
<td>&gt;130/80 - &lt;140/90</td>
<td>≥ 140/90</td>
</tr>
<tr>
<td>Body mass index (kg/m²***)</td>
<td>M: &lt; 25</td>
<td>M: &lt; 27</td>
<td>M ≥ 27</td>
</tr>
<tr>
<td></td>
<td>F: &lt; 24</td>
<td>F: &lt; 26</td>
<td>F ≥ 26</td>
</tr>
</tbody>
</table>

*HbA1c – amount of circulating glycosylated haemoglobin, a measure of the overall control over preceding 3 months.

**BMI ranges recommended for Pacific Islanders are somewhat higher at 20.5-27.0.


**Specific aspects in the management of diabetes**

*General approach to the management of diabetes*
The general approach to the management of diabetes is outlined in Figure 1.

For all diabetics, diet, weight control and regular physical activity are essential. These regimens can produce good glucose control in type 2 diabetes; and if it does, then these should be pursued. Drug therapy should only be considered if blood sugar levels remain uncontrolled after 6-12 weeks.

The discussion below refers to those patients whose blood sugar levels are not adequately controlled with non-pharmacological therapy.

* Metformin is preferable over sulfonylureas.

**Figure 2. General approach to the management of diabetes mellitus.**

**Type 1 diabetes**
All patients with Type 1 diabetes require insulin.

Children should be referred to a specialist paediatric unit and will normally be stabilised in hospital. Adults can be managed as an outpatient.

Insulin dose has to be worked out for each individual according to blood glucose control.

**Type 2 diabetes**

**Obese patients (BMI > 30 kg/m²)**

For obese type 2 diabetic patients, start on

*Metformin 500 mg orally 2-3 times daily up to a maximum of 2 g daily with meals.*

If blood sugar levels are uncontrolled, add glibenclamide (see below). Add insulin if still not controlled.

**Non-obese type 2 diabetes**

For non-obese type 2 diabetic, start on

*Glibenclamide 2.5 to 10 mg as a single dose or twice daily up to a maximum of 20 mg daily with meals or after meals. This drug is preferred in younger patients.*

**Combination oral treatment**

If blood sugar is not adequately controlled with a single oral agent, give

*Metformin + glibenclamide (doses as above).*

**Insulin treatment in type 2 diabetes**

a. **Deciding when to start**

The indications to start insulin in type 2 diabetes are:

- failure of oral hypoglycaemic agents,
- patients undergoing major surgery, critically ill patients, pregnancy

b. **Administering insulin with oral hypoglycaemic drugs**

*Intermediate-acting isophane10 units subcutaneously at bedtime and adjust dose according to blood sugar levels*

OR
Intermediate-acting isophane insulin or mixed insulin 8-10 units subcutaneously twice daily with subsequent adjustment of the dose according to blood glucose levels.

c. Insulin regimens

i. Multiple-dose (“QID”) regimen

This regimen is more suited for stabilization of blood sugar for inpatients.

*Soluble insulin starting with 5 units subcutaneously 30 minutes before each meal*

AND

*Intermediate-acting isophane 8 units subcutaneously at bedtime.*

Insulin doses should be adjusted based on blood sugar levels.

ii. Twice daily regimen

This regimen can be used for control of blood sugar for both inpatients and outpatients.

*Intermediate-acting isophane insulin 10 units in the morning and 5 units in the evening subcutaneously 30 minutes before each meal.*

OR

*Mixed insulin 10 units in the morning and 5 units in the evening subcutaneously 30 minutes before each meal.*

In principle, two-thirds of the insulin dose should be administered in the morning and one-thirds in the evening. However, insulin doses should be adjusted based on the blood sugar levels and increments of 2 units per dose are recommended.

---

2 For both insulin regimens, extra soluble insulin 5 units subcutaneously can be given if blood sugars are not controlled.
Special situations in the management of diabetes

**Physical Activity**

Physical activity carries additional risks in people with diabetes requiring insulin. Hypoglycaemia is a major concern in this situation.

For mild to moderate physical activity (e.g. fast walking on a flat surface, mopping the floor) for 30 minutes, extra carbohydrates should be taken beforehand.

For “short bursts” or longer hard physical activity (e.g. scrubbing the floor, moving heavy furniture), it is advisable to reduce dosage of short-acting insulin.

**Illness**

Metabolic control may deteriorate rapidly during illness of any kind.

As part of their education program all patients should have a **contingency plan** on which they can work on if an illness upsets their diabetes control.

There should be close monitoring of blood sugar levels.

Insulin doses should be adjusted according to blood sugar levels and changed to short-acting insulin for better control. **Insulin must not be stopped. If there is a need to reduce the dose, it should not be more than 30%.**

Oral hypoglycaemic drugs should not be stopped unless the patient cannot eat.

Maintenance of fluid intake is important.

If the patient is unable to take in solid food, substitute with fruit juices, regular soft drinks, or other fluids containing glucose.

Patients who have repeated vomiting should contact medical help early as both intake of fluids and carbohydrates need to be maintained.

The patient should have thorough knowledge of when, how and where to contact a specialist health care facility.

**Travelling**
Patients on insulin can travel overseas as long there is proper adjustment of their food and insulin doses to adapt to the changing local times.

Journeys should be carefully planned. Enough insulin for the whole trip with some spares should be carried. Insulin should be kept cool inside a well-insulated bag. It is advisable to carry a medical report from the doctor with treatment details to facilitate customs clearance. The report will assist in dealing with any medical problems that may arise during traveling.

Easily absorbed sugary foods (e.g. lollies, fruit juice) should be available while traveling as well as food that takes a little longer (e.g. crackers) to absorb. These can be taken if there is an indication of impending hypoglycaemia.

**Surgical procedures**

The major issues in patients undergoing surgical procedures are the following:

- the need to fast the patient,
- the need to maintain glycaemic control throughout the procedure,
- the need to avoid hypoglycaemia, and
- the need to shift from a rigid preoperative regimen to a very flexible perioperative regimen.

It is desirable for the patient to have normal blood sugar levels and maintenance of fluid and electrolyte balance perioperatively.

**Local anaesthesia**

a. **Patients with normal blood sugar levels**

There is no need to fast patients prior to surgery and the normal doses of insulin or oral hypoglycaemic drugs should be continued. Do a morning preoperative blood sugar reading. Dextrose 5% may be given if the blood sugar is low.

b. **Patients with uncontrolled blood sugar levels**

Control blood sugar levels first and refer to physician if required. Plan surgery once blood sugar is controlled.

**General anaesthesia**

a. **Patients for elective surgery**
Preoperative blood sugar levels should be controlled with either oral hypoglycaemic agents or insulin.

i. **Patients on oral hypoglycaemic agents**

It is recommended to admit patient 2-3 days before surgery and change from oral hypoglycaemic drugs to insulin. Stabilize blood sugar levels using multiple-dose (“QID”) insulin regimen. Give extra soluble insulin 5-10 units subcutaneously if the blood sugar level is \( \geq 12 \text{ mmol/L} \).

**ii. Patients on insulin therapy**

It is recommended that patients be admitted a day before surgery and be started on multiple-dose (“QID”) insulin regimen. Give extra soluble insulin 5-10 units subcutaneously if the blood sugar level is \( \geq 12 \text{ mmol/L} \).

On the day of surgery, omit the morning dose of insulin. Check blood sugar level to ensure that diabetes is under control. The patient might require glucose-insulin-potassium (GIP) infusion depending on the surgery schedule.

**Glucose-insulin-potassium (GIP) infusion:**

\[
\text{One liter of 5\% dextrose} + 20 \text{ units of soluble insulin} + 20 \text{ mmol of potassium chloride, to run for 100 ml/hr.}
\]

**iii. During induction of anaesthesia and surgery**

Close monitoring will be done by the anaesthetist.

**iv. Postoperative**

Insulin therapy is continued till the wound is healing satisfactorily. By this time, the patient can be changed to the usual oral hypoglycaemic drug or insulin therapy.

b. **Patients for emergency surgery**

Start insulin infusion and monitor blood sugar levels according to protocol in the Appendix.

**While principles remain the same as in adults, management of children with diabetes should be undertaken by a specialist paediatrician.**
Management of acute complications of diabetes

Hypoglycaemia

Hypoglycaemia presents as:

- sweating, tremor, tachycardia and pallor from adrenal and sympathetic activity triggered by the low blood glucose and/or
- hunger, mental confusion, coma and seizures.

The factors that precipitate hypoglycaemia include:

- high insulin dose,
- high doses of sulphonylureas,
- presence of renal failure,
- liver disorder,
- septicaemia,
- missed meals,
- hormonal disturbances, and
- vigorous physical activity.

Patients should be treated urgently.

If the patient is conscious and able to swallow, give a sugary food or drink followed by foods that are absorbed longer, e.g. crackers.

If the patient is unable to swallow or unconscious at home, give sugar paste or honey into the mouth and transfer immediately to the nearest health care facility for intravenous glucose therapy. At the health care facility, if the patient unconscious or unable to swallow:

Give dextrose 50% 50 ml intravenously followed by continuous intravenous infusion of 5% dextrose for up to 24 hours.

Hypoglycaemia in the elderly, particularly as a consequence of accumulation of sulphonylurea in the plasma, may be difficult to reverse and may reoccur for several days after stopping the drug.

Diabetic ketoacidosis

General considerations
Diabetic ketoacidosis (DKA) occurs in Type 1 diabetics. The diagnostic features include:

- vomiting,
- abdominal pain,
- acidotic breathing – deep, sighing respiration-like after exercise.
- dehydration,
- ketotic breath – often detectable immediately on approaching the patient.
- mental confusion progressing to coma.

If possible, test urine for moderate to large ketone bodies. Arterial blood gas is desirable if facilities are available.

**DKA might be the first presentation in an unknown type 1 diabetic.**

The common precipitating factors of DKA include:

- history of omission of insulin;
- drugs, e.g. corticosteroids;
- sepsis;
- acute coronary event;
- recent trauma; and
- pregnancy.

**Management**

Management should be undertaken urgently in the nearest health care facility.

**a. Fluids**

Administer intravenous infusion of normal saline as follows:

- One liter for 30 minutes
- One liter for one hour
- One liter for 2 hours
- One liter for 4 hours

Further infusion should be administered according to clinical assessment of the patient. In children, a paediatrician should be consulted and appropriate fluid management should be administered.

Once the blood sugar is \( \leq 12 \) mmol/L, change intravenous fluid to either dextrose saline or dextrose 5%.
b. **Insulin**

*Intravenous bolus dose of 10 units short-acting insulin followed by short-acting insulin intravenously 4 units/hour either by direct intravenous administration or by using an infusion pump if one is available.*

If venous access cannot be established, give:

*Short-acting insulin intramuscularly 8 units /hour.*

Blood sugar should be measured every hour and insulin doses adjusted\(^3\). Insulin doses can be halved when blood glucose reaches ≤12 mmol/l. Thereafter, insulin can be change to multiple-dose (“QID”) insulin regimen subcutaneously followed by twice-daily dosing.

If infusion pumps are not available use the microset intravenous giving set used in paediatrics to achieve the required infusion rate.

c. **Electrolytes**

i. **Potassium**

Insulin takes glucose and potassium into the cells and their serum concentrations fall. A safe and cautious approach is to start supplementary intravenous potassium at a rate of no more than 10-20 mmol/hour once insulin and fluids have been started and when renal function and urinary output have been assessed as satisfactory.

Measure serum potassium along with serum sodium every 4-6 hours.

ii. **Bicarbonate**

Sodium bicarbonate should not be given routinely. It is only given when the blood pH is less than 7.0. In such cases, *infuse 50 mmol of sodium bicarbonate over one hour.*

c. **Treatment of underlying cause**

Treat the underlying cause especially infections.

d. **Other measures**

\(^3\) For adjustment of doses of insulin infusion, refer to the appendix.
An indwelling catheter should be inserted to monitor urine output. Other measures that may be required are: oxygen therapy and insertion of nasogastric tube if paralytic ileus develops.

On recovery, every patient with DKA should be re-educated about avoidance of the complication and the recognition of early warning signs and symptoms.

**Special considerations in children (but always contact a paediatrician)**

Rehydration is critical. The degree of dehydration should be assessed as follows:

- **Mild** (3% or less) - just clinically detectable.
- **Moderate** (around 6%) - easily detected, reduced skin turgor, poor capillary return.
- **Severe** (10%) - poor perfusion, rapid pulse, reduced blood pressure.

Normal saline is the recommended intravenous fluid for rehydration.

Deficits should be replaced gradually (over 24-48 hours) and **not with rapid infusion** as is appropriate for adults. Tables are available to guide the rate of fluid replacement according to body weight and degree of dehydration.

**Hyperosmolar, hyperglycaemic state**

This is a relatively uncommon event usually occurring as a dramatic presenting feature or as a complication of type 2 diabetes.

It presents with a history of thirst, polyuria and progressive impairment of consciousness commonly in a patient who is 60 years or older. It differs from DKA in that patients with hyperosmolar, hyperglycaemic state do not develop ketoacidosis.

Investigations reveal very high blood glucose, usually higher than 30 mmol/L, the serum sodium is often elevated and the calculated serum osmolality >320 mOsm/l.\(^4\)

**Management**

The treatment is similar to that in DKA (see above).

---

\(^4\) Serum osmolality = 2 (Na + K) + urea (mmol/L) + blood sugar (mmol/L).
Intravenous isotonic saline, low dose intravenous insulin (4-6 u/hour by infusion) and careful attention to serum potassium concentrations are the central strategies. Careful monitoring is required as in DKA.

On recovery, the patient may not need long-term insulin therapy. After an initial period of stabilisation with insulin, most patients with type 2 diabetes who present in a hyperosmolar, hyperglycaemic state can be controlled with oral hypoglycaemic drugs combined with diet.

Management of late complications of diabetes

Retinopathy

Diabetic retinopathy is a major cause of blindness. Retinopathic lesions are divided mainly into two categories: background and proliferative retinopathy.

- Visual acuity and fundoscopic examination (if possible) with pupillary dilation should be carried out every year and more often if there is evidence of retinopathy. Specialist ophthalmological opinion and early treatment of lesions (i.e. by laser beam) may be required if it is available.

It is preferable that all diabetics are assessed initially by an ophthalmologist.

Good diabetic control is essential to reduce progression of the retinopathy and/or other complications such as nephropathy and neuropathy.

Neuropathy

Several different types of neuropathy can develop in diabetic patients. The commonly seen ones are peripheral sensory-motor and autonomic neuropathy.

Peripheral sensory-motor neuropathy

Symptoms of peripheral sensory-motor neuropathy include:

- numbness,
- paresthaesia,
- pain, and
- weakness.

If pain is prominent, several treatments have been shown to be effective.

*Amitriptyline* 50-150 mg orally at bedtime

OR
Carbamazepine up to 600 mg orally daily in two divided doses.

Carbamazepine should be introduced gradually starting at 100 mg twice daily and the dose to be increased gradually until the maximum dose that can control the pain can be achieved.

Good glycaemic control is essential for control of symptoms.

**Autonomic neuropathy**

Autonomic neuropathy can present as:

- postural hypotension,
- dysphagia,
- intermittent diarrhoea,
- impotence,
- bladder atony.

Postural hypotension requires specialist assessment but the patient may respond to:

*Fludrocortisone 100-300 μg orally daily*

Fludrocortisone is not available in the Tuvalu Essential Medicines.

**Foot infections**

Diabetic foot infection might involve the skin and soft tissue as well as underlying muscle and bone and should always be regarded as serious. Distal neuropathy with or without vascular damage puts feet at risk from ulceration and infection which may lead to gangrene and the need for amputation.

Treat infection early and aggressively with proper antibiotics. Diabetic infections are often caused by a mixture of organisms (aerobes and anaerobes).

*For mild to moderate infections, give metronidazole 400 mg orally 8-hourly PLUS flucloxacillin 500 mg orally 6-hourly. For severe infections, manage in hospital.*

Control blood sugar to prevent rapid spread of infection.

Advice on proper foot care and wound management. Consider early wound debridement and use of normal saline instead of strong dressing solutions. Seek surgical advice early.

All diabetics should have a foot assessment once a year.
Foot care education should be emphasized to all patients on every visit.

For mild to moderate infections:

Metronidazole 400 mg orally 8-hourly PLUS
Flucloxacillin 500 mg orally 6-hourly

Severe infections

Metronidazole 400 mg orally 8-hourly PLUS
Cloxacillin 2 G iv 6-hourly PLUS Gentamicin 240 mg. iv. once daily

Monitor gentamicin trough concentrations if possible and adjust doses in renal impairment.

Change to oral treatment as soon as possible. Duration depends on response.

Nephropathy

Diabetic nephropathy usually takes 10-15 years to develop after the onset of hyperglycemia and it encompasses all the lesions occurring in the kidneys of patients with diabetes mellitus. Microalbuminuria is the earliest manifestation of diabetic nephropathy and is a marker of progressive deterioration of renal function. Yearly assessment of renal function is important. The literature recommends treatment with angiotension converting enzyme inhibitors (ACEIs) once microalbuminuria is detected. This test is not available in Tuvalu.

USE

Enalapril 2.5-5 mg daily.

In general, treatment of established diabetic nephropathy includes the following:

- control of protein intake,
- use of ACEIs to reduce proteinuria,
- control of blood pressure,
- meticulous control of hyperglycaemia,
- control of hyperlipidaemia, and
- control of other vascular risk factors, i.e. cessation of smoking.

For details of control of blood pressure and hyperlipidaemia, refer to cardiovascular guidelines.
Good blood pressure control as well as good glucose control is essential in all diabetics to reduce progression of complications.

**Diabetes in pregnancy**

Most diabetics can expect to have a successful outcome to a pregnancy. Foetal malformations are common in women who have poor diabetic control in the first trimester. Macrosomia (a big, “chubby” baby) occurs in women with poor control in mid- to late pregnancy.

Pre-eclampsia, hydramnios and peripartum complications are all common in diabetics.

After birth, babies must be monitored for hypoglycaemia.

**Pre-conception clinics**

Ideally, diabetic women should have the opportunity to be assessed and counseled during pre-conception clinics before deciding on pregnancy.

More often, women present in the late first trimester, or even as an emergency when they are already in labour. By then, it will be too late to assess and manage their diabetic state.

**Management of pre-existing diabetes in pregnancy**

The cardinal points to emphasize are:

- adequate control of blood sugar levels,
- proper nutrition, and
- moderate physical activity.

**Control of blood sugar levels**

*Multiple-dose (“QID”) insulin regimen consisting of short-acting insulin before main meals plus intermediate-acting isophane insulin at bedtime.*

If there is a reluctance to undertake this, diabetes may be controlled with:

*Mixed insulin twice daily; dose determined by blood glucose measurement*

The **aims** of treatment are:
• fasting blood sugar level of <5 mmol/L,
• 2-hour post-prandial blood sugar level <7 mmol/L, and
• pre-meal blood sugar level of <6 mmol/L.

**Nutrition**

All pregnant diabetics should review their diet with the assistance of a dietitian. Weight gain in pregnancy should be limited to 10-12 kg if possible.

**Physical activity**

Moderate physical activity should be continued into pregnancy.

A specialist physician working with the obstetrician should supervise the management of a pregnant diabetic. A paediatrician should assess the newborn child.

**Gestational diabetes**

This is defined as glucose intolerance first developing, or first detected, in pregnancy. It occurs in 1 in 20 pregnancies and seems particularly prevalent in Indian populations. Older women (over 30 years of age), the obese and those with a family history of diabetes are more likely to get gestational diabetes than others.

The condition is most likely to appear in the second trimester and will resolve spontaneously after delivery.

**Screening for gestational diabetes**

Several national diabetes associations recommend that screening should be performed in all pregnant women around 26 weeks of gestation.

Testing should be done as early as possible when there is:

• glycosuria at ante-natal clinic (renal threshold for glucose may fall in pregnancy);
• history of stillbirth;
• history of very large babies; and
• positive family history.
A **formal oral glucose tolerance test** in a fasting patient gives the most accurate results. Fasting blood sugar \( > 5.5 \text{ mmol/L} \) and 2-hour post-prandial blood sugar \( \geq 8 \text{ mmol/L} \) are diagnostic of gestational diabetes. As glucose tolerance test (GTT) is time-consuming, it is used only to confirm diagnosis.

For screening of antenatal mothers, a **non-fasting oral glucose challenge** is useful. Give an oral glucose load of 50-75 g to the non-fasting patient and measure blood sugar at one hour. If the blood sugar is \( \geq 8 \text{ mmol/L} \), the result is suggestive of gestational diabetes but further formal testing with a fasting oral glucose challenge should be done for confirmation. However, blood sugar of \( \geq 10\text{mmol/L} \) at one hour is diagnostic of gestational diabetes.

**Management of gestational diabetes**

Gestational diabetes can nearly always be managed by diet alone and a dietician’s help should be sought. The same target of blood sugar levels in established non-diabetics are appropriate for gestational diabetes (see above).

Approximately, 10% of women with gestational diabetes may need treatment with insulin to achieve target blood sugar level. This treatment is important for foetal development and to avoid the complications of late pregnancy.

Many women are reluctant to accept the need for insulin - even short-term (insulin can almost invariably be discontinued after delivery as the metabolic disorder resolves very quickly). The closest control can be achieved with:

*Short-acting insulin, 5 units subcutaneously three times daily ahead of main meals with close monitoring of blood glucose. Intermediate-acting insulin may not be required overnight.*

If there is a reluctance to undertake this regimen, gestational diabetes may be controlled with:

*Mixed insulin twice daily; dose determined by blood glucose measurement.*

**Management of diabetes during labour**

Protocols exist in all maternity units.

Normally the patient will be known to the obstetric team and will have had antenatal care provided by them.

The aims of management are to:
• maintain normoglycaemia
• prevent complications both intra- and post–partum
• deliver a live infant.

**Measure blood glucose hourly during labour**

Administer the glucose-insulin-potassium intravenous regimen for:

• any patient who has already had a blood glucose exceeding 10 mmol/L in early labour;
• who is normally on more than 30 units of insulin daily; and
• patients exceeding a blood glucose of 10 mmol/L at a later stage in labour.

*The infusion contains 20 units of short-acting insulin and 20 mmol potassium chloride in each litre of 5% dextrose (glucose) and should be run at 100 ml/hour.*

Blood glucose should be measured hourly during labour. This should be supplemented with:

*Stat doses of short-acting insulin of 5 units, subcutaneously if blood glucose exceeds 12 mmol/L or 10 units if blood glucose exceeds 15 mmol/L.*

The monitoring of blood glucose is less critical after delivery. Blood glucose may be monitored four-hourly for 24 hours after delivery and less frequently thereafter. Continue glucose/potassium /insulin drip for at least 12 hours after delivery.

As normal feeding resumes insulin can be adjusted to 8-hourly blood glucose measurements.

Insulin requirements usually fall rapidly in the post-partum period.

Insulin will not normally be required post-partum for patients with gestational diabetes.

**After delivery**

Women with gestational diabetes **should be followed up** with an oral glucose tolerance test about 6 week’s post-partum. They are at risk of developing diabetes in later years and it is better to introduce some form of regular surveillance than encounter them with established diabetes (with or without irreversible complications) in later life.
Appendix

INSULIN INFUSION

Preparation

1. Infusion by electronic pump

99 ml of normal saline in a chamber + 100 units (1ml) of short-acting (regular, soluble) insulin
(concentration: 1 unit of insulin per ml)

*If infusion pump is not available, use insulin preparation as discussed under (2) below.*

2. Infusion by intravenous drip

1 liter of normal saline + 100 units (1ml) of short-acting (regular, soluble) insulin
(concentration: 1 unit of insulin per 10 ml)

*This preparation can be used either with ordinary intravenous set that is calibrated to provide macrodrops or the paediatric intravenous set providing microdrops.*

<table>
<thead>
<tr>
<th>Capillary blood glucose (CBG) (mmol/L)</th>
<th>Infusion pump (ml/hr)</th>
<th>Intravenous drip (Preparation 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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<td>8</td>
<td>80</td>
</tr>
<tr>
<td>18.1 – 22.0</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

1 ml = 15 macrodrops or 60 microdrops

Infusion Rate

Initially, give a bolus dose of 10 units of short-acting insulin IV and then infuse insulin continuously using either of the regimens shown below:
Stat doses of short-acting insulin of 5 units intravenously if blood glucose exceeds 12 mmol/L or 10 units if blood glucose exceeds 15 mmol/L.

Serum potassium must be monitored during the infusion. If fluid restriction is essential, preparation (1) is recommended.
CARDIOVASCULAR GUIDELINES

Medicines used in cardiovascular disease

Beta-blockers

- competitively block the adrenergic beta-receptors found at sympathetic nerve endings secreting adrenaline and noradrenaline.
- adverse effects - precipitation of asthma, mental depression, lethargy, and intermittent claudication.
- recent evidence supports the use of beta-blockade in small doses in stable chronic heart failure.
- abrupt withdrawal may result in exacerbation of angina, cardiac arrhythmias and occasionally, in a patient with pre-existing angina, myocardial infarction. It is best to reduce doses slowly over a 7-10 day period if possible.

Propranolol

- blocks both beta-1 and beta-2 receptors.
- reduces cardiac rate, contractility and excitability.
- reduces the caliber of the bronchial tree.
- increases the resistance of peripheral limb arterioles and reduces the mobilisation of glucose from glycogen in response to hypoglycaemia.
- an older medicine which is not accorded first choice status in the following guideline
- main uses – thyrotoxicosis, essential tremor, prophylaxis in migraine, occasional use in anxiety states.

Atenolol, metoprolol

- more selective for beta-1 receptors than propranolol. Despite these differences in selectivity, beta-blockers should not be used in anyone with a history of, or currently with, asthma.
- have the same action on the heart and blood pressure as other beta-blockers
- less likely to produce adverse effects on the peripheral vasculature, the bronchi and on the recovery from hypoglycaemia.
- largely excreted unchanged by the kidney
- doses may need to be reduced in patients with renal impairment.
- atenolol may be given once daily. Metoprolol requires twice daily dosing
**Labetalol**

- has both beta- and alpha-blocking properties
- produces postural hypotension and failure of ejaculation as alpha-receptor-mediated effects.
- use is principally for urgent blood pressure reduction by the parenteral route.

**Calcium channel blocking drugs (calcium blockers)**

- block calcium entry into cells of the cardiac conducting system, myocardial cells and the cells of vascular smooth muscle
- verapamil, nifedipine and diltiazem are in the Tuvalu (EML).

**Verapamil**

- has greater selectivity for cardiac than for vascular calcium channels.
- main role is management of cardiac arrhythmias and angina.
- may cause bradycardia
- negative inotropic action can be harmful in heart failure.
- in overdosage, verapamil produces bradycardia, reduction in cardiac output and occasionally electromechanical dissociation. **Massive** quantities of calcium salts may be required to reverse these effects.
- in therapeutic doses, verapamil causes constipation that can be corrected with oral or intravenous calcium.
- given together with beta-blocking drugs, may produce bradycardia and rarely heart block.

**Nifedipine, felodipine**

- felodipine not available on Tuvalu EML
- greater action on vascular smooth muscle than on the heart
- main use management of hypertension and angina in which the cardiac afterload needs to be reduced
- dilator activity on peripheral arteries and arterioles produces reflex tachycardia and increases the cardiac output. This can lead to worsening of angina or even myocardial infarction in patients with critical stenosis of the coronary vessels. For this reason the **short-acting preparation of nifedipine is less safe than slow-release formulations.**
- despite indirect action to increase cardiac output, nifedipine and felodipine are negatively inotropic. In overdosage, the **direct** cardiac effects predominate to produce bradycardia and reduction in cardiac output. This is treated in the same way as for verapamil and diltiazem.

**Diltiazem**

- less negatively inotropic than verapamil
- has peripheral vasodilator effect
- available as both short-acting and slow-release preparation
Angiotensin converting enzyme inhibitors (ACEI)

- block conversion of angiotensin I to its active derivative angiotensin II - a vasoconstrictor which also stimulates secretion of aldosterone by the adrenal cortex.  
- ACEI reduce constrictor tone in the blood vessels and reduce secretion of aldosterone.  
- many ACEI on the market but little evidence for the clinical superiority of one over the rest.  
- enalapril can be taken once daily and its effects last over 24 hours in most patients with hypertension.  
- major adverse effects - angioedema, cough (6-10%), worsening of renal function in patients with bilateral renal artery stenosis.  
- promote potassium retention: electrolytes and renal function should be monitored when introducing them.  
- the elderly, those dehydrated from intensive diuretic treatment or taking other hypotensive medication are at particular risk of “first dose hypotension”. ACEI should be introduced at a very low dose and increased gradually in these patients.  
- potentially dangerous renal interaction with non-steroidal anti-inflammatory medicines (NSAIM) in patients with some degree of renal impairment- may precipitate renal failure  

ACEI should not be used in pregnancy, obstructive valvular heart diseases and bilateral renal artery stenosis.

Angiotensin receptor blockers

- this class of drug not available on Tuvalu EML  
- block the action of angiotensin at vascular receptors  
- provide no additional benefit in blood pressure control but do not interfere with bradykinin metabolism  
- possibly through this lack of action on bradykinin, do not produce cough  
- are useful in the approx. 6% of patients on ACEI who develop persistent cough  
- candesartan, losartan are some of the medicine of this group

Directly-acting vasodilators

Hydralazine

- directly-acting vasodilator used to treat hypertension and heart failure.  
- given intravenously in urgent cases – especially pregnancy.  
- produces reflex tachycardia, flushing and headache which can be reduced beta-blocking drugs used in combination.  
- principal place is in the urgent reduction of blood pressure- especially in pregnancy.

Nitrates
The Tuvalu EML contains glyceryl trinitrate (sublingual tablet 600 micrograms) and isosorbide dinitrate (an orally available formulation that has a comparatively low and variable bioavailability) - both act as precursors for nitric oxide, the endothelium’s intrinsic vasodilator that is not produced as effectively in diseased arteries.

-major drawback to nitrate treatment is the emergence of tolerance.

-nitrate-free periods help to reduce the development of tolerance.

-glyceryl trinitrate deteriorates in storage particularly in glass bottles and is likely to have very little effect after three months’ storage in this way.

-nitrates must not be used concomitantly with sildenafil (“Viagra”) as it potentiates their action to produce significant hypotension, which, rarely, has been fatal in patients with critically narrowed cerebral or coronary arteries.

**Centrally-acting hypotensives**

-alpha-methyldopa is the only medicine in this category available in Tuvalu

-effective orally and reduces peripheral resistance and blunts cardiac sympathetic response.

-major place is the management of pregnancy-related hypertension where its efficacy and safety have not been matched by other medicines-not recommended for the non-pregnant.

-adverse effects -mental depression, impotence, and rarely, autoimmune haemolytic anaemia and hepatotoxicity.

**Diuretics**

*Frusemide*

-a potent “loop”diuretic of particular value in the treatment of heart failure.

-duration of action 3-4 hours and may be given orally or, for a quick response, intravenously.

*Hydrochlorothiazide and bendrofluazide*

-Bendrofluazide is not available in Tuvalu

-less potent diuretics used in hypertension and as “add-on” treatment in heart failure.

-adverse effects of frusemide and thiazides -hypokalaemia, elevation of serum uric acid (sometimes presenting as gout), impairment of glucose tolerance, and rarely, ototoxicity.

-thiazides may increase serum calcium.

-parenteral diuretics may occasionally be needed in heart failure or high dose oral preparations such as frusemide 500 mg daily, or twice a day, in renal failure.

*Spironolactone*

-competitive inhibitor of aldosterone at the distal renal tubule.
-promotes sodium loss and potassium retention.
-used with thiazide or loop diuretics, enhances sodium loss and helps prevent hypokalaemia.
-in low doses (25 mg daily) is of value when added to conventional treatment in congestive heart failure.
-causes hyperkalaemia in renal impairment.
-anti-androgen activity can cause painful gynaecomastia in men and irregular or postmenopausal vaginal bleeding in women.

Anticoagulants, antiplatelet drugs and thrombolytics

Heparin (unfractionated, UFH) and enoxaparin (low molecular weight-LMW-heparin)

-heparin acts by binding to antithrombin. This inactivates thrombin and activated factor X (Xa), diminishes their procoagulant effect and tips the balance of the clotting cascade towards anticoagulation.
-action of UFH is dose-dependent and is measured by the activated partial thromboplastin time (APTT). The unmodified APTT is less than 50 seconds and the therapeutic range lies between 60 and 85 seconds.
-effects are readily reversed in emergency by the intravenous use of protamine sulphate.
-may be administered by the intravenous or subcutaneous routes.

Low molecular weight –LMW-heparins selectively inhibit Factor Xa activity. Their effect is only partially reversed by protamine.

-a major but rare adverse effect is heparin-induced thrombocytopaenia and thrombosis syndrome (HITTS). This is an autoimmune process that results in low platelet counts, paradoxical thrombosis from platelet deposition and a tendency to bleed.

Warfarin

-an oral anticoagulant that antagonises Vitamin K-mediated final steps in the synthesis of clotting factors II, VII, IX and X in the liver.
-inhibits the synthesis of proteins C and S that normally maintain an anticoagulant effect. As protein C has a short half-life in the plasma and falls early after starting warfarin, this may lead to a hypercoagulable state in the first 24-48 hours.
-therefore recommended to maintain heparin treatment for the first 48 hours after introducing warfarin until the inhibition of the procoagulant factors outweighs the effects on protein C.

-therapy is monitored by the international normalised ratio (INR).
-bleeding is the major risk from overdosage.
-major risk for ineffective dose is the failure to treat the thrombotic disease adequately.
Medicines that may enhance the anticoagulant effect of warfarin include:

- amiodarone
- chloramphenicol
- ciprofloxacin
- cotrimoxazole
- doxycycline
- erythromycin
- ketoconazole
- metronidazole
- miconazole
- simvastatin
- tetracycline

Aspirin, and non-steroidal anti-inflammatories may enhance the risk of bleeding when on warfarin.

Medicines that may reduce the effect of warfarin include:

- barbiturates
- carbamazepine
- nutritional supplements providing vitamin K
- phenytoin
- rifampicin

- vitamin K antagonises the action of the anticoagulant directly.
- bleeding from warfarin can be treated with Vitamin K (takes from 2-3 hours to reverse) or more rapidly with fresh frozen plasma or whole blood transfusion.

**Aspirin**
- technically not an anticoagulant but given for antiplatelet action.
- effect of a single 300 mg (one standard tablet) dose can still be detected in the patient’s blood up to 10-14 days later.
- prophylactic aspirin should be discontinued for about two weeks prior to surgery (substituting heparin if necessary).

**Streptokinase**
- acts by binding to plasminogen and this activates uncomplexed plasminogen to plasmin, the endogenous fibrinolytic substance. Fibrin is lysed and generates fibrin degradation products that appear in blood and urine.
-antibodies to streptokinase appear after its use but may also be caused by exposure to streptococcal antigens.

-can cause allergic, hypotensive and even anaphylactic reactions.

**Lipid-lowering medicines**

- can produce substantial survival benefit in patients after a myocardial infarction or diabetics with high cardiovascular risk--regardless of the lipid level.

Simvastatin is available in the Tuvalu EML taken once daily (restricted to NDTC recommendations)
-onset of action is over 4-6 weeks
-blood lipids should not be re-measured until six weeks have elapsed.

-main side effects are muscle pain accompanied by elevation of serum creatine kinase rarely progressing to rhabdomyolysis. These changes are reversible on discontinuing the drug.

**Antiarrhythmics**

**Atropine**
-an anticholinergic compound used to reverse symptomatic bradycardia.
-antagonises the action of acetylcholine at many different sites and it may produce dry mouth and impairment of accommodation leading to visual blurring.

**Digoxin**
-slows heart rate by depressing conduction through the bundle of His by slowing atrioventricular conduction and by enhancing vagal activity.
-strengthens cardiac contraction and is also a mild diuretic.
-has a slow distribution time after both oral and intravenous administration and takes 4-6 hours to express its action. It is therefore of little extra benefit to give the drug parenterally.
-hypokalaemia potentiates its effect and may predispose to toxicity.
-adverse effects include, sequentially, bradycardia, ventricular ectopic beats, bigeminy, ventricular tachycardia and, if no action is taken, ventricular fibrillation and death. The systemic features of toxicity are anorexia, nausea, vomiting and xanthopsia (yellow vision).
-has a half-life of 24-36 hours in patients with normal renal function.
-excreted almost entirely through the kidney and toxicity is more likely in renal failure and in the elderly.

**Lignocaine**
-a Class I antiarrhythmic that blocks inward sodium movement in excitable tissues and can also be used as a local anaesthetic.
- has a short half-life of around two hours and is metabolised in the liver to produce two pharmacologically active metabolites that may cause central nervous system toxicity if excessive doses of lignocaine are given.
- toxicity includes visual disturbances, paraesthesiae and convulsions.
- cleared through the liver and accumulates if hepatic blood flow is reduced as in congestive cardiac failure.

**Amiodarone**
- second-line antiarrhythmic medicine used particularly for ventricular arrhythmias not responding to other treatments
- very long half-life
- high rate of adverse effects including hypo and hyperthyroidism, pulmonary fibrosis and neuropathy
- should be reserved as a secondary agent in serious disease.
- interacts with warfarin to increase its plasma concentration and effect.

**Cardiovascular medicine interactions**

Many interactions are possible in the management of cardiovascular diseases. Some of the more important ones are described below.

- The action of digoxin is potentiated by diuretics through potassium depletion.
- The negative inotropic action of verapamil is potentiated by beta-blocking drugs.
- The negative chronotropic effect of verapamil is potentiated by beta-blocking drugs.
- There is reduced metabolism of lignocaine with concomitant use of beta-blockers due to reduction in liver blood flow.
- The effect of warfarin is decreased with concomitant use of barbiturates, carbamazepine, phenytoin and rifampicin. These all increase metabolism of warfarin.
- The effect of warfarin is increased with the concomitant use of amiodarone, chloramphenicol, ciprofloxacin, cotrimoxazole, doxycycline, erythromycin, ketoconazole, metronidazole, simvastatin and tetracycline. These inhibit the metabolism of warfarin.
- Plasma concentrations of digoxin are increased with concomitant use of verapamil.
- The combination of ACEI and NSAIMs may precipitate renal failure in patients with even mild compromise of renal circulation.

**Hypertension**

Hypertension is very common in the Tuvalu and is the single biggest risk factor for stroke and may also lead to left ventricular and congestive heart failure, chronic renal failure and retinopathy. The importance of hypertension is increased in the presence of other cardiovascular risk factors such as smoking, diabetes mellitus, raised total or low-density
lipoprotein (LDL) cholesterol or a family history of premature cardiovascular disease. Therefore, treatment should be more vigorous in the presence of multiple risk factors.

Adequate treatment of hypertension substantially reduces the risk of stroke as well as of heart failure, renal failure and, to a lesser extent, myocardial infarction.

**Definition**

The World Health Organization (WHO) defines hypertension as blood pressure (BP) greater than 140/90 mm Hg. For many patients, especially diabetics with high blood pressure there is evidence of extra benefit if 130/85 can be achieved. **Mild hypertension is defined as BP of 141-159/91-99 mm Hg; moderate hypertension, BP of 160-179/100-109 mm Hg; and severe as BP of ≥180/110 mm Hg.**

Not less than two readings should be made at least 30 minutes apart, and preferably on separate occasions, before deciding if a patient has sustained hypertension or not. The appropriate cuff size should be used depending on the arm circumference of the patient. There is usually no urgency to reduce mild or moderate hypertension, unless indicated. Severe hypertension with or without symptoms and any evidence of target organ damage should be treated promptly.

**Types of hypertension**

More than 90-95 percent of patients with hypertension are of the primary or essential type, often with a positive family history. Usually, these patients do not need comprehensive investigations but, whenever possible, urinalysis, blood urea, electrolytes and creatinine are desirable.

For secondary hypertension, careful history and examination will provide clues to underlying causes that are worth investigating further. Secondary hypertension is suspected in the following:

- patients less than 40 years old with significant hypertension and no family history of hypertension
- patients with severe hypertension
- patients whose blood pressure is difficult to control despite good drug compliance
- patients with signs and symptoms suggestive of secondary cause
- patients with accelerated hypertension (with retinal haemorrhages/exudates with or without papilloedema)

Chronic renal disease is the commonest underlying cause for secondary hypertension. The other causes include: renal artery stenosis, phaeochromocytoma, Cushing’s disease, primary aldosteronism (Conn’s syndrome), coarctation of the aorta, and pregnancy-induced hypertension. Occasionally, hypertension is caused by medications such as
corticosteroids, nonsteroidal anti-inflammatory drugs (NSAIDs), or oral contraceptives or excessive ingestion of liquorice.

**Management of hypertension**

The decision to treat hypertension should be based on patient’s overall cardiovascular risk rather than the level of blood pressure alone.

**Non-pharmacological**

This is the first line of management for mild to moderate hypertension unless the patient has the following:

- multiple cardiovascular risk factors
- diabetes
- renal impairment
- past history of cardiovascular event
- target organ damage

Non-pharmacological measures that have been shown to be effective in clinical trials include:

- weight reduction in obese subjects
- reduction in alcohol intake
- smoking cessation
- regular physical activity
- moderate reduction in dietary sodium intake

**Pharmacological**

**Table 3: Step wise treatment of hypertension:**
<table>
<thead>
<tr>
<th>Steps and their characteristics</th>
<th>Treatment</th>
<th>Target</th>
</tr>
</thead>
</table>
| **Step 1:**
Mild to moderate hypertension  
with no risk factors | Lifestyle modification (exercise,  
diet and loose weight) | Blood pressure at around 120mmHg and definitely below 140/90mmHg |
| **Step 2:**
Failure of step 1 after 3-6 months implementation plus one risk factor, or deterioration of hypertension | Lifestyle modification and *Start an antihypertensive such as either hydrochlorothiazide 25-50mg ‘o’ daily OR enalapril 12.5mg bd OR atenolol 25mg ‘o’ daily* | Blood pressure control within 1 to 3 months. Aim at 120/80 and definitely below 140/90mmHg |
| **Step 3:**
Failure of step two after 1-3 months | Lifestyle modification.  
*If a thiazide was initiated, increase the dose or ADD an ACEInhibitor or β-blocker OR a calcium channel blocker. Beware of diabetics when one should not use a β-blocker and a thiazide together. Titrate doses to effect of blood pressure* | Blood pressure control within 1-3 months to be around 120/80 and definitely below 140/90mmHg |
| **Step 4:**
Failure of step 3 | Refer to specifications below |  |

If non-pharmacological measures do not reduce blood pressure to normal (<140/90 mm Hg) after 6-8 weeks in mild to moderate hypertension, pharmacological treatment should be added.

Recent trials have shown that thiazides, beta-blockers, ACEI and calcium channel blockers can all be effective when used as first line drugs. Thiazides are as effective as other classes but are more cost-effective.

Ideally, target levels of blood pressure should be achieved using one medicine and once daily dosing to enhance patient compliance. This is often not possible in practice and combination treatment is commonly required.

If there are no specific contraindications (e.g. asthma for beta-blockers; gout for thiazides; diabetes is a relative, but not absolute, contraindication for thiazides), single agent treatment may be started with:

*Bendrofluazide 2.5 mg orally daily*

OR
- **Atenolol 25-100 mg orally as a single dose**
  
  OR

- **Metoprolol 25-50 mg orally twice daily**
  
  Doses of bendrofluazide greater than 5 mg produce little extra hypotensive effect but increase the risk of high plasma uric acid or low serum potassium level.

  If a combination of medicines is required to achieve blood pressure control, give (each dot-point is a separate regimen)-

- **Atenolol 25-100 mg orally daily**
  
  OR

  **Metoprolol 25-50 mg orally twice daily**

  WITH

  **Bendrofluazide 2.5-5 mg orally daily**

- **Atenolol 25-100 mg orally as a single dose**
  
  OR

  **Metoprolol 25-50 mg twice daily**

  WITH

  **Nifedipine 20-40 mg orally twice daily**

- **Nifedipine 20-40 mg orally twice daily**
  
  WITH

  **Enalapril 2.5-40 mg orally once daily**

- **Enalapril 2.5-40 mg orally once daily**
  
  WITH

  **bendrofluazide 2.5-5 mg orally daily**
Hydralazine should rarely be used on its own. It produces headache, reflex tachycardia (both prevented by beta-blockade) and fluid retention (prevented or treated by a thiazide diuretic).

The angiotensin converting enzyme inhibitors (ACEI) can be used as monotherapy or in combination. They should be considered as the medicines of first choice in the management of hypertension in the following conditions:

- complicated by heart failure
- requiring treatment after a myocardial infarction
- associated with left ventricular systolic dysfunction
- occurring in diabetic patients.

If an ACEI is indicated give :-

- *Enalapril 2.5-40 mg orally daily and monitor blood pressure over 4 hours. Some patients are very sensitive to ACEIs*

  If the dose of enalapril is above 20 mg daily, it can be given in divided doses but the daily total should not exceed 40 mg.

Methyldopa should not be used as first-line treatment in non-pregnant hypertensives as it may produce mental depression, impotence in males and rarely autoimmune haemolytic anaemia. It is occasionally useful where response to other agents is inadequate or other antihypertensive drugs are not available.

**Hypertensive emergency (urgent blood pressure reduction)**

This is seldom needed but may be required in hypertensive encephalopathy, acute hypertensive heart failure, acute myocardial infarction, dissecting aneurysm and phaeochromocytoma. Patients with these conditions should be admitted to hospital and monitored. The aim is to reduce blood pressure within 60-90 minutes.

While the blood pressure may respond to oral agents (as above), initial parenteral treatment may be needed:

- *Hydralazine 5 mg bolus intravenously (IV) over 5-10 minutes and repeated every 20 minutes up to a maximum of 20 mg followed by intravenous infusion of hydralazine (see Appendix).*

  OR

- *Labetalol (100 mg per 20 ml); initial dose of 20-40 mg given intravenously over 1-2 minutes and repeated at intervals of 5-10 minutes until 200 mg have been given.*
Alternatively, labetalol may be given as a continuous intravenous infusion at a rate of 2 mg per minute (see Appendix).

After initial stabilisation, the patient should be changed to oral treatment for maintenance.

The practice of opening a nifedipine 10 mg capsule and giving it sublingually is **not supported** as emergency treatment. It delivers an uncertain dose and most of the effect occurs as a result of absorption of the swallowed drug. **On occasions, in older patients, unexpectedly rapid falls in blood pressure have resulted in stroke or myocardial infarction.**

**Hypertension in children**

**Definition**

Hypertension in children is defined statistically as systolic/diastolic blood pressure levels greater than 95th percentile for age, gender and height. Below are normal blood pressure readings at various ages.

**Table 4. Normal blood pressure in children**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Systolic blood pressure (95th percentile)</th>
<th>Diastolic blood pressure (95th percentile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonate</td>
<td>95</td>
<td>70</td>
</tr>
<tr>
<td>0-5</td>
<td>115</td>
<td>75</td>
</tr>
<tr>
<td>6-10</td>
<td>120</td>
<td>80</td>
</tr>
<tr>
<td>11-15</td>
<td>135</td>
<td>85</td>
</tr>
</tbody>
</table>

**Etiology**

Hypertension in the paediatric age group is uncommon. Renal parenchymal disease, renovascular disease and coarctation of the aorta account for 90 percent of all hypertension in children. Essential hypertension is **rare** before 10 years of age.

**2.13.2 Non-pharmacological management**

Non-pharmacological interventions are used initially for management of essential hypertension in children. These include:
weight reduction
• low salt diet
• physical activity

**Pharmacological management**

a. **Asymptomatic hypertension**

Refer for investigation for underlying causes of hypertension.

b. **Symptomatic hypertension**

Symptomatic hypertension requires immediate treatment.

In the Pacific region, post-streptococcal glomerulonephritis is one of the most common cause of hypertension requiring treatment in children. It appears to be rare in the Tuvalu.

Give:
- *Frusemide 1-2 mg per kg intravenously 8-12 hourly*

If blood pressure is not controlled, ADD

- *Nifedipine 0.25-0.5 mg per kg orally (up to a maximum of 10 mg) every 4-8 hours*

In severe cases, ADD

- *Enalapril 0.1 mg per kg orally daily increasing up to 0.5 mg per kg daily over two weeks*

In cases where urgent reduction of blood pressure is necessary:

- If the patient is conscious and not vomiting:
  
  *Nifedipine 5 mg (for patients <2 years) and 10 mg (for patients >2 years) crushed and swallowed with water or given by orogastric tube. Repeat dose every 20 minutes to achieve BP control.*

- If level of consciousness is impaired or patient is vomiting:
  
  *Hydralazine 0.1-0.2 mg per kg intravenously or intramuscularly (IM) stat then 4-6 micrograms per kg per minute by intravenous infusion*
OR

Labetalol 0.2 mg per kg intravenous push over 2 minutes. If no response in 5-10 minutes, increase to 0.4 mg per kg up to a maximum of 60 mg.”

Isolated systolic hypertension in the elderly

Systolic blood pressure rises (systolic BP of >160 mm Hg and diastolic BP of <90 mm Hg) with age in most, but not in all patients. Recent trials show that reducing isolated systolic hypertension at all ages reduces risk of stroke and heart failure.

- Hydrochlorothiazide 12.5-25 mg orally daily OR bendrofluazide 2.5 mg orally daily

And, if necessary ADD

- Atenolol 25-100 mg orally daily OR metoprolol 25-50 mg orally twice daily

AND/OR

- Nifedipine Retard 20-40 mg orally twice daily

Always start with low doses and increase them slowly in the elderly patient. Target systolic pressure is 160 mm Hg or below which can be achieved gradually over several weeks.

Blood pressure monitoring

Once patients have been stabilised on regular treatment they should normally be reviewed at 2-3 monthly intervals. Serum creatinine and electrolytes need to be measured within the first 6-8 weeks of stable treatment and thereafter annually.

Resistant hypertension

Consider:

- non-compliance with treatment (almost certainly the commonest cause)
- failure to detect a primary cause especially renal artery stenosis or primary hyperaldosteronism
- ingestion of substances interacting with the antihypertensive treatment, e.g. NSAIDs, steroids, liquorice
- ingestion of a large sodium load or consumption of a large amount of alcohol
Hypertension in pregnancy

Hypertension less than 20 weeks of pregnancy is due to either:

- chronic hypertension or
- chronic hypertension with superimposed pre-eclampsia

After 20 weeks of pregnancy, hypertension can be due to:

- pregnancy-induced hypertension (PIH) – hypertension without proteinuria
- mild pre-eclampsia
- severe pre-eclampsia
- eclampsia

Mild pre-eclampsia

Mild pre-eclampsia is defined as hypertension that occurs after 20 weeks of pregnancy and characterized by the following:

- two readings of diastolic blood pressure of 90-110 mm Hg taken at least four hours apart
  PLUS
- proteinuria 2+ and
- no signs or symptoms of severe disease (see below)

It is recommended that patient be admitted if:

- BP ≥ 150/100 mm Hg on two occasions
- there are symptoms of severe disease (see below) and
- there is concern about foetal well being
- follow-up and accessibility of obstetric care is a concern

Mild pre-eclampsia does not usually require treatment. However, if the BP is >160/100 mm Hg,

- Methyldopa 250-500 mg orally two-three times a day
  AND, if necessary, ADD
- Hydralazine 25 mg three orally times daily

It is recommended that BP should be maintained at 130-140/80-90 mm Hg.
Severe pre-eclampsia (see also the Obstetric and Gynaecology Guidelines)

Severe pre-eclampsia is defined as hypertension that occurs after 20 weeks of pregnancy and characterized by the following:

- diastolic BP >110 mm Hg
- proteinuria 3+
- epigastric tenderness, headache, visual changes, hyperreflexia, pulmonary oedema, oliguria and/or convulsions

Severe pre-eclampsia needs urgent referral and transfer to the hospital.

In the hospital, the management of severe eclampsia includes the following:

- If the diastolic BP >110 mm Hg
  - Labetalol (100 mg per 20 ml); initial dose of 20-40 mg given intravenously over 1-2 minutes and repeated at intervals of 5-10 minutes until 200 mg have been given. Alternatively, labetalol may be given as a continuous intravenous infusion at a rate of 2 mg per minute (see Appendix). Note, Labetolol not available in Tuvalu EML.

  After initial stabilisation, the patient should be changed to oral treatment for maintenance.

  OR

  Hydralazine 5 intravenously as a bolus dose

  - Start intravenous fluids, e.g. 500 ml plasma expander over one hour.
  - Maintain strict fluid balance chart.
  - Monitor BP, pulse and respiration regularly.
  - Insert indwelling catheter and maintain urine output at >30 ml/hr.

For maintenance of blood pressure:

- Nifedipine 10-20 mg orally as required to a maximum of 60 mg daily to keep diastolic BP <110 mm Hg

  OR

- Hydralazine by slow intravenous infusion, 50 mg in 100 ml of dextrose saline in a chamber titrated in order to keep diastolic BP <110 mm Hg
It is not necessary to reduce BP to normal levels, rather it is more important to maintain BP at “safe” level of diastolic BP of <110 mm Hg. The definitive treatment for pre-eclamptic toxaemia (PET) is delivery of the baby. This should be undertaken as soon as it is practicable, preferably in a referral hospital.

Prevention of recurrent seizures in eclampsia / prevention of seizures in pre-eclampsia.

If convulsion occurs or is imminent, administer magnesium sulphate as described below.

- If infusion pump is available:

  *Magnesium sulphate 4 grams as loading dose (diluted in 100 ml of dextrose 5% to be infused slowly over 20 minute)s. This is to be followed by maintenance dose of magnesium sulfate (12.5 grams in 100 ml of dextrose 5%) to be infused at 1 gram per hour (see Appendix).*

  Monitor the patient by checking deep tendon reflexes and respiratory rate. Both are depressed if the magnesium serum levels become too high. If respiration rate falls to 12/min or below *immediately* reduce the rate of infusion if the intravenous route is being used. If an antidote is needed use calcium gluconate by IV infusion

If infusion pump is not available:

give: *magnesium sulphate 4 Gm. IV over 5-15 minutes followed by*

**EITHER IV infusion 1 Gm/hour for at least 24 hours after the last seizure**

**OR**

*magnesium sulphate deep IM injection 5 Gm into each buttock, then 5 Gm. every 4 hours into alternate buttocks for at least 24 hours after the last seizure*

Use no greater than 20% concentration of magnesium sulphate for IV injection

Use 50% magnesium sulphate for IM injection. Mix each 5 Gm. magnesium sulphate solution with 1 mL of 2% lignocaine for IM injections.

Monitor patient as above

After delivery of the baby (24-48 hours) when the patient’s condition is stable, blood pressure can be maintained with either:

- *Methyldopa 250-500 mg orally two-three times daily*
OR

- **Nifedipine 20-40 mg orally twice daily**

OR

- **Hydralazine 25-50 mg orally three times daily.**

### Ischaemic heart disease

Major risk factors for coronary atherosclerosis are: positive family history (premature mortality due to coronary artery disease in first degree relatives), smoking, sedentary lifestyle, obesity, diabetes, hypertension and hyperlipidaemia. The high prevalence of diabetes in the Tuvalu is likely to lead to further increase in coronary artery disease in the future.

Others aggravating factors include anaemia, arrhythmias, thyrotoxicosis and valvular heart disease.

Treating the presenting syndrome and ignoring the associated risk factors is a poor and inadequate approach to the patient with coronary artery disease.

**Prevention of cardiovascular disease**

Major non-modifiable risk factors are age, gender and family history. These with the modifiable risk factors (i.e. smoking, diabetes mellitus, dyslipidaemia and hypertension) account for most cases of cardiovascular disease.

**Risk factors should be assessed in any appraisal of a patient with coronary artery (or any other arterial) disease.**

**Primary prevention**

Strategies that are beneficial include:

- smoking cessation
- treatment of hyperlipidaemia
- treatment of hypertension
- good control of diabetes mellitus

A balanced and appropriate diet exerts a protective effect. Patients should be helped to achieve ideal body weight (body mass index between 20 and 25 kg/m²) and should reduce dietary saturated fat and added salt. There is evidence that at least two serves of fish a week provide benefit.
Physical activity may not be an independent protective factor but may have an impact on obesity, cardiorespiratory fitness and elevated blood pressure.

The major risks associated with lipids are elevated LDL cholesterol and reduced HDL cholesterol. There can be little doubt about the need to treat elevated LDL cholesterol in patients with familial hypercholesterolaemia and a poor family prognosis. However, debate currently centers on the appropriate cut off point for starting lipid lowering treatment in the population at large. Guidelines and studies on which to base them are lacking for most developing countries.

**Secondary prevention**

It is not too late to improve the natural history of cardiovascular disease even after it is clinically apparent as angina, claudication, transient ischaemic attacks or occlusive events.

Modification of modifiable risk factors together with the near routine use of aspirin, beta-blockers, statins and, in most cases ACEIs, is supported by good quality clinical trials showing improved survival after myocardial infarct.

**Principles of management**

The principles of management of ischaemic heart disease are:

- patient education
- modification of risk factors
- identification and management of precipitating factors
- drug therapy
- consideration for coronary revascularization

**Management of coronary pain syndromes**

Pain attributable to coronary artery obstruction occurs in each of the three coronary pain syndromes—stable angina, unstable angina and myocardial infarction. However, there are patients who are asymptomatic but have evidence of myocardial ischaemia.

**Stable angina**

Angina pectoris is pain, usually felt in the central chest, which may radiate to the neck, both arms and occasionally, the back that occurs during exercise or emotional stress and is rapidly relieved by rest. Angina is stable if, for at least one month, it has been brought
on by the same amount of exertion and is not accompanied by pain at rest – unless caused by emotional stress.

a. Pharmacotherapy

i. Acute attack

- *Glyceryl trinitrate 300-600 micrograms sublingually*

Repeat every 5 minutes if pain persists up to a maximum of three tablets. If pain persists, check that tablets are active (a tingling sensation if put on the tongue). If no response and tablets are of good quality, treat as for unstable angina. Patients should sit or lie down when first using glyceryl trinitrate because of the possibility of symptomatic hypotension. Glyceryl trinitrate should not be exposed to light.

ii. Subsequent treatment

Patients should be on aspirin and will usually require further treatment to improve exercise tolerance. Initially, use

- *Aspirin 100-150 mg orally daily*

  AND

- *Atenolol orally 50-100 mg daily*

  OR

- *Metoprolol 25-50 mg. orally twice daily*

The other medicine that can be considered in uncontrolled angina include:

*Isosorbide dinitrate 10-40 mg orally three times daily*

(To prevent the development of nitrate tolerance, there should be an interval of eight hours between the night dose and the first dose the next day.)

  OR

- *Verapamil 40-120 mg orally 2-3 times daily*

  OR
• *Nifedipine 20-40 mg orally twice daily*\(^5\)

**The combination of a beta-blocker and verapamil is contraindicated.**

### iii. Use of glyceryl trinitrate as prophylaxis

Nitrates may be used prophylactically for any form of physical or emotional stress.

• *Glyceryl trinitrate 300-600 micrograms sublingually*

### iv. Refractory stable angina

Occasionally, patients will not respond to preventive treatment even if a combination of beta-blocker, calcium channel blocker (nifedipine) and nitrates is prescribed.

If pain persists despite addressing the modifiable risk factors and optimum drug therapy, it is recommended that if possible, the patient be referred for further cardiac assessment.

**Unstable angina**

Characterised by anginal pain which is severe, of recent onset, or which has recently become abruptly worse. Angina occurring at rest or following recent myocardial infarction is also classified as unstable angina.

All patients diagnosed to be suffering from unstable angina should be referred for admission

The most important distinction to make is between unstable angina and an acute myocardial infarction. The factors favouring an acute myocardial infarction include pain of more than 15-20 minutes duration; pain not responsive to nitrates or requiring narcotics; systemic features such as pallor, sweating, vomiting and hypotension. If any or all of these are present, admit to hospital or health. An electrocardiogram (ECG) is critically important in making the diagnosis.

The aim of treatment in unstable angina is to relieve the pain and to modify the environment around the “active” plaque to reduce the likelihood of coronary artery occlusion. However, it should be borne in mind that chest pain might be secondary to
other serious conditions like acute myocardial infarction, pericarditis, aortic dissection and pulmonary embolism.

For initial treatment:

- **Oxygen therapy**
- **Aspirin** 150-300 mg orally stat
  
  AND

- **Morphine** 2.5-10 mg intravenously as needed
  
  AND

- **Atenolol** 50-100 mg orally daily
  
  OR

- **Metoprolol** 25-50 mg orally twice daily

If pain persists and if the patient’s hemodynamic status allows, ADD:

- **Nifedipine** 20-40 mg orally twice daily
  
  AND, if required, ADD

- **Isosorbide dinitrate** 10-40 mg orally three times daily

If pain still persists, heparin should be given, in addition, as follows:

- **Heparin** 5,000 units by bolus dose intravenously followed by 1,000 units per hour by intravenous infusion
  
  OR

  calculated as 400 units/kg over a 24 hour period divided into 24 equal doses, following the initial bolus dose of 5,000 units

Subsequent doses should be adjusted to keep the APTT (activated partial thromboplastin time) between 60 and 85 seconds. The APTT should be measured 6-hourly until stable, then daily.
Heparin will normally be required for at least three days and possibly longer depending on clinical response.

If symptoms persist despite all of the above treatment, cardiological intervention, if available, is required with a view to further investigation and revascularisation.

**Myocardial infarction**

Complete occlusion of a coronary artery leads to the death of the cardiac muscle it supplies. Occlusion of a large, proximal vessel may cause myocardial ischaemia of such an extent that the patient dies rapidly of pump failure. Alternatively, a ventricular arrhythmia (tachycardia, fibrillation) may reduce cardiac output to such a drastic extent that, if the abnormal rhythm cannot be reversed, death is most likely.

Severity of pain by itself is a poor indicator of the extent of myocardial damage especially in a diabetic patient. Poor cerebral function, peripheral circulatory signs such as pallor, sweating and hypotension combined with extensive ECG changes with or without arrhythmias point to a large infarct.

The aims of immediate management are to:

- relieve pain
- achieve coronary reperfusion and minimise infarct size
- prevent and treat complications
- allay the patient’s anxiety

All patients with suspected myocardial infarction should be admitted to hospital and preferably to a unit where cardiac monitoring can be performed.

a. **Immediate management**

Unless the patient is very anxious, routine use of a sedative (e.g. diazepam) is not recommended.

i. **Pain relief**

- *Morphine 2.5-10 mg intravenously with repeat doses as necessary AND*
- *Glyceryl trinitrate 600 micrograms sublingually with a repeat dose in 5 minutes if no response*

Glyceryl trinitrate should not be given if patient hypotensive.
ii. Limiting infarct size

- *Aspirin 300 mg* chewed or dissolved before swallowing
- *Oxygen 4-6 L per minute* by mask
- Thrombolytic therapy – *streptokinase if available.*
- *Use only under the supervision of a specialist physician.*

The indications for thrombolytic therapy includes chest pain that has developed within the previous 12 hours with either ST-segment elevation myocardial infarction (STEMI) or development of new left bundle branch block (LBBB) or both.

**Streptokinase**

- 1.5 million International Units (IU) by intravenous infusion over 30-60 minutes. If blood pressure falls as a result of the infusion, reduce the rate or stop briefly and restart at half the previous rate.

Streptokinase induces antibody formation that makes it unsuitable for use in subsequent episodes of coronary occlusion. It may also produce allergic symptoms (i.e. bronchospasm, angio-oedema, urticaria, flushing and musculoskeletal pain).

The contraindications to thrombolytic therapy are shown in Table 1.

Patients most likely to benefit from thrombolytic treatment are those presenting within 6 hours with large anterior infarcts especially if complicated by heart failure. Those presenting after 24 hours have less chance of benefit and increased risk of cardiac rupture.

For mild or moderate allergic reactions to streptokinase:

- *Promethazine 25 mg intravenously*

  OR

- *Hydrocortisone 100 mg intravenously*

**Table 5. Contraindications to thrombolytic therapy**

<table>
<thead>
<tr>
<th>Absolute contraindications</th>
<th>Relative contraindications</th>
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<td>Active internal bleeding</td>
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<td>Recent surgery, biopsy or trauma</td>
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<td>Neurosurgery within 6 months</td>
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<td>Severe uncontrolled hypertension (a blood pressure greater than 180/110 mm Hg during presentation)</td>
<td>Pregnancy</td>
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<tr>
<td>Aortic dissection</td>
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<tr>
<td>Coma</td>
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<tr>
<td>Oesophageal varices</td>
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</table>

Severe allergic reactions should be treated as for anaphylaxis.

- *Adrenaline 1 in 1,000 solution, 0.5-1 ml (0.5-1 mg) intravenously over 5 minutes*

If response is poor, increase dose to:

- *Adrenaline 1 in 1,000 solution 2 to 5 ml (2-5 mg) intravenously over 5 minutes*

AND ADD

- *Promethazine 25 mg intravenously*

OR

- *Hydrocortisone 100 mg intravenously*

**b. Management in the post-infarct period**

**i. Beta-blockers**

- *Atenolol 25-100 mg orally daily*
OR

- *Metoprolol* 25-50 mg orally twice daily

The benefit persists long-term and beta-blockade should be continued indefinitely.

**ii. Angiotensin converting enzyme inhibitors (ACEI)**

- *Enalapril* 5-40 mg orally daily

Outcome is improved after myocardial infarction with these agents. ACEIs should be started 24-48 hours after the acute episode in patients with a previous myocardial infarct, diabetes mellitus, hypertension, anterior infarct or evidence of persisting left ventricular dysfunction. Persistent hypotension and/or renal dysfunction are the only major contraindications.

**iii. Antiplatelet agent**

- *Aspirin* 150-300 mg orally daily

**iv. “Statin” (hydroxymethylgutaryl CoA reductase inhibitor)**

Recent large-scale trials have demonstrated a substantial role for statins in the secondary prevention of coronary thrombosis and myocardial infarction, *independent of lipid level*.

A combination of lifestyle modification, and ongoing treatment with aspirin, beta blockade, a statin, and, in many cases, ACEIs has been justified by clinical trials of adequate size and duration.

The administration and supervision of this potentially complex regimen is best organised through a cardiac rehabilitation program for the first few months after the myocardial infarction. Extensive patient education is required during this period.

c. **On discharge**

At the time of discharge, a cardiac rehabilitation program is recommended. The program should include the following:

- continuing medication, as above
- patient education
- modification of risk factors
• avoidance of precipitating factors
• dietary management
• resumption of work, driving and sexual activity
• advice on air travel
• further investigations, e.g. stress test, echocardiography, and coronary angiography with a view to possible intervention if indicated

Heart failure

Heart failure occurs when the heart is unable to pump adequate blood to meet the metabolic demands of the tissues. It is a syndrome and not a disease in itself. Heart failure is the result of a primary underlying cause and this should always be looked for and, if possible, treated in the course of investigation and management. More often, the heart failure is in a compensated state and symptoms develop due to one or many precipitating factors. Identification and management of these precipitating factors are very important. Hence, in the treatment of heart failure it is vital to address both the underlying etiology and the precipitating factors.

Causes of heart failure

The common causes of heart failure are:

• ischaemic heart disease (see relevant section)
• valvular heart disease remains a common and important cause of heart failure in Tuvalu
• hypertension is a treatable cause that is also common
• hyperthyroidism – cardiac manifestation might be the only presentation of this condition
• cardiomyopathy that can occur from several different causes

The less common causes of heart failure are:

• congenital heart disease
• infective endocarditis
• myocarditis
• cor pulmonale
• pericardial diseases

Precipitating factors of heart failure

These include:
poor compliance with medication
- excess dietary salt
- fluid excess
- other medicines – NSAIDs, steroids, antidepressants, verapamil
- arrhythmias – tachyarrhythmias or bradyarrhythmias (most commonly atrial fibrillation)
- intercurrent infections particularly respiratory infections
- acute myocardial infarction
- infective endocarditis
- anaemia
- hyperthyroidism
- uncontrolled hypertension
- physical overexertion
- pregnancy

**General management of chronic heart failure**

The principles of management are:

- non-pharmacological treatment
- pharmacological treatment
- treatment of underlying etiology
- treatment of precipitating factors
- other general measures

**Non-pharmacological**

- weight reduction
- salt restriction – ideally, no added salt is advised
- water restriction – this is not necessary unless there is dilutional hyponatraemia; in this situation, reduction to no lower than 1.5 liter per day is recommended

**Pharmacological**

The aims of treatment are to improve the prognosis and to relieve and control the symptoms and signs of heart failure. The commonly used medicines in the treatment of heart failure include:

- diuretics – frusemide, spironolactone, thiazides
- angiotensin converting enzyme inhibitors – unless contraindicated, virtually all patients with heart failure should be on ACEI
- digoxin
• beta-blockers – carvedilol, very low dose metoprolol and bisoprolol have been proven in clinical trials to be effective in heart failure (these drugs or dose-forms are not current in the Tuvalu EML)
• isosorbide dinitrate
• hydrallazine

a. **Mild to moderate heart failure**

Treatment is commenced with diuretics and ACEI added to potentiate the response.

• *Frusemide 40-80 mg orally daily*
• *Enalapril 2.5 mg daily followed by gradual increments to a maximum of 20 mg daily*

Hypotension can result after the first dose in the elderly, patients who are already dehydrated from previous diuretic therapy, in the presence of pre-existing hyponatraemia, and concurrent treatment with other anti-hypertensives.

If heart failure is not controlled by these, ADD

• *Digoxin 0.0625-0.5 mg orally daily according to age and renal function.*

    Digoxin is recommended if the patient is in atrial fibrillation and the ventricular rate is not controlled.

If ACEI cannot be used in patients with heart failure because of angioedema, worsening renal function or intractable cough, alternative treatments to reduce cardiac “after-load” include:

• *Hydralazine 25-50 mg orally two-three times daily*

    PLUS

• *Isosorbide dinitrate 10-20 mg three times a day*

b. **Severe heart failure**

If despite the above treatment the heart failure worsens or fails to respond, hospitalization is recommended. Treatment in the hospital includes:
• **Frusemide up to a maximum of 1 gram daily in divided doses**

  Absorption of oral diuretics is often impaired in severe heart failure and frusemide starting with 80 mg IV BD is advised. Patients having significant renal impairment will require higher doses of frusemide.

  PLUS

• **Enalapril orally as above**

  PLUS

• **Spironolactone 25-50 mg orally daily**

  PLUS

• **Digoxin 0.0625-0.5 mg orally daily according to age and renal function**

  If these treatments are inadequate, the following can occasionally be required:

• **Hydrocholorothiazide 25-50 mg orally daily**

  OR

• **Hydralazine 25-50 mg orally three times daily**

  PLUS

• **Isosorbide dinitrate 10-20 mg orally three times daily**

  Frusemide and hydrocholorothiazide act at different sites in the nephron and will supplement each other’s action if used together.

**Treatment of underlying etiology and precipitating factors**

In all cases, the underlying etiology and precipitating factors must be treated.

**General measures**

The general measures in the treatment of chronic heart failure may include:

• bed rest
• oxygen therapy
• regular weight monitoring
• patient education
• therapeutic aspiration of fluids from serous cavities
• heparin 5,000 units subcutaneously BD till patient is mobilized as prophylaxis for deep vein thrombosis (DVT)

**The role of beta-blockers in heart failure**

Beta-blockers are used to counteract the effect of the activated sympathetic nervous system in heart failure.

Studies have shown that beta-blockers are useful in all stages of heart failure from various causes except in decompensated heart failure. The beneficial effects include improvement in survival, reduction in all cause mortality and hospitalization rate, and improvement of ejection fraction and functional class.

It is recommended that beta-blockers should be started in small doses and increments made to maximum tolerable dose.

The drugs and dose forms that have shown efficacy in clinical trials are not currently in use in Tuvalu. If and when they are introduced their use should be restricted to specialist physicians and the medicines should only be started under hospital in-patient conditions.

**Acute cardiogenic pulmonary oedema**

Immediate treatment should include:

• bed rest
• maintain airway
• administer oxygen 4-6 L per minute by mask
• fusemide 40-80 mg IV repeated in 30 minutes if needed
• morphine 5-10 mg IV
• salbutamol nebulizer 2.5-5 mg 4-hourly, if there is evidence of bronchospasm (e.g. wheezing)
• sublingual glyceryl trinitrate if patient is not hypotensive
• other treatments that may be required when there is significant hypotension:
  – dopamine infusion if patient is hypotensive (refer to Appendix)
• ventilatory support if required

The underlying etiology and precipitating factors must be treated and the general measures discussed above have to be followed.
Patients with classical signs and symptoms of heart failure but normal cardiac (left ventricular) ejection fraction on investigation may have:

- fluid overload (or renal failure producing the same picture)
- a mechanical cause for the heart failure such as severe mitral regurgitation
- principally diastolic heart failure resulting in poor diastolic filling and correspondingly poor forward perfusion

The main causes of this relatively uncommon form of heart failure include:

- pericardial disease
- myocardial hypertrophy with fibrosis (e.g. long-standing hypertension)
- atrial fibrillation and any other causes of poor diastolic filling
- infiltrative diseases (e.g. amyloidosis, sarcoidosis, haemochromatosis)

The importance of diastolic heart failure and its recognition lie in the fact that patients with this condition are very sensitive to the effects of diuretics and vasodilators both of which can precipitate severe reductions in cardiac output and in blood pressure.

In a case of suspected diastolic heart failure referral to a specialist physician is required.

**Cardiac arrhythmias**

Cardiac arrhythmias range from trivial ectopic beats to the life-threatening ventricular fibrillation. Whether or not an arrhythmia requires intervention depends largely on its capacity to make a significant impact on cardiac output.

In a patient whose myocardial function is already impaired (e.g. by a large infarct) a change from normal sinus rhythm to atrial fibrillation with a ventricular rate of 140 beats per minute may be sufficient to cause heart failure. By contrast, a young person with a normal myocardium may sustain a supraventricular tachycardia at the same rate for days without any evidence of cardiac decompensation.

**Causes of cardiac arrhythmias**

The common and/or important causes of arrhythmias are:

- ischaemic heart disease
- valvular heart disease
- cardiomyopathy
- hypoxia
• electrolyte disturbance – hypokalaemia, hyperkalaemia, hypocalcaemia, hypomagnesaemia
• endocrine – hyperthyroidism, phaeochromocytoma
• medicines– digoxin, tricyclic antidepressants
• congenital conduction abnormalities

**Aims of treatment**

In general, there are four aims in the treatment of cardiac arrhythmias:

• return the heart to normal sinus rhythm, if possible
• control the heart rate
• treat any associated risks (e.g. anticoagulant therapy in atrial fibrillation)
• treat the underlying cause

Most arrhythmias are benign and injudicious use of antiarrhythmic drugs can be harmful as many of them are proarrhythmic on their own.

**Tachyarrhythmias**

**Atrial**

a. Sinus tachycardia

This implies a persistent heart rate over 100 per minute in a resting patient.

It usually has an underlying cause such as anxiety, thyroid overactivity or systemic illness. The first approach should be to identify and treat the underlying cause.

If no obvious underlying cause is apparent, treatment is generally not needed.

b. Atrial premature complexes

Treatment is seldom required. If patient is symptomatic,

• *Atenolol 25-100 mg orally daily*

OR
• Metoprolol 25-50mg orally twice daily

c. Paroxysmal supraventricular tachycardia (PSVT)

This occurs intermittently and sometimes can be converted to sinus rhythm by carotid sinus massage (may be hazardous in elderly patients), by the Valsalva manoeuvre or by holding ice cold water in the mouth or immersing the face briefly in cold water. If these are ineffective,

Give, with ECG monitoring,

• Adenosine 3mg (in 1 mL) IV. over 5-10 seconds.

This may produce transient hypotension and a feeling of chest constriction. Patients should be warned this may happen.

If no response, after 2 minutes,

-give Adenosine 6 mg IV over 5-10 seconds.

This can be increased by one further increment to 12 mg iv if needed after a further 2 minutes.

OR

provided the QRS complex is not broad (wider than 0.12 seconds)* and blood pressure monitoring is in place

• Verapamil 5 mg intravenously slowly; repeat if needed up to 15 mg

If not available,

• Digoxin 0.25-0.50 mg orally stat, repeat same dose orally six hours later, followed by 0.25 mg orally six hours after the second dose, and followed by 0.25 mg orally six hours after the third dose and continue at 0.25 orally mg daily.

The maintenance digoxin dose should be adjusted depending on the patient’s renal function and serum potassium level.
*Verapamil must NEVER be given to a patient with a wide-complex undiagnosed tachycardia – QRS > 0.12 seconds. If there is any possibility that the rhythm is a ventricular tachycardia treat as such.

d. Prophylaxis for paroxysmal supraventricular tachycardia (PSVT)

A few patients may require prophylaxis if attacks are frequent.

- Atenolol 25-100 mg orally daily

OR

- Metoprolol 25-50 mg orally twice daily

e. Atrial flutter and fibrillation (AF)

Atrial flutter usually presents with a 2:1 atrioventricular block and a completely regular rate of around 150 beats per minute. Atrial fibrillation presents with a similar rate which is however quite irregular.

i. Control ventricular rate

This is only required if the ventricular rate is >100 per minute. The urgency to control the rate depends on the pre-existing ventricular rate and the state of the cardiac function – e.g. adequate or in heart failure. For many patients especially the elderly rate control is best achieved and maintained with digoxin

Digoxin 0.5-1.0 mg orally, followed by 0.25-0.5 mg every 4-6 hours up to a maximum of 1.5-2.0 mg in the first 24 hours.

Maintenance treatment thereafter will require digoxin 0.0625-0.5 mg daily depending on age, renal function and plasma digoxin level, if available. The intravenous route is rarely necessary because oral digititalization is just as effective.

OR
Control rate with beta-blockade

. *Atenolol 25-100 mg orally daily*

OR

- *Metoprolol 25-50 mg orally twice daily*

If beta-blockers are contraindicated,

- *Verapamil 40-80 mg orally three times daily*

ii. Treatment of underlying cause

Whenever possible, the underlying cause should be identified and treated (e.g. hypokalaemia, thyrotoxicosis).

iii. Anticoagulant therapy

Unless contraindicated and impractical (i.e. poor patient compliance, difficulty in monitoring), anticoagulant therapy should be considered in every patient with chronic AF to prevent thromboembolic events. If warfarin cannot be used for one reason or another, aspirin can be used as alternative but is not as effective as warfarin. The risk of thromboembolism increases in patients with previous thromboembolism, mitral valve disease, heart failure, hypertension and in older patients – especially women over the age of 75 years.

iv. Cardioversion

This should only be attempted where facilities are adequate and experienced staff are available.

It is appropriate to try to restore sinus rhythm if the patient has only been in atrial fibrillation for a few hours. Anticoagulation with intravenous unfractionated heparin (5000units iv. followed by hourly 1000units/hour) or enoxaparin (1mg/kg subcut.twice daily: reduce dose if creatinine is raised or calculated creatinine clearance<30mL/min) should be initiated before cardioversion even if the arrhythmia has existed for as short a time as a few hours, as thrombus may already have started to form in the fibrillating atrium. Restoration of sinus rhythm may save the patient from long-term anticoagulation- although heparin should be continued for 2-4 days after successful conversion as “stunned” atria may develop after the conversion and clot may begin to develop.
It is **never** appropriate to attempt cardioversion in a patient with AF of long, or unknown, duration without prior full anticoagulation. The risk to the patient of thrombo-embolism is greater than that of continuing AF with a well-controlled ventricular rate.

After successful cardioversion, rhythm may be maintained with amiodarone 200-400mg orally three times each day for one week, 200-400mg twice daily for a further week and then a maintenance dose of 100-200mg daily as continuing treatment.

**Ventricular arrhythmias**

a. **Premature ventricular ectopics including bigeminy**

These are benign unless patients have underlying heart disease. If no obvious cause is found, the following measures are advisable:

- reduce coffee and tea intake
- stop smoking
- reduce alcohol intake

Drug treatment is not normally required but in symptomatic cases beta-blockade may be of value.

- **Atenolol 25-100 mg orally daily**

  **OR**

- **Metoprolol 25-50mg orally twice daily**

b. **Ventricular tachycardia (VT)**

i. **Non-sustained ventricular tachycardia**

In hospitals where ECG monitoring is possible, treat only prolonged episodes that cause cardiovascular haemodynamic instability.

*Lignocaine 2%, 50-100 mg intravenously over 1-2 minutes followed by 4 mg per minute intravenous infusion for a maximum of one hour then 1-2 mg per minute by intravenous infusion for 24 hours (see Appendix).*
ii. Sustained ventricular tachycardia

(a) With haemodynamic stability

Treatment is the same as for non-sustained ventricular tachycardia.

(b) With haemodynamic instability (“pulseless VT”)

The treatment for this condition is immediate intervention by defibrillation. Maintenance of sinus rhythm after electrocardioversion requires drug therapy:

- Lignocaine 50-100 mg intravenously over 1-2 minutes
  followed by 4 mg per minute intravenous infusion for a maximum of one hour
  then 1-2 mg per minute by intravenous infusion for 24 hours (see Appendix).

If long-term oral drug treatment is required to maintain sinus rhythm:

- Atenolol 25-100 mg orally daily
  OR
- Metoprolol 25-50 mg orally twice daily

In difficult cases, sotalol can be considered but it is not currently available in Tuvalu. Oral amiodarone may be an alternative but the drug is also not available in Tuvalu.

c. Torsades de pointes

This is a rare, polymorphic ventricular tachycardia in which the QRS axis is constantly shifting (turning, “torsade”). Patients usually have a prolonged QTc (greater than 0.45 seconds) on the ECG. The rhythm is particularly prone to occur as a result of drug therapy including treatment with tricyclic antidepressants, phenothiazines, erythromycin and ketoconazole. Any medicine suspected of causing the arrhythmia should be stopped immediately.
Patients should be managed in hospital with ECG monitoring. No consensus exists about the most effective treatment. If the arrhythmia is associated with cardiovascular collapse, treat as for “pulseless VT”—see above.

If patient is stable, give -

- Lignocaine 75-100 mg intravenously over 1-2 minutes followed by 4 mg per minute for a maximum of one hour. Maintenance infusion thereafter of 1-2 mg per minute by intravenous infusion (see Appendix).

Alternatively,

- Magnesium sulphate 50%, 2 g intravenously over 10-15 minutes followed, if necessary, by 0.5-0.75 g per hour by intravenous infusion for 12-24 hours

**Do not use amiodarone in this arrhythmia**

d. **Ventricular fibrillation** (see under cardiac arrest, below)

e. **Ventricular asystole**

Institute CPR.

- Adrenaline 1mg (1 ml of a 1:1,000 solution) intravenously and repeat at 5 minute intervals until the return of spontaneous circulation is achieved

- Atropine 3 mg intravenously with a saline flush of 20 ml

f. **“Pulseless” ventricular activity**

Treatment is as for ventricular asystole with the addition of the need to exclude potentially reversible causes such as:

- hypoxia
- hypovolaemia
- hypothermia or hyperthermia
- hypokalaemia or hyperkalaemia and metabolic disorders
- cardiac tamponade
- tension pneumothorax
- toxins, poisons, medicines
- thrombosis – pulmonary or coronary

**Cardiac arrest**
This is due to ventricular tachycardia, fibrillation, asystole or “pulseless” ventricular activity.

On the assumption that no immediate ECG diagnosis can be made of the underlying rhythm, immediately:

- Institute and continue cardio-pulmonary resuscitation (CPR).
- Defibrillate at 200 joules and, if no response, twice more at 360 joules (for children: 4 joules per kg).
- Secure airway and ventilate at maximum oxygen percentage achievable.
- Obtain an ECG tracing while maintaining CPR.
- Give adrenaline 1 mg (1 ml of a 1:1,000) as an intravenous bolus followed by 20 ml saline flush.
- Repeat defibrillation at 360 joules three times in succession.
- Repeat intravenous adrenaline. If venous access cannot be obtained in order to administer adrenaline, give adrenaline 5mg (5 ml of a 1:1,000 solution) diluted to 10 ml of normal saline through the endotracheal tube.
- Repeat defibrillation at 360 joules on three successive occasions.

If no response has been achieved at this point, the chances of recovery are slight. Acidosis will certainly have occurred and may be treated with:

- **Sodium bicarbonate 8.4% (1 mmol per ml) 1 mmol per kg intravenously over 5-15 minutes**

  Sodium bicarbonate is also indicated in cases where arrhythmia is secondary to hyperkalaemia.

Control of rhythm may be attempted with:

- **Lignocaine 1%, 75-100 mg intravenously over 1-2 minutes followed by 4 mg per minute for the next hour and decreasing to a maintenance dose of 1-2 mg per minute thereafter (see Appendix).**

However, the mainstay of management remains effective CPR followed by urgent defibrillation. The primary drug in emergency treatment is adrenaline.

**Bradyarrhythmias**

**Sinus bradycardia**
Treat only if symptomatic. Exclude hypothyroidism, pituitary failure and medicines (e.g. beta-blockers, digoxin, and verapamil).

If intervention is required:

- **Atropine 0.6-1.8 mg intravenously and repeat as needed**

**Atrioventricular block**

Medicines (digoxin, beta-blockers or verapamil) may be the cause and should be withheld if this appears to be the case.

**a. First degree AV block**

There is prolonged PR interval on ECG. This requires no treatment.

**b. Second degree AV block**

There are two types.

  i. **Wenckebach phenomenon (Mobitz type I)**

     In this type of AV block, there is successive prolongation of the PR interval followed by a dropped beat and the whole cycle repeats.

  ii. **Mobitz type II**

     There is a fixed ratio between the atrial and ventricular contractions in this type of arrhythmia, e.g. 2:1 or 3:1.

     Generally, both types of AV block do not require treatment. Rarely, pacing may be required in Mobitz type II AV block.

**c. Third degree heart block**

This may be an acute and potentially spontaneously reversible complication of, for example, an acute anterior or inferior myocardial infarction. In centres where cardiac pacing is possible, this is the treatment of choice.
If pacing is not available give

- *Isoprenaline 20 micrograms intravenously, repeat according to clinical response and follow with an infusion of 1-4 micrograms per minute or occasionally higher in patients who have been on beta-blockers (see Appendix).*

There is anecdotal evidence for the efficacy of salbutamol and theophylline in maintaining response if the block has responded to isoprenaline.

**The treatment of choice for chronic heart block is permanent cardiac pacing.**

**Peripheral vascular disease (PVD)**

Atherosclerotic disease of the limb vessels is part of the overall spectrum of atheromatous disease. Risk factor modification is as much a strategy in managing PVD as in the prevention of coronary artery disease and stroke.

**Acute limb ischaemia**

The signs and symptoms of this condition are:

- pain
- paresthaesiae
- paralysis
- pulseless
- pallor

**Causes**

The common causes of acute limb ischaemia are:

- embolization from the heart
- thromboembolism from a large atheromatous vessels or an aneurysm
- *in situ* thrombosis of a diseased vessel
- use and abuse of ergot derivatives for migraine

**This is an emergency. Urgent investigation and surgical consultation are required.**

The limb should be protected using a bed cage and heel pad but should not be elevated.
**Medicines**

- **Morphine 2.5-5 mg intravenously as required to control pain**

  AND

- **Heparin sodium 5,000 units intravenously as a loading dose followed by 1,000 units per hour by intravenous infusion, and thereafter adjusted according to the APTT.**

If viability of the limb is restored:

- **Warfarin for 3-6 months aiming at an INR of 2.0 to 3.0**

There should be efforts to determine and treat the cause of the thromboembolic event. Depending on the cause, (e.g. atrial fibrillation), warfarin might need to be taken for an indefinite period.

Following a local thrombus rather than an embolic event:

- **Aspirin 150-300 mg orally, daily, which may be preferable to warfarin.**

All cases must be assessed by the surgical team as there may be a place for embolectomy.

**Chronic limb ischaemia**

The gradual loss of circulation caused by atheroma and local thrombosis may present with resting ischaemic pain often worsening, over a few weeks (and needing increasing amounts of analgesic), to ulceration and gangrene of the feet and toes.

The aims of management are:

- pain relief
- improvement and preservation of circulation
- treatment of sepsis
- modification of risk factors

**Pain relief**

Pain is often very severe and may require:
Morphine 2.5-10 mg intravenously repeated 4-hourly or more often until pain is controlled.

Improvement and preservation of the circulation

- Surgical intervention will normally be required. Early consultation should be requested.
- Elevate the head of the bed.
- Reduce antihypertensive medication, if possible, to permit a high normal blood pressure.
- Withdraw any beta-blocking medicines, including eye drops.
- Sympathectomy may provide some symptomatic relief but will not improve ultimate outcome.
- Anticoagulation.

Treatment of sepsis

Patients should be assessed at a hospital. Organisms are commonly of several sorts but anaerobes will be present. It is recommended that culture of specimens from the ischaemic limb be taken prior to empirical antibiotic treatment:

- Metronidazole 400 mg orally 8-hourly
  
  PLUS
  
- Cloxacillin 500 mg orally 6-hourly

In patients hypersensitive to penicillin, erythromycin or chloramphenicol can be used.

The antibiotic may need to be modified once the culture results are available.

If the patient is not receiving heparin intravenously as treatment, this drug should be used prophylactically:

- Heparin sodium 5,000-7,500 units subcutaneously every 12 hours
Modification of risk factors

All modifiable risk factors listed under the section on Ischaemic Heart Disease should be addressed.

**Smoking is a major preventable risk.**

Intermittent claudication

Intermittent claudication refers to pain felt in the legs on exertion that is relieved by rest (as differentiated from spinal claudication where the pain persists even with rest). Most patients do not suffer loss of a limb as a result of this disease. Life expectation is dictated primarily by co-existing atheroma elsewhere - especially in the coronary circulation.

The single most important management strategy is **modification of risk factors.** The other modalities of treatment are:

- A graded exercise program, e.g. walking 50-60 minutes per day can extend claudication distance

  *Aspirin 150-300 mg orally daily*

Cerebrovascular disease

Cerebrovascular disease is common. However, our ability to treat stroke and reverse neurological damage once it has occurred is strictly limited. This makes it all the more important to institute **primary prevention** in the hope of reducing stroke incidence in the community.

Risk factors

The risk of stroke doubles with each succeeding decade above 20 years (although the absolute risk of stroke at 20 is very low). The major modifiable risk factors are:

**Hypertension**

Stroke risk increases linearly with initial height of blood pressure. Effective treatment of all forms of hypertension **reduces** stroke risk. Isolated systolic hypertension, common in the elderly and once thought to be benign, also constitutes a stroke risk.

**Smoking**
Smoking is clearly identified as a major risk factor for cerebrovascular disease, as it is for peripheral vascular and coronary artery disease.

**Diabetes mellitus**

While tight control of blood sugar has been shown to delay the progression of retinopathy and nephropathy, this evidence is not so strong for the occurrence of cerebrovascular disease.

**Dyslipidaemias**

Association exists between high low-density lipoprotein (LDL) cholesterol and stroke. While evidence exists for the protective effect of lowering lipids for coronary artery disease, similar evidence is not available for cerebrovascular disease. It seems reasonable to modify dyslipidaemia as part of risk factor management.

**Pre-existing cardiovascular disease**

Asymptomatic carotid artery stenosis increases stroke risk.

Atrial fibrillation with or without valvular disease of the heart disease or valve prosthesis is a major risk factor. Treatment with aspirin or warfarin reduces stroke substantially.

**Medicines**

Excessive alcohol consumption is a modifiable risk factor for stroke.

Oral contraceptives (irrespective of oestrogen dose) in women over 35 years of age who also smoke are a documented risk for cerebrovascular disease even though the absolute risk of stroke in this age group is low.

**If patient has multiple risk factors:**

*Aspirin 150-300 mg orally daily*

**Transient ischaemic attack (TIA)**

A TIA is an episode of neurological impairment of sudden onset with a duration of less than 24 hours unassociated with symptoms of migraine. Common primary causes are
emboli from a cardiac source or from major atheromatous extracranial vessels – especially the carotid arteries.

The risk of stroke after a TIA is 5-7 percent per year and as high as 10-18 percent per year for patients with greater than 70 percent carotid stenosis on the relevant side.

The medical management in the absence of a source for embolism involves anti-platelet therapy:

- **Aspirin 150-300 mg orally daily**

If the TIA is due to a demonstrable cardiac cause and no evidence of cerebral hemorrhage by CT scan, warfarin may be commenced immediately.

### Completed stroke

**Diagnosis**

Clinical diagnosis unsupported by brain imaging has been shown to be less reliable than was earlier thought. This is important if causes with specific therapy are to be detected and treated early.

The two most important categories that have therapeutic importance are **thromboembolic disease** and **haemorrhage**.

**Management of ischaemic stroke**

The aims of management are:

- to reverse ischaemia
- to protect brain cells from the effects of ischaemia
- to rehabilitate the patient
- to introduce vigorous secondary prevention

**a. Reversing ischaemia**

The use of streptokinase has shown little or no benefit and the risk of bleeding is high. Other forms of thrombolytic therapy are not an option in Tuvalu yet but are being trialled overseas.
b. **Protecting cells from ischaemic injury**

Brain cells die not only from ischaemia itself but also from the local release of excitotoxic molecules in response to the ischaemia. Therefore, adequate hydration and oxygenation is important. In ischaemic stroke, it is advisable not to be aggressive to lower the blood pressure (i.e. maintain diastolic BP at 100-110 mm Hg) rapidly during the first ten days. However, in hemorrhagic stroke, BP of less than 140/90 is advisable.

c. **Rehabilitation**

Rehabilitation should be commenced as soon as urgent diagnostic and therapeutic measures have been taken. Therefore, referral to a physiotherapist and eventually, if possible, to a rehabilitation unit is recommended.

d. **Secondary prevention**

There is clear evidence that modifying risk factors after a completed stroke confers benefit.

**Management of haemorrhagic stroke**

The underlying cause of hemorrhagic stroke should be identified and treated accordingly (i.e. control blood pressure in hypertensive intracerebral bleed). Without imaging it is not possible to make a certain diagnosis.

**Stroke related to subarachnoid haemorrhage**

Many patients with subarachnoid haemorrhage have a primary cause potentially amenable to intervention – in particular aneurysm. Vasospasm in this condition may produce reversible neurological deficits which can persist and even lead to death. Vasospasm manifests as an altered conscious state or increased neurological defect.

**Non-hypertensive cardiovascular disease in pregnancy**

The ideal time to evaluate a woman with cardiovascular disease is before she becomes pregnant. This allows time to make or confirm the diagnosis and make a management plan.

Enormous changes occur in the cardiovascular system in normal pregnancy. Vasodilatation occurs very early. Cardiac output increases by up to 40 percent at 20
weeks, yet the impact of vasodilatation is so great that blood pressure continues to fall to its minimum at mid-term and only slowly returns to normal as term approaches. Blood volume increases slowly in response to vasodilation and reaches its maximum in the final trimester after 30 weeks.

All these changes are normally reversed within 5-7 days of delivery.

These changes put demands on a normal cardiovascular system and can lead to heart failure if, for example, severe valvular disease is present.

**Valvular heart disease**

Mitral stenosis is the most important valvular lesion to be encountered in pregnancy. It may present with pulmonary oedema or sudden onset of atrial fibrillation.

The same treatment principles apply as in the non-pregnant patient (see section on heart failure).

Although diuretics are not recommended in the treatment of pregnancy-related hypertension, in pulmonary oedema or congestive heart failure they should be used and are safe. Digoxin may also be given if indicated.

**Angiotensin converting enzyme inhibitors should not be used in pregnancy.**

Vasodilatation (“cardiac unloading”), if required, is best achieved with:

- **Hydralazine** 25-50 orally three times daily

  PLUS

- **Isosorbide dinitrate** 10-40 mg three times daily if additional therapy is required

Mitral valvuloplasty may be performed in pregnancy, if the clinical state warrants this.

Mitral valve prolapse is a common valvular abnormality in pregnancy. As blood volume expands, the murmur and click may disappear. This lesion does not normally produce any haemodynamic problems.

**Antibiotic prophylaxis at delivery**

Normal vaginal delivery and elective caesarean section do not require prophylactic antibiotics in a patient with a normal heart or with mitral valve prolapse. However,
delivery in the presence of a prolonged labour or pre-existing infection does require antibiotic prophylaxis.

Antibiotic prophylaxis is **routinely** indicated for patients with **established valvular disease**.

Delivery should occur at a hospital maternity unit.

A suggested regimen for a patient arriving in labour is:

- **Gentamicin 2 mg per kg intravenously**
  PLUS

- **Ampicillin 1 gram intravenously followed by ampicillin 500 mg intravenously 6 hours later**

The same regimen can be used in patients:

- not admitted in labour; given just before vaginal delivery or caesarian section
- with spontaneous membrane rupture; give antibiotics on admission to the unit
- at rupture of the membranes to induce labour; the first dose being given just before the procedure occurs

**Cardiac arrhythmias in pregnancy**

The same principles apply as in the non-pregnant patient (see Chapter 4).

The following list is a guide to antiarrhythmic drug safety in pregnancy. For most of the drugs, experience is too limited for a firm recommendation to be made.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol</td>
<td>Associated with foetal growth retardation</td>
</tr>
<tr>
<td>Atropine</td>
<td>Safe</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Safe</td>
</tr>
<tr>
<td>Lignocaine</td>
<td>Safe</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Safe; may induce foetal bradycardia</td>
</tr>
<tr>
<td>Verapamil</td>
<td>Insufficient data; avoid if possible</td>
</tr>
</tbody>
</table>
While beta-blocking drugs are commonly listed as medicines to avoid in pregnancy, clinical trials with oxprenolol in pregnancy-related hypertension have revealed no excess of foetal abnormalities despite prolonged exposure *in utero*. The only cardiovascular medicine incriminated in retarding foetal growth is atenolol.

**Infections of the cardiovascular system and their prevention**

* **Bacterial endocarditis**

Treatment should be –given intravenously
- prolonged
- used in high concentrations throughout

If bacterial endocarditis is suspected take three blood cultures at three separate times before starting antibiotics.

**Empirical therapy where the organism is unknown /culture negative endocarditis**

- Penicillin G1.8 Gm. IV 4-hourly PLUS
- Cloxacillin 2Gm.IV 4-hourly PLUS
- Gentamicin 80 mg IV 8-hourly –adjust maintenance dose according to renal function

* **Streptococcal endocarditis**

Penicillin 1.8 Gm. IV 4-hourly for 4 weeks PLUS
Gentamicin 80 mg.IV 8-hourly for 2 weeks –adjust dose/dose frequency according to renal function

**Enterococcal endocarditis**  a less sensitive organism than *S.viridans* and the penincillin/gentamicin regimen above may need to be continued for 6 weeks .

**Staphylococcal endocarditis**- if a cloxacillin –sensitive organism :-

Cloxacillin 2Gm. IV 4-hourly for 6 weeks

In other circumstances consult with infectious disease/microbiology specialist.

**Prevention of bacterial endocarditis.**

**Low-risk**  –with structural heart disease but no prosthetic valve/previous endocarditis
Local anaesthetic – amoxycillin 3 Gm. orally one hour before surgery, 1.5 Gm 6 hours after procedure

General anaesthetic — ampicillin 2 Gm. IV at induction followed by 500 mg orally 6 hours after the procedure

High risk- prosthetic valve(s) or previous endocarditis, any type of procedure

- ampicillin 2 Gm. at induction followed by ampicillin 500 mg IV or amoxicillin 500 mg orally 6 hours after the procedure. WITH
gentamicin 1.5 mg/kg IV at induction of (general) anaesthesia or commencement of the procedure

**Prevention of recurrences of rheumatic fever**

Rheumatic fever (and later valvular heart disease) are not uncommon in Tuvalu. Prophylaxis against further attacks is vital.

If the rheumatic fever did not involve the heart

Benzathine penicillin 1.2 megaunits every 4 weeks for 5 years or up to 18 years of age.  

OR

Penicillin V 250 mg orally 12 hourly for the same duration (more difficult for patient compliance)

If the heart was involved the above prophylactic regimen is recommended until at least 40 years of age.

Some sources recommend prophylaxis for life but there is no clear evidence base for this recommendation. It errs on the side of caution.

**Appendix**

<table>
<thead>
<tr>
<th>Medicine to be infused</th>
<th>Formulation</th>
<th>Preparation</th>
<th>Infusion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydralazine</td>
<td>20 mg/ampoule</td>
<td>Reconstitute 20 mg ampoule by adding 2 ml of sterile water (concentration: 10 mg of)</td>
<td>Infuse initially at 0.2-0.3 mg/min (12-18 ml/hr).</td>
</tr>
<tr>
<td>Medicine to be infused</td>
<td>Formulation</td>
<td>Preparation</td>
<td>Infusion rate</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
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</tr>
<tr>
<td>hydralazine/ml.</td>
<td>Add hydralazine solution above to 98 ml of normal saline in a metered chamber (concentration: 1 mg of hydralazine/ml).</td>
<td>Maintenance dose: 0.05-0.15 mg/min (3-9 ml/hr).</td>
<td></td>
</tr>
<tr>
<td>Magnesium sulphate</td>
<td>50%, 2 ml (1 g) ampoule; 10 ml (5 g) ampoule</td>
<td>Loading dose: Magnesium sulfate 50%, 4 g (8.0 ml) diluted in 100 ml of dextrose 5%. Maintenance dose: Magnesium sulfate 50% (25 ml) in 100 ml dextrose 40%.</td>
<td>Loading dose: Use infusion pump and run at 300 ml/hr and set total volume at 108 ml. Maintenance dose: Infuse at 1 g/hr. Set infusion pump to run at 10 ml/hr and set total volume at 125 ml.</td>
</tr>
</tbody>
</table>
| Labetalol              | 100 mg/20 ml (5 mg/ml) | Add 100 mg (20 ml) of labetalol in 80 ml of dextrose 5% in a metered chamber (concentration: 1 mg of labetalol /ml). | Recommended dose: 0.5–2.0 mg/min  
Infusion rate: 30 ml/hr (0.5 mg/min) initially then titrate until diastolic blood pressure of 110 mm Hg is achieved to a maximum dose of 120 ml/hour (2 mg/min). |
| Dopamine               | 1 vial = 200 mg/5 ml | Add 200 mg of dopamine in 95 ml of normal saline or dextrose 5% in a metered chamber. After reconstitution, the concentration of dopamine in the chamber will be 200 µg/ml [1 ml = 60 microdrops (µgtts) or 33 µg/µgtts]. | To achieve enhanced renal perfusion: 2-5 µg/kg/min (120-300 µg/min)  
For antihypotensive effect: 5-50 µg/kg/minute (300-3,000 µg/min)  
For example, the infusion rate in a 60 kg patient will be:  
- Renal perfusion dose: 4-10 µgtts/min (4-20 ml/hr)  
- Antihypotensive effect: 10-100 ml/hr |
<p>| Streptokinase          | 1 vial = 1.5 | Add 2 ml of normal saline to the | 100 ml/hr |</p>
<table>
<thead>
<tr>
<th>Drug</th>
<th>Concentration</th>
<th>Description</th>
<th>Time</th>
<th>Rate (ml/hour)</th>
<th>Dose (mg/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptokinase</td>
<td></td>
<td>Million units vial containing 1.5 megaunits streptokinase. Mix the streptokinase solution to 98 ml of normal saline in a metered chamber.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lignocaine 2%</td>
<td>2% solution (20 mg/ml vial)</td>
<td>Discard 200 ml from 1 liter of dextrose 5% and add 2 grams (200 ml or 20 vials) of lignocaine 2% (concentration: 4 mg of lignocaine/ml).</td>
<td>1st hour</td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd hour</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>After the 2nd hour for 24 hours</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Lignocaine 1%</td>
<td>1% solution (10 mg/ml vial)</td>
<td>Discard 400 ml from 1 liter of dextrose 5% and add 4 grams (400 ml or 40 vials of lignocaine 1% (concentration 4 mg of lignocaine/ml).</td>
<td>1st hour</td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd hour</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>After the 2nd hour for 24 hours</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Isoprenaline</td>
<td>2 mg/ampoule (1 mg/ml)</td>
<td>Add 2 mg (1 ampoule) of isoprenaline to 99 ml of normal saline or dextrose 5% in a metered chamber (concentration: 0.02 mg of isoprenaline/ml or 20 µg of isoprenaline/ml).</td>
<td>Initially at 3 ml/hr (1 µg/min) then titrate accordingly based on response of heart rate, blood pressure, urine output, central venous pressure and peripheral circulation up to a maximum of 60 ml/hr (20 µg/min).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RESPIRATORY GUIDELINES

Medicines Used in Respiratory Diseases

Introduction

This chapter contains brief summaries of the major drugs used in the management of respiratory disease and are recommended in these guidelines. The summaries do not contain comprehensive accounts of the pharmacology of these compounds. The reader is advised to consult standard textbooks and/or the industry product information for more details.

It is important to consider the risks and benefits of drugs (particularly corticosteroids) that are used to treat respiratory diseases. As a general principle, the lowest drug doses that achieve best control should be used. For example:

Patient adherence to asthma treatment is better if regimens have:

- fewer devices and drugs
- fewer adverse effects
- been understood and agreed between patient and health care professional.

Beta\textsubscript{2} receptor stimulating drugs (Beta\textsubscript{2} agonists)

Introduction

Stimulation of beta\textsubscript{2}-receptors on airway smooth muscle relaxes the muscle resulting in bronchodilation. All beta\textsubscript{2} agonists may also stimulate beta\textsubscript{1}-receptors; however, the effects of beta\textsubscript{1}-receptor stimulation (eg tachycardia) are more likely to occur following systemic absorption or following inhalation of relatively large doses.

Under almost all circumstances, the preferred route of administration for beta\textsubscript{2} agonists is by inhalation. Administration by inhalation causes bronchodilation with low doses thus minimising systemic adverse effects.

Adverse effects: Dose-limiting adverse effects of the beta\textsubscript{2} agonists are most commonly tachycardia (which can also lead to paroxysmal tachyarrhythmias, such as atrial fibrillation or paroxysmal supraventricular tachycardia), tremor, headaches, muscle cramps, insomnia, and a feeling of anxiety and nervousness. In high doses (eg tablets, intravenous and emergency nebulisation) all beta\textsubscript{2} agonists can cause hypokalaemia and hyperglycaemia.
Short-acting beta2 agonists

Salbutamol

Salbutamol is the only drug in this class in the Tuvalu Essential Medicine List (EML) and is available in puffers, inhalation solution, 2mg/5mL oral solution and 4mg tablets. It is a fast-acting bronchodilator; the effects are evident within 5 minutes and last for about 3 hours. It is used to relieve bronchoconstriction and is often referred to as a reliever (blue puffer) medication.

Precautions: Regular and frequent use of salbutamol without appropriate attention to other aspects of respiratory illness is inadvisable. Proper consideration of issues such as an asthma management plan, monitoring of symptoms and lung function and suitable and preventive therapy are important when salbutamol is used in the regular management of airways disease. In general, it should be reserved for intermittent symptom relief rather than regular treatment of asthma. High-volume, regular use may indicate that the underlying disease process is poorly controlled, warranting modification of other aspects of drug therapy. The use of one or more canisters per month is associated with a greater risk of hospital admission.

Anticholinergic bronchodilators

Ipratropium bromide

Ipratropium bromide is the drug of this type which is not available in the Tuvalu Essential Medicine List (EML) and can be given by inhalation. It is a short-acting anticholinergic drug that produces bronchodilation by blocking vagal tone and reflexes, which mediate bronchoconstriction.

Used alone, ipratropium bromide is not a powerful bronchodilator. The duration of action is approximately 6 hours. Although the onset of action is 3 to 5 minutes, peak effect is not reached until 1.5 to 2 hours, so ipratropium bromide should not be used for immediate relief of symptoms. The drug can be used to augment the duration of bronchodilation achieved with beta2 agonist therapy and is recommended for acute severe asthma and in chronic obstructive pulmonary disease (COPD).

Adverse effects related to the anticholinergic action of ipratropium bromide are uncommon, as this drug is poorly absorbed. Some local adverse effects, such as blurred vision or precipitation of glaucoma in susceptible individuals, may result from inadvertent contact of nebulised drug with the eyes. Similarly, although buccal absorption is slight, some patients may experience a dry mouth. Systemic anticholinergic effects are very rare.
**Xanthines (Theophylline and Aminophylline)**

Although the mechanism of action is not well understood, xanthines may relax smooth muscle and increase diaphragm contractility. The xanthine agents available in the Tuvalu Essential Medicine List (EML). Aminophylline, a derivative of theophylline, administered intravenously. In routine use, the bronchodilator actions of theophylline offer no advantage over beta$_2$ agonists. Aminophylline should be reserved for severe acute asthma failing to respond to standard management. For patients not taking theophylline a bolus loading dose should be given. This must be given slowly over 5-10 minutes or severe side effects will result.

The efficacy of theophylline is difficult to demonstrate in patients with COPD; however, it may be helpful in some individuals. Theophylline should be considered only for patients in whom other treatment has failed to control symptoms adequately (eg after a trial of short-acting bronchodilators and long-acting bronchodilators), or in patients who are unable to use inhaled therapy.

**Adverse effects, interactions and precautions:**

These drugs have a number of unpleasant side effects including nausea and vomiting, insomnia, cardiac arrhythmias, seizures, and hypokalaemia. The liver enzymes responsible for theophylline metabolism are inhibited by a range of drugs, including macrolide antibiotics (eg erythromycin), quinolone antibiotics (eg ciprofloxacin). COPD administration of theophylline with these drugs may cause serious theophylline toxicity. In situations where such combination therapy cannot be avoided, the patient must be monitored closely.

The enzymes responsible for the metabolism of theophylline may also be induced by cigarette smoking and by other drugs, including rifampicin, and some anticonvulsants (eg phenytoin, carbamazepine, barbiturates). The introduction of concurrent therapy with one of these drugs may result in a loss of the therapeutic effect of theophylline.

Theophylline has a narrow therapeutic window, and the dosage for maintenance therapy should be based on assessment of clinical response and adverse effects. Lower doses may be required in the elderly or in hepatic impairment. Smokers will usually need higher doses. In the management of COPD, satisfactory clinical response may be attained with lower doses than are necessary for the treatment of asthma. Theophylline is well absorbed after oral administration, and has a highly variable half-life of approximately 8 hours in adults and 4 hours in children.

**Corticosteroids**

**Introduction**

Corticosteroids are widely used in the treatment of asthma and other respiratory diseases to reduce bronchial inflammation and hyperresponsiveness. They are thought to reduce the synthesis and secretion of a variety of inflammatory mediators (such as
prostaglandins and leukotrienes) and cytokines, which are implicated in the pathogenic process underlying asthma.

Corticosteroids are used in the management of both acute severe asthma and the preventive management of asthma. The agent available on the Tuvalu Essential Medicine List (EML) are prednisolone and is given orally, hydrocortisone and dexamethasone (used parenterally) and beclomethasone dipropionate given by inhalation.

Note that dexamethasone oral formulation is not available on the Tuvalu EML but is effectively interchangeable with prednisolone.

**Inhaled corticosteroids**

**Beclomethasone dipropionate**, is used as preventive (brown puffer) therapy in asthma. It has a delayed onset of clinical effect and should be used regularly. **It is not sufficiently potent and does not have a sufficiently rapid effect to be of use in acute severe asthma.**

**Adverse effects, interactions and precautions:** Inhaled corticosteroids do not generally produce systemic adverse effects until large doses are administered. Systemic effects are dependent on a complex interplay between:

- potency of the corticosteroid
- absorption of the drug deposited in the airway, and delivery device used (MDI with or without spacer),
- absorption of drug deposited in the pharynx and swallowed, and first-pass hepatic metabolism (to a minor degree).

In adults, doses at which systemic adverse effects may become manifest are those greater than 500 to 750 micrograms daily of beclomethasone. In children, doses at which systemic adverse effects may become manifest are those greater than 400 micrograms daily. Systemic adverse effects occur at lower doses in some patients, and the possibility of cataracts should be considered, particularly in those receiving therapy of extended duration. The dose at which the hypothalamic-pituitary-adrenal (HPA) axis is suppressed has not yet been established for any corticosteroid, so the lowest effective dose should always be recommended.

The effect of inhaled corticosteroids on long-term growth in children is unclear. Most studies have focused on short-term growth velocity and have failed to show any reduction in final height. In fact, children with severe asthma may have improved growth velocity after starting inhaled corticosteroids, perhaps by eliminating the growth-suppressive effects of poorly controlled asthma.

In low doses adverse effects are uncommon, but include hoarse voice and oral and oesophageal *Candida albicans* infection (candidiasis/thrush). To minimise oropharyngeal thrush and absorption of inhaled corticosteroids, patients should be advised to rinse their throat and mouth with water and spit out after inhalation. Patients using a puffer hould also be encouraged to use a spacer.

Corticosteroid nasal sprays may cause sneezing, nasal irritation and nosebleeds.
Oral corticosteroids

Oral prednisolone is well absorbed and is eliminated by liver metabolism. Its plasma half-life is approximately 3 hours; however, the biological action is prolonged for up to 24 hours. Its metabolism is enhanced by drugs that induce liver enzymes (eg phenytoin and carbamazepine) and inhibited by drugs that inhibit liver enzymes (eg erythromycin, roxythromycin).

Consideration of the patient’s weight and age, as well as the severity of the disease being treated, should guide the dosage regimen for systemic corticosteroids. In general the lowest dose possible to achieve the desired clinical response should be used.

Prednisolone is usually given as a short course lasting several days to weeks with the aim of disease control without exposing the patient to the corticosteroid for a long enough period for significant adverse effects to develop.

It is generally given as a single daily dose in the morning to mimic the natural cortisol peak. Dosing in the evening often results in sleep disturbances.

Dose reduction (tapering)
The hypothalamic-pituitary-adrenal axis is suppressed by glucocorticoid therapy. The dose, duration of treatment and individual patient characteristics affect the onset and extent of this effect. However, treatment with prednisolone at doses of 5 -10mg for longer than 2 weeks can be sufficient to cause adrenal suppression. Therefore tapering of the dose is required to avoid both adrenal insufficiency and also rebound in symptoms, which may occur with sudden cessation. The rate of reduction is dependent on the dose level, duration of treatment and underlying disease state.

Adverse effects
Systemic corticosteroid treatment inevitably results in adverse effects if the dose and/or duration of treatment are sufficient, because most are dose-related biological effects of the hormone.
Table 6. Important complications of corticosteroids

<table>
<thead>
<tr>
<th>Glucocorticoid</th>
<th>Mineralocorticoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ gastrointestinal effects (eg dyspepsia, risk factor for peptic ulceration, gastrointestinal bleeding)</td>
<td>▪ hypertension</td>
</tr>
<tr>
<td>▪ growth retardation</td>
<td>▪ hypokalaemic alkalosis</td>
</tr>
<tr>
<td>▪ immunosuppression, risk of infections</td>
<td>▪ sodium-retaining effects</td>
</tr>
<tr>
<td>▪ metabolic effects (eg diabetes, hypertriglyceridaemia)</td>
<td></td>
</tr>
<tr>
<td>▪ myopathy</td>
<td></td>
</tr>
<tr>
<td>▪ ocular effects, particularly increased intraocular pressure and cataracts</td>
<td></td>
</tr>
<tr>
<td>▪ osteoporosis</td>
<td></td>
</tr>
<tr>
<td>▪ pituitary-adrenal suppression</td>
<td></td>
</tr>
<tr>
<td>▪ psychological disturbances (eg euphoria, depression, paranoid psychosis)</td>
<td></td>
</tr>
<tr>
<td>▪ skin atrophy</td>
<td></td>
</tr>
<tr>
<td>▪ weight gain and redistribution of fat</td>
<td></td>
</tr>
</tbody>
</table>

**Parenteral corticosteroids**

**Hydrocortisone and Dexamethasone** are used intravenously for the acute treatment of asthma. The exact time course of action is not well established, but response takes at least some hours to develop.

Approximate dose equivalents of oral and parenteral corticosteroids are:

- Oral prednisolone 25mg
- IV hydrocortisone 100mg
- IV dexamethasone 4mg

**NB Prednisone is converted to prednisolone in the liver and is therefore should be used in the same dose as prednisolone**

Evidence suggests that moderate- to high-dose oral corticosteroids may be as effective as parenteral corticosteroid treatment for the management of acute asthma.

**Adverse effects:** Very few acute adverse effects are seen, but psychoses, mood changes, hypokalaemia and hyperglycaemia can occur.
Antihistamines

Introduction

Histamine and many other inflammatory mediator compounds are released from mast cells during type 1 (IgE-mediated) allergic reactions. Histamine released in this way stimulates $H_1$-receptors, which contributes to the signs and symptoms of this type of allergic reaction (eg redness, swelling, itching, sneezing, runny nose, nasal congestion, red eyes). Histamine $H_1$-receptor antagonists can be divided into 2 subgroups depending on their CNS effects: sedating and less sedating. *Promethazine* is available on the Tuvalu EML belongs to the first group and produces drowsiness and sedation.

Adverse effects, interactions and precautions: These drugs may affect psychomotor performance and the ability to drive motor vehicles or to operate heavy machinery. Patients must be advised of this, and cautioned against these activities. These drugs also potentiate the effect of other CNS depressants (eg alcohol).

Promethazine also has anticholinergic activity and may produce dry mouth, blurred vision, constipation and urinary retention. Its use may lead to a drying effect throughout the respiratory tract and a thickening of bronchial mucus. It should not be used where their anticholinergic activity may be contraindicated (eg in patients with narrow angle glaucoma or prostatic hypertrophy).

Use of respiratory drugs in competitive sport

Many drugs used in the management of respiratory illnesses may be banned or restricted in the context of competitive sport. Examples include some bronchodilators, corticosteroids and decongestants.

The following drugs in the Tuvalu EML have been permitted for use in national and international sporting competition by patients with asthma:

- salbutamol,
- beclomethasone,
- prednisolone, (when used out of competition)

In all instances, it is recommended that athletes contact their national sporting organisation before taking medication. In many cases written notification is needed via an Abbreviated Therapeutic Use Exemption form. The International Olympic Committee (IOC) (<http://www.olympic.org>) requires that athletes wishing to take asthma medications during the games have either significant bronchodilator response or a positive bronchial challenge test.
Drug-induced lung disease

Introduction

The number of drugs that have been shown to damage the respiratory system continues to grow. Drugs from the same pharmacological category tend to induce the same adverse effects. A thorough medication history should be undertaken and an adverse reaction considered in the differential diagnosis of unexplained lung disease.

Examples of drugs that can cause lung disease

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchospasm</td>
<td>beta blockers, contrast media, nonsteroidal anti-inflammatory drugs</td>
</tr>
<tr>
<td>Cough</td>
<td>angiotensin converting enzyme inhibitors</td>
</tr>
<tr>
<td>interstitial lung disease</td>
<td>amiodarone, methotrexate, nitrofurantoin</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>amiodarone, propranolol, bromocriptine, nitrofurantoin</td>
</tr>
<tr>
<td>systemic lupus erythematosus</td>
<td>hydralazine, isoniazid, phenytoin</td>
</tr>
</tbody>
</table>
Inhalational drug delivery devices

Introduction
Many respiratory drugs are delivered topically to the airway by inhalational devices; this achieves an effect on the airways with a rapid onset of action and minimal systemic adverse effects.

The devices available for drug delivery are metered dose inhalers (MDIs), commonly known as ‘puffers’ and used with or without spacers, and nebulisers.

Errors of technique occur with all devices, so it is important to check patient technique at each review. Demonstration and repetition are essential for achieving optimal patient technique.

Metered dose inhalers (MDIs) /Puffers

Introduction
A metered dose inhaler (MDI) or puffer is a multidose device usually containing micronised powdered medication and a propellant system such as hydrofluoroalkane (HFA). Care of these devices is important:

- The majority of puffers need to be washed regularly to avoid blockage.
- The recommended frequency of washing ranges from daily to monthly, depending on the device; refer to the specific product information for directions.
- Patients should shake the device every time they use it.
- If there appears to be very little liquid inside the canister when shaken, it is time to replace it.
- Technique

Since up to 70% of patients use an incorrect technique with a puffer, resulting in inadequate drug delivery to the lungs,

- check patient technique and demonstrate the correct technique (if necessary) at every opportunity. It has been shown that there is deterioration in technique within 2 months of correct demonstration.
- The device should be held upright with the mouthpiece at the bottom. This allows an accurate dose to be dispensed into the actuator valve.
- Deposition of the drug from the inhaler to the airway is achieved by coordinating the actuation of the puffer and inhalation of the aerosol mist.
- Starting at the end of a normal expiration, the puffer should be actuated once, at the same time as a slow deep inspiration through the mouth is undertaken. At the completion of the slow deep inspiration, the breath should be held for approximately 10 seconds.
There are two techniques which are both satisfactory if performed well:

* closed mouth where the lips are sealed around the mouthpiece of the MDI
  - open mouth where the inhaler is held up to 6 cm away from the open mouth.

Common errors when using puffers include:

- failing to coordinate the puffer actuation with the start of the inspiration
- inspiring too rapidly
- closing the mouth and then inspiring through the nose after actuation of the puffer
- actuating the puffer more than once during the inspiration
- failing to hold the breath.

Spacer devices

It is often appropriate to use a chamber device with the MDI. These spacers hold the aerosol cloud, which is produced from an MDI, in a confined space and allow subsequent inhalation over a longer period. Evaporation of some of the propellant produces particles of smaller size and gives the potential for greater endobronchial deposition. Spacer devices have a valve system, which can help patients who have problems with coordination. They are particularly useful in decreasing the oropharyngeal deposition of medication and increasing the proportion of the dose delivered to the lung. With inhaled corticosteroids, spacers are an important means of reducing candidiasis and dysphonia.

Inhalation of aerosol from the spacer should commence as soon after actuation as possible to minimise deposition in the spacer and loss of drug. One actuation of MDI per inhalation is recommended.

Spacer devices with MDI in appropriate doses may be substituted for nebulised medication during asthma exacerbations:

- 4 to 10 inhalations of standard dose short-acting beta₂ agonists can produce a similar bronchodilator effect to standard nebulised doses.

Spacers should be washed before initial use and at least monthly thereafter:

- Use warm water with kitchen detergent,
- Leave to drain (without rinsing) and allow to dry before use,
- A cloth should not be used to dry the spacer, as this can produce an electrostatic charge causing drug particles to adhere to the walls of the spacer.
Before using the spacer, it should be ‘primed’ by actuating 3 to 5 doses of drug; this minimises fluctuations in dose due to variation in electrostatic charge.

**Spacer devices (Figure 3)**

**Technique**
Correct use of a spacer is:
- shake the MDI before use
- insert MDI, mouthpiece down, into the spacer
- actuate the MDI
- inhale slowly and deeply from the spacer (starting as soon after actuation as possible)
- hold breath for 10 seconds.

Two modifications may be applicable for children.
- take 4 to 6 tidal breaths to inhale the aerosol
- use a face mask adapter to inhale from the spacer (infants and young children).

**Nebulisation**

**Introduction**

*There is a tendency to overuse this expensive form of drug delivery. The inhalation, via a large-volume spacer, of 4 to 10 separate actuations from a standard beta₂ agonist MDI, provides an equivalent bronchodilator effect to that achieved by nebulisation.*
Nebulisation aims to produce an aerosol from a solution of drug in a bowl. This may be done using a simple pump or, if electricity is unavailable, an oxygen cylinder. In children with asthma, oxygen, if available, may be the better choice.

**Technique**

Nebulisers produce reasonable aerosols with a flow of at least 8 L per minute. The nebuliser fill volume should be 2.5 to 5 mL of solution, which will usually achieve nebulisation of about 80% of the contents within the first 5 to 10 minutes. If nebulisation is incomplete after 10 or 15 minutes, the nebuliser might be blocked or cracked, or the pump may be faulty. Pumps should be serviced, and filters changed regularly—every 6 to 12 months depending on the amount of use.

**Use of devices in children**

MDIs with a spacer and mask can be used in children younger than 2 years of age. MDIs alone require a reasonable amount of coordination; therefore, they should not be used without a spacer.

---

**OXYGEN THERAPY**

Oxygen is essential for human metabolism and lack of oxygen is generally fatal within 5 to 6 minutes. Oxygen has almost no adverse effects in the acute situation and should not be withheld if there is any suggestion of it being needed. The indications for oxygen therapy are:

- respiratory arrest
- Hypoxia of any cause
- acute asthma attack
- exacerbation of COPD

Oxygen therapy should be monitored with pulse oximetry and blood gas estimation if available. Aim to achieve an oxygen saturation of at least 95%. Humidification of oxygen is not necessary.

**Methods of Oxygen Delivery**

a) Intranasal Catheters

These provide a low concentration of oxygen of between 25 and 40%. They should be used with an oxygen flow rate of between 1 and 4 litres/minute (1 – 2L/min in children). Higher flow rates cause drying of the nasal mucosa and are uncomfortable. They should only be used in patients with mild hypoxia or cardiac failure or myocardial ischaemia. They do not provide a high enough oxygen concentration for patients with significant hypoxia, carbon monoxide poisoning, shock or cardiac arrest.

b) Plastic Face Masks

These provide oxygen concentrations of between 35 and 70%. The oxygen flow rate should be set between 4 and 15 litres/minute. Do not use face masks with an oxygen flow rate less than 4 litres/minute. This method of oxygen delivery is suitable for patients with moderate hypoxia or shock.
c) Tight Fitting Face Masks (eg. Laerdal, CPAP masks)
   These devices can provide oxygen concentrations close to 100%. They should be used in patients with severe hypoxia or with cardiac arrest.

**Adverse Effects of Oxygen**

Patients with chronic obstructive airway disease and elevated carbon dioxide levels may occasionally have a hypoxia-dependent respiratory drive. In these patients, the administration of oxygen causes hypoventilation and an increase in the carbon dioxide level. Although this may cause problems it is far less dangerous than hypoxia itself. In the emergency situation, it is important that hypoxia is corrected - problems with carbon dioxide retention can be handled later. Do not hesitate to give oxygen to hypoxic patients with chronic obstructive airway disease.

Administration of 100% oxygen sometimes causes pulmonary toxicity but this only occurs after 24 hours and therefore is not a problem in the emergency situation.

**NOTE:** If arterial blood gases are available, then they should be measured before the commencement of oxygen to establish the baseline.
Pulmonary function testing

Introduction
Pulmonary function tests play a role in:

- assessing breathlessness, asthma and other chronic chest disorders
- monitoring response to treatment
- assessing fitness for surgery

The results are reported in relation to reference values and whether they fall within the normal range for an individual of that age and gender.

Available tests measure expiratory air flow.

**Peak expiratory flow (PEF)**

Uses a portable PEF meter and can be valuable in assessing the diurnal variability of airflow obstruction (a characteristic feature of asthma), as well as the response to therapy. The technique is simple and can be performed as part of the asthma management plan. It is not as sensitive as spirometry but patients can be taught to do it.

**Technique is important:**

- insert tube firmly into the monitor
- hold a few centimetres from the mouth
- take in and hold as deep a breath as possible
- put tube into mouth and close lips firmly around it
- blow into tube as hard, fast and long as possible
- Rest for 30 seconds
- Repeat above steps twice
- Record best result

**Spirometry**

This measures more parameters of lung function and is more accurate than PEF. However the test is effort-dependent, and should be performed by trained personnel in order to obtain reproducible results.

It should be performed using the same technique as for PEF

For immediate assessment and ongoing monitoring of asthma the forced expiratory volume exhaled in 1 second (FEV₁) is the most useful. For assessment of lung damage in a variety of lung diseases, the expiratory forced vital capacity (FVC) and the total lung
capacity (TLC) can be helpful. Additionally the FEV₁ can be recorded and expressed as a percentage of FVC.

Results for an individual can be compared with reference values matched for age, gender, height and ethnicity. The range of normal values for the FEV₁ and FVC is between 80% and 120% of that predicted from the reference values.

**Spirogram**

![Spirogram Diagram](image-url)
Spirogram showing obstructive ventilatory defect

Normal
FEV₁ = 4
FVC = 5
FEV₁/FVC = 80%

Mild
FEV₁ = 3
FVC = 5
FEV₁/FVC = 60%

Moderate
FEV₁ = 2.5
FVC = 5
FEV₁/FVC = 50%

Severe
FEV₁ = 1.4
FVC = 4
FEV₁/FVC = 35%
Pulse oximetry measures oxyhaemoglobin saturation (SaO$_2$) by applying a clip containing light-emitting diodes to the finger or earlobe. The method is non-invasive and, where available, can provide very helpful information in the diagnosis of severity of respiratory disease. It can also be helpful in assessing progress in the management of acute asthma and respiratory failure.

Asthma

Introduction
Asthma is a common chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation causes an associated increase in airway hyperresponsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is reversible either spontaneously or with treatment.

Management includes prevention of attacks, treatment of acute attacks and, where necessary, long term medication which works best with strict adherence. All patients, both adult and children, should be given an asthma plan which needs frequent review and repetition to ensure full understanding by the patient or parents.

It is essential that they understand the difference between the blue reliever puffers (MDIs) and the brown preventer puffers.

Prevention of attacks
It may be possible to prevent or reduce the severity of attacks by:

- avoidance of trigger factors where possible eg known allergens, tobacco smoke, stress etc
- appropriate management of acute exacerbations
- appropriate management of infections
- appropriate long-term medication use with an individual patient management plan
- Regular assessment by lung function tests
Avoidance of drugs that can cause bronchoconstriction eg beta blockers, aspirin, ibuprofen and indomethacin.

NB Paracetamol is rarely a problem and is the analgesic of choice for asthmatics.

*Treatment of an acute attack of asthma*

This must always be treated as a serious emergency

Severity is estimated by clinical assessment, measurement of peak expiratory flow rate and by pulse oximetry.

- Pulse rate may also be helpful in indicating severity of an attack:
  - Mild <100
  - Moderate 100-120 (children 100-200)
  - Severe >120 (children >200)

Wheezing is an unreliable indicator of the severity of an asthma attack and may be absent in a severe attack. In severe asthma the patients will lack sufficient air flow to perform lung function tests.

Cyanosis indicates life-threatening asthma.

All patients with moderate or severe asthma should be given oxygen. Patients with severe asthma should be managed in an intensive care unit if possible and may occasionally require intubation and mechanical ventilation.

**In ADULTS:**

**Oxygen**

Give oxygen via face mask if moderate or severe asthma.

**Beta-adrenergic Agonists**

Use beta-adrenergic agonists to reverse bronchospasm. In very severe asthma intravenous salbutamol may be useful in addition to nebulized.

Give salbutamol 5 mg by nebulizer with oxygen and repeat every 30 minutes if necessary (or give continuously in severe asthma)

OR
Give salbutamol by puffer using spacer (up to 50 puffs) if nebulisers are not available

PLUS if very severe

Give salbutamol 5 microgram/kg intravenously (to a maximum of 250 microgram) over one minute then commence an infusion at 5 microgram/kg per hour

NOTE: Continuous nebulized salbutamol is probably as effective as intravenous

**Anticholinergics**

These agents have a synergistic effect with beta-adrenergic agonists. In severe asthma consider the use of ipratropium.

Give ipratropium bromide 0.5 mg by nebulizer and repeat every 4 hours if necessary

**Corticosteroids**

Steroids reduce inflammation of the airways. Their effects are delayed for at least 4 hours but they are important to prevent relapse. Oral steroids are as effective as those given parenterally in most patients.

Give hydrocortisone 200 mg intravenously then 100mg six hourly

OR

Give prednisolone 50 mg orally daily

**Other Drugs**

Aminophylline provides no additional benefit to optimal doses of beta-adrenergic agonists. It has a number of undesirable side effects including seizures, ventricular tachycardia, hypokalaemia and vomiting. Routine use in asthma is not recommended. However, it may be of benefit in patients with severe asthma who require hospitalisation. A loading dose is given to patients who are not taking oral theophylline:

Give aminophylline 5 mg/kg (to a maximum of 250 mg) intravenously over 5 minutes

Adrenaline does not appear to have any advantage over salbutamol. It may be used as a last resort or when intravenous access or nebulisers are not available:

Give 1:1000 adrenaline 0.5 - 1 mL intramuscularly or subcutaneously

NOTE: Adrenaline may be given down the endotracheal tube - the dose is 5 times the intravenous dose and it should be diluted in 10 ml of normal saline.
In CHILDREN:

**Oxygen**
Give oxygen via face mask to all children with asthma.

**Beta-adrenergic Agonists**
Use beta-adrenergic agonists to reverse bronchospasm. In very severe asthma intravenous salbutamol may be useful in addition to nebulized.

Give *salbutamol* 2.5 mg by nebulizer with oxygen to children 5 years of age or under, or give 5 mg by nebulizer to children over 5 years and repeat every 30 minutes if necessary (or give continuously in severe asthma)

PLUS if very severe

one minute then commence an infusion at 5 microgram/kg per hour

NOTE: Intravenous salbutamol may be more effective than continuous nebulized in young children with severe asthma.

**Anticholinergics**
These agents have a synergistic effect with beta-adrenergic agonists.

Give *ipratropium bromide* 0.25 mg by nebulizer and repeat every 4 hours if necessary

**Corticosteroids**
Steroids reduce inflammation of the airways. Their effects are delayed for at least 4 hours but they are important to prevent relapse. Oral steroids are as effective as those given parenterally in most patients.

Give *hydrocortisone* 1 - 4 mg/kg intravenously to a maximum of 200 mg then every six hourly

OR

Give *dexamethasone* 0.2 mg/kg intravenously or intramuscular to a maximum of 8 mg

OR

Give *prednisolone (prednisone)* 1 mg/kg orally to a maximum of 50 mg daily

**Other Drugs**
Aminophylline provides no additional benefit to optimal doses of beta-adrenergic agonists. It has a number of undesirable side effects including seizures, ventricular tachycardia, hypokalaemia and vomiting. Routine use in asthma is not recommended. However it may be of benefit in patients with severe asthma. A loading dose is given to patients who are not taking oral theophylline:

Give *aminophylline* 5 mg/kg (to a maximum of 250 mg) intravenously over 5 minutes

Adrenaline does not appear to have any advantage over salbutamol. It may be used in severe asthma as a last resort or when intravenous access is not available:

Give *1:1000 adrenaline* 0.1 ml/kg intramuscularly or subcutaneously to a maximum of 0.5 ml

**Management after an acute attack**

*Adults*

All patients will need follow up and some form of on going therapy

- review trigger factors to identify the possible cause of the attack
- discuss avoidance measures
- start or adjust the patient’s maintenance therapy
- design or adjust the patient’s asthma action plan
- review adherence to prescribed medication regimen.

**Continuing Management**

*Mild Episodic*

Patients may only need to use:

- salbutamol puffer 1-2 puffs up to 8 puffs a day. (with spacer for children or adults with poor coordination)

They should all be advised of the symptoms of an acute attack and told to seek medical advice if their need to use the puffer increases or they are using more than 8 puffs a day

**OR**

if unable to use a puffer with or without a spacer

GIVE

- Salbutamol tablets 4mg 6-8hourly
OR

- Theophylline SR 300mg orally bd

**Moderate Persistent**

- salbutamol puffer 1-2 puffs prn up to 8 puffs a day. (with spacer for children or adults with poor coordination)

OR

if unable to use a puffer with or without a spacer

- Salbutamol tablets 4mg 6-8hourly

OR

- Theophylline SR 300mg orally bd

AND ADD

- beclomethasone dipropionate 100 microgram bd

Review

- any new trigger factors
- asthma management plan
- arrange for follow up if possible

**Severe Persistent**

If symptoms persist or deteriorate

- continue any existing oral therapy and inhaled salbutamol

AND CONSIDER

- Using a spacer with 5-10 puffs inhaled over 5-10 minutes every 2 hours
- If available give nebulised salbutamol 5mg over 10 minutes 2-4 hourly
• Increase beclomethasone dipropionate dose to 200 microgram bd

IF SYMPTOMS PERSIST START

• Prednisolone 25-50mg orally daily for 1-2 weeks

If response is good tail off the predisolone aver 10days

Some patients with severe asthma will need:

• Prednisolone 5-7.5mg orally long term

If none of the above treatments produce improvement the patient should be referred urgently to hospital for acute management

Children

All should have follow up and some form of on going therapy and asthma plan

• review trigger factors to identify the possible cause of the attack
• discuss avoidance measures
• start or adjust the patient’s maintenance therapy
• design or adjust the patient’s asthma action plan
• review adherence to prescribed medication regimen.

Mild Episodic

GIVE

• salbutamol puffer 1-2 puffs prn up to 8 puffs a day (with spacer.)

Parents should be advised of the symptoms of an acute attack and told to seek medical advice if their need to use the puffer increases or they are using more than 8 puffs a day

Moderate Persistent

• salbutamol puffer 1-2 puffs prn up to 8 puffs a day. (with spacer )

OR
if unable to use a puffer with or without a spacer

AND ADD

For children over 6 and/or able to use an inhaler with a spacer

- beclomethasone dipropionate 50-100 microgram bd

For children under 6 and/or unable to use an inhaler with spacer

GIVE

- Prednisolone 1mg/Kg a day for 3 days and review

  If unable to reduce or cease prednisolone refer to a doctor

**Severe Persistent**

If symptoms persist or deteriorate

- continue any existing oral therapy and inhaled salbutamol

AND GIVE IF POSSIBLE

- 5-10 puffs salbutamol inhaled using a spacer over 5-10 minutes every 2 hours
- If available give nebulised salbutamol 5mg over 10 minutes 2-4 hourly
- Increase beclomethasone dipropionate dose to 100 microgram bd

OR for children unable to inhale with a spacer

GIVE

- Prednisolone 2mg/kg orally daily for 1-2 days

If none of the above treatments produce improvement the patient should be referred urgently to hospital
Review and education

Introduction
Optimal self-management and education with regular clinical review results in significant reductions in emergency health care utilisation. A structured program, conducted over time, that teaches detection and management of deteriorating asthma and optimal use of medications is required. Essential components are:

- written information about asthma
- self-monitoring and feedback
- education about optimal delivery device technique (see [Inhalational drug delivery devices]).
- provision of an individualised written asthma action plan (see [Asthma action plan])
- regular medical review and assessment of medications (including corticosteroid dose reduction when the patient has been stable for a reasonable length of time, eg 3 months).

Adherence (compliance)
If asthma control is poor despite apparently adequate treatment, consider poor adherence. Adherence falls with improvement in symptoms. Strategies that may improve adherence include:

- utilising an open, nonjudgmental approach when discussing adherence
- allowing the patient to express their concerns about medication, and addressing these concerns
- improving the patient’s understanding of asthma management over a period of time. Comprehensive information can rarely be retained after one visit
- explaining the goals of treatment. Adherence will be improved if your aims are in concordance with the patient’s goals
- keeping treatment simple and setting achievable goals in collaboration with the patient (using once- or twice-daily dosing where possible, using as few medications as possible)
- discussing potential adverse effects. For further information, see [Getting to know your drugs]
- identifying useful daily associations to simplify medication adherence (eg using preventive therapy in the bathroom, and then brushing teeth)
- obtaining support of the patient’s family and peers
- keeping in touch.

- need for infants or toddlers to use oral or inhaled corticosteroids
- the need for older children to use maintenance inhaled corticosteroid therapy at doses greater than 600 micrograms daily of beclomethasone (or the equivalent dose of other drugs)
- the need for a discussion on complications of treatment
- suspected occupational asthma
- the need for a detailed discussion on control of the home environment.
**Asthma management plan**

In the management of asthma, both patients and health professionals should use the same framework of management and similar terminology. To facilitate this, a 6-point management plan has been proposed:

- Assess asthma severity,
- Achieve best lung function
- Maintain best lung function: identify and avoid trigger factors
- Maintain best lung function: optimise medication program
- Develop an asthma action plan

Educate and review regularly

**Asthma action plan**

All patients should have an asthma action plan—in written form—that outlines how to:

- recognise symptoms of asthma deterioration
- start treatment
- reach medical attention.

Action plans may be based on peak expiratory flow (PEF) measurements or asthma symptoms or both. Plans should be simple, individualised and based on 2 to 4 action points. Plans based on PEF measurements should use personal best PEF as for action points.

*All patients with asthma should know how to obtain prompt medical assistance.*

The principles of asthma action plans are:

- increase the dose and frequency of inhaled beta2 agonist
- increase the dose of inhaled corticosteroid or commence prednisolone if the patient is already on a high dose of inhaled corticosteroid
- obtain prompt medical attention
- in an emergency, immediate use of a high-dose inhaled short-acting beta2 agonist (eg salbutamol 6 to 10 inhalations by MDI or 5 mg by nebuliser) and transfer to an emergency department (preferably by an ambulance that carries supplemental oxygen).

*Asthma action plans must be individualised.*

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6 By the Thoracic Society of Australia and New Zealand, The Royal Australian College of General Practitioners, the Pharmaceutical Society of Australia and the Asthma Foundations, through the National Asthma Council.
Chronic obstructive pulmonary disease (COPD)

Definitions
Chronic obstructive airways disease (COPD) is characterised by airflow obstruction that is not fully reversible. The airflow limitation is in most cases both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases, most commonly cigarette smoke. COPD is usually some combination of:

- emphysema, where the lung parenchyma is structurally damaged, with destruction of alveolar septa and formation of abnormally enlarged airspaces
- airway damage with airway wall thickening and narrowing of the airway.
- Chronic bronchitis which is defined clinically as a cough productive of sputum, occurring on a daily basis for 3 months in each of 2 consecutive years

Some patients may have bronchodilator responsiveness whether or not they have a history of asthma. The dyspnoea of COPD is frequently associated with cough, sputum production, recurrent respiratory infection and wheezing, which may only be evident during infective exacerbations. Typically, the dyspnoea has developed insidiously over several years and it may be the patient’s only symptom.

Typically, COPD affects middle-aged and older people, and cigarette smoking is the major causative factor. The figure illustrates the accelerated decline in lung function caused by smoking.
The differences between the lines illustrate effects that smoking, and stopping smoking, can have on the FEV$_1$. This figure shows the rate of loss of FEV$_1$ for one particular susceptible smoker; other susceptible smokers will have different rates of loss, thus reaching ‘disability’ at different ages.

† = death, the underlying cause of which is irreversible chronic obstructive pulmonary disease, whether the immediate cause of death is respiratory failure, pneumonia, cor pulmonale or aggravation of other heart disease by respiratory insufficiency

This figure was first published in Fletcher C, Peto R. The natural history of chronic airflow obstruction. BMJ 1977;1:1645-8 and is reproduced by permission of the BMJ Publishing Group.

Solid line mean and SD   Decide locally how much information to include but will need reference

Measurement of lung function

The spirometric abnormalities associated with COPD are a reduction in postbronchodilator forced expiratory volume in 1 second (FEV$_1$), and a reduction in the FEV$_1$/forced vital capacity (FVC) ratio to less than 70% (ie an obstructive pattern).
Management of chronic stable COPD

**Smoking cessation**

*Smoking cessation is the only intervention that has been shown to improve the natural history of COPD; to prevent deterioration it is vital that the patient stops smoking.* (see figure 3)

**Bronchodilators for long-term treatment of COPD**

**Introduction**

In the long-term treatment of COPD, bronchodilators are recommended for the relief of wheezing and shortness of breath. Anticholinergic agents are more effective in COPD than they are in asthma.

Bronchodilators can improve the FEV₁, FVC and exercise tolerance independently of each other. Spirometric changes are not seen in all patients, but improvement in symptoms and functional capacity can occur even without spirometric changes.

GIVE

- salbutamol 100 to 200 micrograms MDI by inhalation, up to 4 times daily

OR

- ipratropium bromide 40 to 80 micrograms by inhalation, up to 4 times daily.

If the response to initial single-agent therapy is unsatisfactory or the patient has moderate to severe disease,

GIVE

- salbutamol 100 to 200 micrograms MDI by inhalation, up to 4 times daily

PLUS

- ipratropium bromide 40 to 80 micrograms by inhalation, up to 4 times daily.

.. Patients with poor inhalation technique can use a large-volume spacer; this improves lung deposition of the aerosol

In patients who are unable to use an MDI (with or without a spacer),

USE

- Salbutamol 4mg orally up to 8 hourly as tolerated

OR

- Theophylline SR 300mg bd
The effect of these agents may be monitored by self reported symptoms or by PEF or spirometry.

**Corticosteroids for long-term treatment of COPD**

**Introduction**

Only 10% of patients with stable COPD benefit in the short term from corticosteroids. There are no distinguishing clinical features to predict which patients may benefit. Oral corticosteroid reversibility tests do not predict response to inhaled corticosteroids; they should not be used to identify which patients should be prescribed inhaled corticosteroids.

**Inhaled corticosteroids**

The aim of treatment with inhaled corticosteroids is to reduce exacerbation rates and slow the decline in health status, not to improve lung function *per se*. The effect of inhaled corticosteroids on mortality is uncertain.

**Benefits are not seen in patients with COPD who continue to smoke cigarettes.**

Inhaled corticosteroids should be prescribed for patients:

- with an FEV$_1$ less than or equal to 50% predicted
- who have documented evidence of responsiveness to inhaled corticosteroids (on PEF or spirometry)
- who have had 2 or more exacerbations requiring treatment with antibiotics or oral corticosteroids in a 12-month period.

**GIVE**

- beclomethasone dipropionate 300 to 400 micrograms by inhalation, twice daily

To minimise oropharyngeal candidiasis and systemic absorption of inhaled corticosteroids, patients should be advised to rinse their throat and mouth with water and spit out after inhalation. Patients using a puffer should also be advised to use a spacer to lessen the risk of candidiasis and dysphonia.

The response to corticosteroids should be closely monitored with measurement of PEF or spirometry.

*Patients who do not suffer frequent exacerbations should be assessed after about 6 weeks of treatment. Because of the potential risks of long-term corticosteroid use, only those patients in whom clear objective benefit has been obtained should continue with treatment. Inhaled corticosteroid doses should be gradually reduced to the minimum dose that maintains subjective benefit.*

**Oral corticosteroids**

Oral corticosteroids are not recommended for maintenance therapy in COPD. However, they may be needed in some patients with advanced COPD in whom corticosteroids cannot be withdrawn following an acute exacerbation. In these cases, the dose of oral corticosteroid should be kept as low as possible.
**Combined therapy for long-term treatment of COPD**

If patients remain symptomatic on monotherapy, their treatment should be intensified by combining therapies from different drug classes. Combined therapy should be discontinued if there is no benefit in symptoms or lung function tests.

**Management of pulmonary hypertension and cor pulmonale**

Cor pulmonale is defined as an alteration in the structure and function of the right ventricle caused by a primary disorder of the respiratory system. Pulmonary hypertension is the common link between lung dysfunction and the heart in cor pulmonale. Hypoxic patients with COPD develop pulmonary hypertension, which may be present for years without causing symptoms. In some patients it leads to the development of the clinical syndrome of cor pulmonale. This should be considered if patients with COPD have:

- peripheral oedema
- raised jugular venous pressure
- a systolic parasternal heave
- a loud pulmonary second heart sound.

**GIVE**

- Frusemide 40-80mg orally daily

If this is insufficient to control symptoms and signs

**ADD**

- Enalapril 2.5mg daily followed by gradual increments to a maximum of 20mg daily

Hypotension can result after the first dose in the elderly, patients who are already dehydrated by diuretic therapy, in the presence of pre-existing hyponatraemia and concurrent treatment with other anti-hypertensive drugs.

**Obstructive sleep apnoea**

Obstructive sleep apnoea is common in patients with COPD, particularly in those with advanced disease. Patients with COPD and coexisting sleep apnoea may have hypoxaemia that worsens during sleep and in the recumbent position (see [Obstructive sleep apnoea]).

**Self-management plan**

Patients at risk of having an exacerbation of COPD should have a self-management plan and be encouraged to respond promptly to the symptoms of an exacerbation. This plan should outline the initial response the patient should take, and may include:

- if breathlessness increases—adjust bronchodilator therapy to control symptoms
• if breathlessness increases and interferes with activities of daily living—start oral corticosteroid therapy (unless contraindicated)
• if sputum increases in volume or becomes purulent—start antibiotics.

These patients should keep a course of antibiotic and corticosteroid tablets at home for use

**Antitussive therapy**

Sipping hot water with or without honey, lemon and ginger can be soothing but other antitussive therapy should not be used in the management of stable COPD. Antitussive therapy may suppress breathing and induce hypercapnia, and can be counterproductive by causing sputum retention and constipation.

**Prophylactic antibiotic therapy**

There is insufficient evidence to recommend prophylactic antibiotic therapy in the management of stable COPD.

**Acute Exacerbation of Chronic Obstructive Pulmonary Disease**

Exacerbation of chronic obstructive airways disease (COPD) is a common problem in emergency medicine. The response of COPD to treatment is generally slower than that of asthma and most patients require admission.

**Oxygen**

It is essential that oxygen be given to maintain oxygen saturation greater than 92%. Although administration of oxygen can cause an elevation in arterial carbon dioxide levels in a few patients, this is far less of a problem than hypoxia itself. For mildly hypoxic patients oxygen via an intranasal catheter will be sufficient while those with more severe hypoxia may require oxygen via a face mask. Use the lowest flow rate necessary to maintain an adequate arterial oxygen saturation.

CAUTION: In patients with CO2 retention, oxygen saturation should be maintained between 90 – 95%.

**Bronchodilators**

Salbutamol and ipratropium have a synergistic action:

• Give salbutamol 5 mg via nebulizer every 2 to 4 hours
  
  PLUS

• Give ipratropium bromide 0.5 mg via nebulizer every 4 hours

*If a nebuliser is not available use puffers with a spacer*
**Corticosteroids**

Oral and parenteral routes are equally effective except in the sickest patients.

- Give *hydrocortisone 200 mg intravenously every 6 hours*
  
  OR

- Give *prednisolone 40 mg orally daily*

**Antibiotics**

Since many exacerbations of chronic obstructive pulmonary disease (COPD) are due to viral infection or noninfective causes, antibiotics are only occasionally indicated. At least half of patients with chronic bronchitis are persistently colonised with *Haemophilus influenzae, Streptococcus pneumoniae* or *Moraxella catarrhalis*—hence a positive sputum culture is not necessarily indicative of acute infection.

However, these organisms may be responsible for more severe exacerbations, in which antibiotics have been shown to be of benefit. The aim of treatment with antibiotics in acute exacerbations of chronic bronchitis is to reduce the volume and purulence of sputum; elimination of colonising organisms is not required.

*Antibiotics have been shown to be effective only when all 3 cardinal symptoms of acute bacterial exacerbations are present: increased dyspnoea, increased sputum volume and sputum purulence.*

When indicated, use

- Give *amoxycillin 500 mg orally or ampicillin 500mg intravenously every 8 hours*
  
  OR if penicillin sensitive

- Give *erythromycin 500 mg orally every 6 hours for 5-7 days*

**Cough**

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**Introduction**

Cough is a frequent symptom and sign of an underlying disease, but is not itself a diagnosis. Management should concentrate on defining and then treating the underlying cause, if appropriate and possible.
Cough may be due to:

- Smoking
- Infections eg viral sore throat, tracheitis, pneumonia, tb etc
- Asthma
- Rhinitis/postnasal drip
- Oesophageal reflux
- Aspiration eg neuromuscular disorders, stroke
- Drugs eg angiotensin converting enzyme inhibitors, beta blockers
- Carcinoma of bronchus or lung
- Bronchiectasis
- Interstitial lung disease
- Heart Failure, especially if cough nocturnal

Cough in Adults

The most important aspect of management is the diagnosis treatment of any underlying condition and reassurance where appropriate.

Cough Linctuses and cough suppressants are of little value and sipping hot water, with or without lemon, honey and ginger is as effective as anything.

If cough is associated with a sore throat or upper respiratory infection

GIVE

- Paracetamol 1g orally 6 hourly – maximum dose 8g a day for no more than 3 days
Paediatric aspects of cough

**Causes**

**Introduction**

Many of the common causes of cough in adults occur in children. More so than in adults with chronic cough, there is considerable controversy regarding the importance of post-nasal drip and gastro-oesophageal reflux in the aetiology of chronic cough in children. Some additional factors that need to be considered are outlined below.

**Infections**

Recurrent viral bronchitis is the most common cause of recurrent cough in children. Specific infections, such as pertussis, TB and those caused by *Mycoplasma pneumoniae*, cause cough as a part of typical clinical syndromes. *Chlamydomphila* (formerly known as *Chlamydia*) infection may cause a prolonged cough in the first few months of life.

**CROUP**

Croup is a viral infection of the upper airway which affects children from the ages of 6 months to 3 years. It is characterised by fever, a harsh cough, a hoarse voice and stridor. Children who have stridor while at rest or who have signs of respiratory distress (i.e. suprasternal retraction, tachypnea, restlessness) should be admitted. Pulse oximetry is useful – an oxygen saturation of 93% or less while breathing air is also an indication for admission. Most cases of croup however are mild and self-limited.

**Mild croup**

These patients will have stridor only with exertion or crying and no signs of respiratory distress. Avoid exposure to cold air. Give paracetamol for fever.

- Give *paracetamol* 20 mg/kg every 4 hours

**Moderate croup**

These patients will have stridor at rest and some signs of respiratory distress but oxygen saturation should be greater than 90% on air.

- Give *oxygen to maintain an oxygen saturation greater than 93%*
  
  PLUS

- Give *dexamethasone* 0.6 mg/kg intramuscularly as a single dose
Severe croup

These patients will have signs of marked respiratory distress plus hypoxia or cyanosis. Admission to an intensive care unit is desirable and intubation may be necessary.

- Give oxygen to maintain an oxygen saturation greater than 93%

PLUS

- Give dexamethasone 0.6mg/kg intramuscularly as a single dose (SUBSTITUTE WITH HYDROCORTISONE)

PLUS

- Give nebulized adrenaline, 0.5 ml/kg of 1:1000 solution or 0.05 ml/kg of a 1% solution diluted with saline to a volume of 2.5 ml

NOTE: Patients who fail to respond to nebulized adrenaline may require endotracheal intubation. Nebulized adrenaline provides only temporary relief of airway obstruction lasting 1 to 2 hours. Patients should be closely observed after this period for recurrence of obstruction.

'Asthma'

In the absence of wheeze or evidence of reversible airway obstruction, the presence of cough alone is unlikely to be due to asthma. Recent studies suggest that many children with these symptoms have increased cough receptor sensitivity secondary to viral respiratory infections. These children do not generally respond to antiasthma medications, especially inhaled corticosteroids.

Mechanical causes

A persistent unproductive irritant cough with no obvious cause may be an indication for bronchoscopy to exclude the following: a foreign body, an unusual focal lesion of the bronchial wall, or an extrinsic lesion pressing on the airway.

Aspiration of milk should be considered as a cause in infants when cough is related to feeding.

Smoking

Smoking should be considered as a cause of cough in children: 10% of children are regular smokers by the age of 12 years. Environmental tobacco smoke exposure from parental smoking may also be a cause of cough, especially in children under 2 years of age.
Therapy

Antitussive medications have a very limited place in paediatric practice.

If parents ask for something to soothe the child’s throat

SUGGEST

- Hot water with honey, lemon and ginger. This may be sipped as often as required

Upper Respiratory Tract Infections

Rhinitis

Rhinitis is common, affecting approximately 20% of the population. In a patient complaining of rhinitis symptoms—sneezing, rhinorhoea, nasal obstruction, post-nasal drip, itching of the nose—it is important to exclude any underlying or associated pathology (eg chronic sinusitis, nasal polyps,) before commencing drug treatment. Unilateral foul-smelling discharge, especially in children, may indicate a foreign body in the nasal cavity.

Causes of rhinitis include:

- infections—viral, bacterial or fungal
- environmental allergens
- occupational exposures (eg wood dust, grains, chemical, latex, aerosols of nickel salts)
- drug use (eg aspirin, NSAIDs, antihypertensives, oral contraceptives), drug abuse (eg cocaine sniffing),
- hormonal changes related to menstrual cycle, pregnancy or puberty

Rhinitis can occasionally be caused by emotional changes, by some foods, or by other conditions such as gastro-oesophageal reflux, especially in children.

Acute viral rhinitis: common cold

- In the large majority of cases antibiotics should not be given and management should be non pharmacological
- Fever with significant facial pain and frank pus from the nose suggests sinusitis, and antibiotic treatment may be indicated.

GIVE

- Amoxycillin 500mg orally 8 hourly for 7 days
- Adequate hydration, especially in children, is the most important aspect of management.
If fever and/or headache are present

**GIVE ADULTS**

- Paracetamol 1g 4-6 hourly orally in adults. Maximum dose 8g a day for no more than 3 days for adults

**GIVE CHILDREN**

- Paracetamol 20mg/kg every 4 hours for a maximum of 48 hours

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**Allergic rhinitis**

**Introduction**

Over the last decade, the prevalence of allergic rhinitis has increased worldwide. It is caused by environmental allergens and can be aggravated by chemical irritants (e.g., active or passive smoking). If possible, establish the cause of the allergy and advise the patient on techniques to minimize exposure to both allergens and irritants. Allergic rhinitis and asthma often coexist and this association should be looked for.

Allergic rhinitis is classified as either intermittent (lasting for less than 4 days of the week or less than 4 weeks) or persistent (lasting for more than 4 days of the week and more than 4 weeks). The severity of symptoms is classified as either mild or moderate/severe.

**Mild disease**

Mild disease minimally impairs daily activities (including work, sport, school and leisure) and does not usually cause sleep disruption. If the patient has persistent disease with significant sleep disturbance

**GIVE**

- Promethazine 10mg at bedtime

Patients should be advised that sedating antihistamines may interact with alcohol and may affect ability to drive and operate machinery.

**Moderate/severe disease or inadequately controlled mild disease**

Rhinitis is defined as moderate/severe disease if it interferes with sleep and/or impairs activities of daily living, leisure, work, school or sport. Intranasal corticosteroids can be helpful in this situation. They have a slow onset of action and need to be used continually for maximum effect. They are effective for the relief of all rhinitis symptoms (including nasal congestion) and often relieve eye symptoms. Patients need to be advised to shake the device, and to clear the nasal passages before using the nasal spray (the use of a saline nasal spray may be helpful)

**GIVE**
• beclomethasone dipropionate 50 micrograms/spray, 2 to 4 sprays into each nostril, twice daily (child 3 to 12 years: 1 spray into each nostril, twice daily). The drug not available in current EML.

NB referral to an ENT clinic will be necessary to obtain necessary advice.

**Nonallergic rhinitis**

The mainstay of management of nonallergic rhinitis is to try to identify any cause and correct this if possible. Intranasal corticosteroids often provide symptom relief, but may have to be continued for prolonged periods. In vasomotor rhinitis

**Intractable rhinitis**

If symptoms of rhinitis are continuous and not controlled by maximum doses of intranasal corticosteroids, the diagnosis should be reviewed—consider enlarged adenoids in children or chronic sinusitis in adults. Referral to an ear nose and throat surgeon may be helpful, especially if nasal polyposis that has not responded to intranasal corticosteroids is present; surgical resection may be needed.

In children who have rhinitis for more than 3 months, a bacterial infection may be present.

For recommendations about choice of antibiotic and length of treatment, see the section on sinusitis in For severe and persistent allergic rhinitis in adults that has not responded to topical corticosteroids, consider

\[
\text{prednisolone 10 to 25 mg orally, once daily for 7 to 10 days.}
\]

However, prednisolone should not be used long-term for rhinitis. A single intramuscular injection of a depot preparation of methylprednisolone is sometimes used.

**Acute Epiglottitis**

Epiglottitis is a medical emergency and failure to provide prompt treatment may be fatal. It is due to infection of the epiglottis with Haemophilus influenzae bacteria. Epiglottitis mainly affects children between the ages of 3 and 8 years but is occasionally seen in adults as well. It is characterised by fever, inspiratory and expiratory upper airway noises, a severe sore throat, dysphagia and drooling. The patient usually looks very unwell.

There is a very high risk of acute airway obstruction. All patients should be referred immediately to an anaesthetist and admitted to an intensive care unit. Attempting to view the throat or otherwise upsetting the child may cause airway obstruction and should be avoided. Keep the patient sitting up.

Give

• *ceftriaxone 100 mg/kg stat then 50mg/kg intravenously daily*

OR

Give
- chloramphenicol 40 mg/kg stat then 25mg/kg intravenously daily

**Early transfer to oral therapy is desirable**

- Chloramphenicol 750mg-1g IV 6 hourly for 5-10 days.

Alternative:
- Ceftriaxone 2g IV as a single dose daily 5-10 days (impatient use only) OR
- Ampicillin 500mg-1g IV 6 hourly for 5-10 days (when sensitivity known)

## Lower Respiratory Tract Infections

### ACUTE BRONCHITIS

In an immunocompetent adult or child, acute bronchitis is most often viral and does not require antibiotic therapy. Randomized controlled trails show that antibiotic therapy provides on overall benefit to the patient and may cause harm.

If severe and practically if sputum is voluminous and purulent, with fever, secondary bacterial infections is assumed:
- Amoxycillin 500mg orally 8 hours for 5-7 days.

Alternative:
- Doxycycline 100mg orally 12 hours for 7 days (if available) OR
- Tetracycline 500mg orally 6 hours for 5-7 days OR
- Erythromycin 500mg orally 6 hours for 5-7 days

### ACUTE EXACERBATION OF CHRONIC BRONCHITIS

Acute exacerbation could be either viral or bacterial infection. Common organisms include *Strep pneumoniae, H influenzae, Moraxella catarrhalis*. The indication for Antibiotic therapy is increased cough and dyspnoea TOGETHER with increased sputum volume and/or Purulence.

Treatment as for Acute Bronchitis above.

## PNEUMONIA

### COMMUNITY ACQUIRED

Choice of antibiotic is often empirical. In immunocompetent, otherwise healthy patients it is usually caused by single microorganisms such as *Streptococcus pneumoniae, H influenzae, Mycoplasma pneumoniae, Chlamydia, Staph aureus* is not uncommon in Tuvalu
Note: In immunocompromised patients such as diabetics or in elderly patients or patients with co-existent illness (e.g. cancer, liver disease, heart failure or renal failure) a broad-spectrum antibiotic cover may be required.

(a) **Mild Disease**
- Amoxycillin 500mg orally 8 hours for 7-10 days OR
- Procaine Penicillin 3.6g (4 mega units) IM daily for 7-10 days.

Alternatives:
- Tetracycline 500mg orally 6 hourly for 7-10 days OR
- Doxycycline 100mg orally 12 hours for 7-10 days

If hypersensitive to penicillin or Mycoplasma or Chlamydia suspected:
- Erythromycin 500mg orally 6 hourly for 10-14 days OR
- Doxycycline 100mg orally 12 hours for 10-14 days

(b) **Moderate Disease**
- Penicillin G 1200mg (2 mega unit) IV 6 hours for 7-10 days

In patients hypersensitive to penicillin
- Chloramphenicol 1g IV 6 hourly X 7 – 10 days

If the clinical response to parenteral therapy is satisfactory, high dose oral therapy may be substituted after a few days e.g. Amoxycillin **500mg to 1g** orally 8 hourly or to chloramphenicol 0.5g-1g orally 6 hours for patients on chloramphenicol IV.

**Severe Disease**

In adults, severe pneumonia should be suspected if the following features are present;
- Respiratory rate > 30 per minute
- \( \text{PaO}_2 < 60\text{mmHg or SaO}_2 < 90\% \) on room air
- \( \text{PaCO}_2 > 50}\text{mmHg on room air} \)
- Chest X-ray evidence of bilateral involvement or involvement of multiple lobes
- Increase in size of chest X-ray opacity by 50% or more within 48 hours of admission.
- Requirement for mechanical ventilation or inspired oxygen >35% to maintain \( \text{SaO}_2 > 90\% \)

Haemodynamic compromise:
- Systolic blood pressure < 90mmHg
- Diastolic blood pressure < 60mmHg
- Recent deterioration in renal function
- White blood cell count <4 or >30 x 10^9/L

Empirical:
- Penicillin G 1200mg (2 mega unit) IV 6 hourly **PLUS**
• Cloxacillin 2g IV 6 hours  **PLUS** 
• Gentamicin 4-6 mg/Kg IV once daily (maintenance dose adjusted according to renal function).

If severe or no response then the following may be added
• Erythromycin .500mg 6 hourly

If hypersensitive to penicillin
• Ceftriaxone 2g IV daily  **PLUS**  
• Erythromycin 0.5-1g IV (slow infusion over 1 hour) 6 hourly

Definitive therapy should be instituted based on bacteriological data.

If *Streptococcus anginosus* is proven
• Penicillin G 3-4 mega (1800-2400mg) IV 6 hourly x 21 days

If *Pseudomonas aeruginosa* is proven
• Piperacillin 4g IV 6 hourly  **PLUS**  
• Gentamicin 240mg IV once daily (to be adjusted for renal function)

If *Staphylococcus aureus* is proven
• Cloxacillin 2g IV 6 hourly for 3 to 4 weeks (oral therapy can be substituted once patient’s condition is stabilized)

**HOSPITAL ACQUIRED PNEUMONIA**

Refers to pneumonia not present at the time of admission and developing in patients after 48 hours of hospitalization. It is usually due to Gram-ve organisms but *Staphylococcus aureus* is not uncommon in Tuvalu.

• Cloxacillin 1g IV 6 hourly for 14-21 days  **PLUS**  
• Gentamicin 240mg IV once daily for 14-21 days (maintenance dose adjusted for renal function)  **PLUS**  
• Metronidazole 400mg PO 8 hourly or PR 500mg 12 hourly x 14-21 days.

**NEUTROPENIC PATIENTS/PATIENTS WITH RESPIRATORY DEVICE OR TRACHEOSTOMY**

Gram- negative bacilli including *Pseudomonas aeruginosa* are common causative agents

• Piperacillin 3g IV 6 hourly  **PLUS**  
• Gentamicin 240mg IV once daily (maintenance dose adjusted for renal function)  **PLUS**  
• Erythromycin 0.5g-1g IV (infused over one hour) 6 hourly.

Once bacteriological status known, modify regimen accordingly. Total duration of therapy is 14-21 days.

**IMMUNOSUPPRESSED PATIENTS**
Pneumonia is these patients may be recurrent and due to unusual organisms. A microbiologist or physician should be consulted regarding diagnosis and treatment. REFER to PCP under opportunistic infections HIV

**ASPIRATION PNEUMONIA**

Minor debris of aspiration pneumonia does not require antibiotic therapy. For severe disease or abscess formation, more prolonged and high dose treatment is indicated.

- *Streptococcus anginosus*, anaerobes (2 mega units) IV 4-6 hourly for 10-14 days. **PLUS**
- Metronidazole 400mg orally 8 hours for 10-14 days.

Alternative for penicillin hypersensitive patients.
- Chloramphenicol 500mg – 1g IV / orally 6 hourly.

Note: In addition, flucloxacillin or gentamicin may be required if infection with either staphylococci or aerobic gram negative bacteria suspected or proven. If *Streptococcus anginosus* is isolated, high dose penicillin will be required and for a longer duration, usually 21 days

**Suppurative lung disease**

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**Bronchiectasis**

**Introduction**

Bronchiectasis is a disease characterised morphologically by the permanent dilation of bronchi and bronchioles, and clinically by recurrent or persistent bronchial infection and cough.

Most patients with bronchiectasis have a chronic cough with sputum production. The sputum is usually purulent and may be bloodstained. Exacerbations of bronchiectasis are related to retained inflammatory secretions and bronchial sepsis. The condition is categorised according to the radiological appearance of the airways.

Bronchiectasis can present as a local process in one lobe or segment, or as a generalised process in both lungs. Childhood pneumonia is probably the most common cause. When focal disease is present, the cause may be intraluminal (e.g., foreign body, broncholith or endobronchial tumour), or due to extrinsic compression of the airway by enlarged lymph nodes.
Management

General measures

Although it is generally accepted that keeping the airways as free of secretions as possible is an important part of the management, hard evidence that it makes a difference is difficult to find. Patients ideally should be referred to a physiotherapist experienced in the area, so that an appropriate routine may be developed. This may include regular postural drainage (see figure 4) with or without percussion, advice about coughing techniques.
Figure 5. Postural drainage

Left lower lobe

Right lower lobe

Lower lobes, posterior segments
For patients with significant airflow obstruction, nebulised bronchodilators may assist with clearing secretions.

GIVE
- salbutamol 100 to 200 micrograms MDI by inhalation, up to 4 times daily

OR
- ipratropium bromide 40 to 80 micrograms by inhalation, up to 4 times daily.

If the response to initial single-agent therapy is unsatisfactory or the patient has moderate to severe disease,

GIVE
- salbutamol 100 to 200 micrograms MDI by inhalation, up to 4 times daily

PLUS
- ipratropium bromide 40 to 80 micrograms by inhalation, up to 4 times daily.

Patients with poor inhalation technique can use a large-volume spacer; this improves lung deposition of the aerosol.

In patients who are unable to use an MDI (with or without a spacer),
USE
- Salbutamol 4mg orally up to 8 hourly as tolerated

OR
- Theophylline SR 300mg bd

The effect of these agents may be monitored by self reported symptoms or by PEF or spirometry.

**INFECTION**

If sputum becomes infected it is important to give antibiotics as early as possible
GIVE
(a) Mild Disease

- Amoxycillin 500mg orally 8 hours for 7-10 days.

Alternative:

- Cefaclor SR* 375mg 12 hourly for 7-10 days (for inpatient use only).

(b) Severe Disease

- Chloramphenicol 500mg 6 hourly orally / IV for 7-10 days

Alternative:

- Amoxycillin 500mg orally 8 hours for 7-10 days PLUS
- Metronidazole 400mg orally 8 hours for 7-10 days OR
- Cefactor 375mg 12 hours for 7-10 days (as a single agent) OR
- Doxycycline 100mg 12 hourly for 7-10 days (as a single agent)

* Cefaclor SR 375mg not available in Tuvalu EML

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**Lung abscess**

*Introduction and causes*

Lung abscesses usually develop either as a result of the aspiration of organisms in patients with dental caries, or as a consequence of severe necrotising pneumonia. Patients with altered conscious states (eg from anaesthesia, or alcohol intoxication, or postictal) and/or with swallowing difficulties are at particular risk. Septic emboli are occasionally a cause in intravenous drug users, often with right-sided endocarditis.

**Management**

The treatment of a lung abscess requires adequate drainage of the infected material and appropriate antibiotics. Where possible, attempts should be made to identify the causal organism. If there is a possibility that the patient may have aspirated a foreign body (eg a tooth, a peanut), then bronchoscopy is appropriate. If the abscess has clearly cavitated and the patient has a productive cough, the abscess is probably draining into the airways, and antibiotics and physiotherapy should be sufficient.

**GIVE**

- Penicillin G 2 mega units IV 6 hourly PLUS
- Cloxacillin 2g IV 6 hourly PLUS
- Metronidazole 400mg orally 8 hours

Gentamicin should be added if aspiration is likely cause of the abscess.
Management of parapneumonic effusion and empysema

**Introduction**

Pleural effusion may complicate up to 50% of cases of pneumonia, and if not detected and managed appropriately may develop into a thoracic empyema. If there is clinical suspicion of a parapneumonic effusion, this should be confirmed by chest X-ray, and the fluid sampled. The fluid should be cultured. If possible, the pleural fluid pH should be assessed on a heparinised sample and fluid should be sent for routine biochemistry including LDH.

**Drainage**

As with any collection of pus, adequate drainage is the most important aspect of management.

Adequate drainage of empyema is essential. The duration of therapy is usually prolonged.

**GIVE**

- Penicillin G 2 mega units IV 6 hourly PLUS
- Cloxacin 2g IV 6 hourly PLUS
- Metronidazole 400mg orally 8 hours

**Interstitial Lung Disease**

**Introduction**

Many different pathological processes can affect the lung interstitium. In addition to infection by viruses, bacteria and fungi (the pneumonias), cardiogenic oedema, and fibrotic reaction to accumulation of nonorganic dust particles (the pneumoconioses), there are also many conditions in which the lung interstitium becomes inflamed, infiltrated or fibrosed. They are characterised by a restrictive pattern on spirometry testing.

**Spirogram showing restrictive ventilatory defect**
Cryptogenic fibrosing alveolitis (idiopathic pulmonary fibrosis)

Cryptogenic fibrosing alveolitis or idiopathic pulmonary fibrosis is a specific form of chronic fibrosing interstitial pneumonia limited to the lung. Cryptogenic fibrosing alveolitis is the most common nonspecific interstitial lung disease of unknown aetiology in the elderly population, although it can occur at any age. It has a peak age of onset in the 50s and 60s and a smoking history is common. The pathology is that of ‘usual interstitial pneumonia’ with patchy foci of fibroproliferation. The usual prognosis is poor, with death occurring approximately 2 years after diagnosis.

The diagnosis is dependent upon:

- a typical history of slowly progressive breathlessness over months to years
- basal crackles on chest auscultation
- typical basal and peripheral reticular shadowing on XRay or computerised tomography of the lungs
- typical restrictive lung function abnormalities.

The best evidence is for an attempt at stabilisation and improvement in survival with a combination of oral prednisolone (low-dose) and oral azathioprine. Use
**prednisolone 0.5 mg/kg lean body weight (LBW) orally, daily for 4 weeks; then 0.25 mg/kg LBW daily for 8 weeks; then 0.125 mg/kg LBW daily thereafter (ie approximately 30 to 40 mg/day tapered to 7.5 to 10 mg/day)**

PLUS

**azathioprine 50 mg orally, daily, increasing by 25 mg every 1 to 2 weeks) up to a maximum of 150 mg (approximately 2 to 3 mg/kg LBW) orally, daily.**

_This should only be added if frequent monitoring of Wbc, platelets and liver function tests is possible_

If this regimen is used, a therapeutic trial of at least 3 months is necessary. If the patient continues to deteriorate on clinical and/or physiological criteria, consideration should be given to stopping medication.

**Other interstitial pneumonias**

Interstitial pneumonias, other than cryptogenic fibrosing alveolitis, include the following:

- desquamative interstitial pneumonia (DIP)
- nonspecific interstitial pneumonia (NSIP)
- organising pneumonia (OP)—previously known as ‘bronchiolitis obliterans organising pneumonia (BOOP)’ or ‘chronic organising pneumonia (COP)’.

These interstitial lung diseases were formerly included under the broad heading of cryptogenic fibrosing alveolitis/idiopathic pulmonary fibrosis, but are now recognised as separate conditions, with individual pathological, clinical and radiological characteristics. All have a better prognosis than cryptogenic fibrosing alveolitis, related to corticosteroid responsiveness. Treatment should commenced with

**prednisolone 30 to 50 mg orally, daily, with duration and subsequent tapering dependent on clinical, physiological and radiological response.**

**Sarcoidosis**

Sarcoidosis is a multisystem granulomatous disease. The mediastinal lymph nodes or lungs are affected in more than 90% of cases. Overall, the prognosis in sarcoidosis is good, with at least 50% of pulmonary abnormalities eventually showing complete radiological clearing. The best outlook is in young patients presenting with subacute symptoms, erythema nodosum and bilateral hilar lymphadenopathy. Prognosis is worse in middle-aged patients presenting with an insidious onset of sarcoidosis, diffuse lung infiltration and pulmonary function abnormalities. Hypercalciuria is very common; however, frank hypercalcaemia occurs only occasionally

Corticosteroids usually improve systemic symptoms, pulmonary function and radiological appearances. BUT

- **Acute or subacute** sarcoidosis with bilateral hilar lymphadenopathy is likely to settle spontaneously and corticosteroids are seldom required.
- **Musculoskeletal pains** and **erythema nodosum** should be controlled with nonsteroidal anti-inflammatory drugs (NSAIDs) .
• Corticosteroids are indicated if pulmonary infiltrates are associated with \textbf{breathlessness} and significantly \textbf{impaired pulmonary function} or if pulmonary function is worsening over time.

• \textbf{Hypercalcaemia} should be treated with corticosteroids in addition to dietary control of calcium and vitamin D intake and high fluid intake.

• \textbf{Uveitis} normally requires corticosteroids, either topically or systemically, or both.

• \textbf{Central nervous system, cardiac, or other severe extrathoracic organ involvement}, eg hepatitis, should be treated with corticosteroids.

If corticosteroids are to be given, use

\textit{prednisolone 20 to 40 mg orally, daily for 6 to 8 weeks.}

If there is no response after 6 to 8 weeks, taper the dose to zero.

If there is a response, taper the dose to 10 to 15 mg orally, daily as a maintenance dose for 6 to 12 months.

Illness may present as acute or subacute episodes of pyrexia, chills and malaise with shortness $>$.

\textbf{Drug-induced interstitial lung disease}

\textit{Eosinophilic reactions}

Lung parenchymal interstitial eosinophilic infiltration gives breathlessness and sometimes a cough; the patient may also wheeze (suggesting an airway component as well). A maculopapular rash occurs frequently. There may be pyrexia. An immunological reaction is the likely cause.

Drugs that may be implicated include:

• antibiotics (, nitrofurantoin, penicillins, sulfonamides (\textbf{including co-trimoxazole}), tetracyclines)

• anti-inflammatory drugs (aspirin, sulfasalazine)

• cytotoxic drugs (methotrexate)

• antipsychotics and antidepressants (chlorpromazine,)

• anticonvulsants (carbamazepine, phenytoin).

\textit{For treatment, removal of the drug is paramount.}

In severe or moderately severe cases, judged on clinical criteria, a short course of prednisolone can be given; use

\textit{prednisolone 20 to 40 mg orally, daily for 2 weeks.}
Scuba diving

People with any significant obstructive airways disease including asthma and COPD should be automatically disqualified from scuba diving. This is because of the theoretical risk of localised gas trapping, due to airway narrowing, or the presence of bullae, giving an increased risk of barotrauma. Individuals with wheeze precipitated by exercise or cold should be advised not to dive.

Any history of spontaneous pneumothorax precludes scuba diving because of the almost certain presence of bullae or blebs on the visceral pleura. **Lung bullae and history of pneumothorax increase the risk of barotrauma and are a contraindication to diving.**

Decompression

Divers with or without respiratory disorders may develop decompression sickness (the bends) and need decompression in a hyperbaric oxygen chamber. They should be transported for treatment as a matter of urgency.

*The only one close to Tuvalu is in Fiji, at the Suva Private Hospital*

*Address and telephone number to be inserted*

Pregnancy and breastfeeding

**Pregnancy and respiratory drugs**

The major period of danger for teratogenic effects of drugs is the first trimester of pregnancy, although some drugs can interfere with functional development of organ systems and the central nervous system in the second and third trimesters.

There is no convincing evidence that any of the drugs commonly used to treat respiratory disorders cause particular problems during pregnancy. As a general principle, the lowest dose achieving best control should be used. Inhalation has particular advantages as a means of drug administration during pregnancy; the therapeutic effect may be achieved without the need for plasma concentrations liable to have a pharmacological effect on the fetus.

**Attacks of asthma during pregnancy may reduce the amount of oxygen available to the fetus, so it is particularly important that asthma is well controlled. If this is achieved, asthma has no important effects on pregnancy, labour or the fetus. Severe exacerbations should be treated promptly with conventional therapy. Most asthma medications are safe to use during pregnancy.**
Breastfeeding and respiratory drugs

The benefits of breastfeeding are sufficiently important to recommend that breastfeeding should be continued unless there is substantial evidence that the drug taken by the mother will be harmful to the infant and that no therapeutic equivalent can be given.

Most drugs are excreted only to a minimal extent in breast milk and in most cases the dosage to which the infant is ultimately exposed is very low and is well below the therapeutic dose level for infants. In most situations, drugs cross the placenta more efficiently than they pass into breast milk.

For these reasons the time of dosing in relation to breast feeding does not make much difference.

Inhalation has particular advantages as a means of maternal drug administration during breastfeeding because the therapeutic effect may be achieved without reaching plasma concentrations that may contribute to the drug entering breast milk.

Respiratory drugs in pregnancy and breastfeeding

<table>
<thead>
<tr>
<th>Drug</th>
<th>Status in Pregnancy</th>
<th>Use in breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminophyl line</td>
<td>Safe</td>
<td>use with caution; monitor infant for irritability</td>
</tr>
<tr>
<td>beclomethasone dipropionate</td>
<td>Can be used because its inhaled</td>
<td>May be safe to use</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Safe</td>
<td>Safe</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>Safe</td>
<td>Safe</td>
</tr>
<tr>
<td>Ipratropium bromide</td>
<td>safe because inhaled</td>
<td>Safe</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>Safe</td>
<td>safe</td>
</tr>
<tr>
<td>Promethazine</td>
<td>may cause foetal drowsiness</td>
<td>safe in single dose</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>Safe</td>
<td>Safe</td>
</tr>
<tr>
<td>Theophylline</td>
<td>crosses placenta in significant amounts. Avoid if possible</td>
<td>use with caution; monitor infant for irritability</td>
</tr>
</tbody>
</table>
ANTIBIOTIC GUIDELINES

ABOUT ANTIBACTERIAL IN GENERAL

The number of antimicrobials available for the therapy has increased rapidly during the past years. Brief summaries of antimicrobial agents commonly used in therapy are prescribed in the chapter.

ANTIBACTERIAL AGENTS

These are grouped based on their site of action on the bacteria, as given below:

CELL WALL SYNTHESIS

BETA-LACTAMS

- Penicillins
- Cephalasporins
- Carbapenems
- Monobactams

GLYCOPEPTIDES

- Vancomycin

PROTEIN SYNTHESIS

- Aminoglycosides (eg, Gentamicin)
- Chloramphenicol
- Fusidic acid
- Lincosamides (eg, Clindamycin)
- Macrolides (eg, Erythromycin)
- Tetracyclines

RNA POLYMERASE

- Rifampicin

DNA
- Quinolones (eg. Nalidixic acid)
- Metronidazole
- Nitrofurantoin

**FOLATE METABOLISM**

- Trimethoprim
- Suphonamides

**BETA – LACTAM ANTIBIOTICS**

Penicillins, cephalosporins, monobactams and carbapenems have a β-lactam ring in their molecular structure. These bactericidal antibiotics act primarily on the bacterial cell wall. Although some bacteria produce β-lactamase and therefore have developed resistance, these drugs on the whole remain useful in treating many different types of infections.

**Penicillins**

Penicillin is active against *Streptococci, Neisseria, Spirochetes*, some anaerobes including *Clostridia* and a few other organisms. The prevalence of penicillinase producing *Neisseria gonorrhoea* is on the increase. There are reports of decreased susceptibility of pneumococci and streptococci to penicillin from other parts of the world. The only serious disadvantage of penicillins is hypersensitivity reaction.

A. **Penicillin formulations** available are:

1. Penicillin G (Crystalline Penicillin or Benzyl Penicillin) – for intravenous (IV) use. Needs to be given frequently (4-6 hourly)
2. Procaine Pencillin – intramuscular (IM) preparation with a longer duration of action. Needs to be administered less frequently i.e daily.
3. Benzathine Penicillin – given IM provides low levels of penicillin in the circulation for 3-4 weeks.
4. Penicillin V (Phenoxyethylenicillin) – an oral preparations, intrinsically less active than Penicillin G

Penicillin is the drug of choice for the treatment of the following interactions:

1. Streptococcal infections e.g tonsillopharygitis
2. Infections due to *streptococcus pneumoniae*.
3. Meningococcal infections e.g meningitis, septicaemia
4. Syphilis
5. Clostridial infections, anthrax, diphtheria
6. Leptospirosis

B. **Aminopenicillins**
Ampicillin and amoxicillin are destroyed by staphylococcal β-lactamases but have a slightly broader spectrum than penicillins because of their activity against some gram negative bacilli like E.coli, salmonella sp and shigella sp. They also have better activity against H.influenzae and enterococci compared with penicillin. Although initially sensitive, resistance to these drugs among E.coli is now widespread. Many strains of H.influenzae also produce β-lactamases, which can destroy these drugs.

Amoxycillin is better absorbed than ampicillin and has a longer half life and hence is preferred for oral therapy. These drugs are used in empirical treatment of respiratory infections and in the treatment of susceptible urinary tract infections. They may be used for typhoid fever.

**C. Anti-Staphylococcal Penicillins**

These are narrow spectrum penicillins, resistant to Staphylococcal β-lactamases. Methicillin, oxacillin, and cloxacillin fall into this category. Of these only cloxacillin, flucloxacillin and dicloxacillin are clinically useful and are to be used only for proven or suspected staphylococcus infections.

Flucloxacillin, suitable for oral administration, can cause chloestatic jaundice in some patients.

Some staphylococci have developed resistance to this group, the mechanisms other than lactamases. These methicillin resistance Staphylococcus aureus (MRSA) will be resistant to all other lactams (i.e all penicillins, cephalosporins, monbactams and carbapenems).

**D. Anti-Pseudomonal Penicillins**

Newer penicillins with a high grade of activity against gram negative bacteria including pseudomonas, eg. piperacillin, ticarcillin*

**E. β-lactam and β-lactamase inhibitor combination**

Eg. Clavunate, Sulbactam*

Augmentin is a preparation containing amoxicillin and clavulanic acid. Clavulanic acid has minimal antibacterial activity but inhibits β-lactamase effectively. This combination is useful in the treatment of β-lactamase producing bacteria. Sulbactam* is another β-lactam inhibitor used in combination with penicillins. Combinations are more expensive and so should be used only while treating infections with known β-lactamase producers. Amoxycillin/clavulanic acid combination can cause cholestasis.

*Note: Hypersensitivity to any penicillin implies hypersensitivity to all penicillins. 5-10% of patients with Penicillin hypersensitivity, especially those with early manifestations, are also hypersensitive to cephalosporins.*

* NOT IN EML
Cephalosporins and related drugs

The cephalosporins have been traditionally divided into three “generations” based on their spectrum of activity. In general, cephalosporins are less prone to hypersensitivity reactions, are more stable to staphylococcal penicillinases and have a broader spectrum than penicillins.

However, they are expensive and have very little action on enterococci. None of them are effective against MRSA. Cephalosporins also have been shown to select MRSA, vancomycin resistant enterococci and ceftriaxone resistant gram-negative bacilli. Therefore, indications for their use should be limited.

First generation cephalosporins include among others, cephalexins* (oral), cephalothin and cefazolin* (parenteral). The spectrum of activity is similar, being effective against penicillinase producing staphylococci and other Gram-positive cocci (except MRSA and enterococci) and a few gram-negative enteric bacilli. There is no special advantage for any one first generation cephalosporins over another. They are not usually first choice for any infection. They may be used in some patients with penicillin hypersensitivity.

Cephamandole* (parental), cefuroxime axetil* and cefaclor* (oral) are second “generation drugs” which are more stable to some Gram-negative β-lactamase. Their activity against Gram-positive organisms is similar to, or less than, that of the first generation cephalosporins and they have varying degrees of activity against anaerobes. These drugs have limited role in therapy and are more expensive.

The major activity of the third generation cephalosporins (ceftriaxone, ceftazidime*, cefotaxime) is against gram-negative bacilli. They have some activity on gram-positive cocci and that against anaerobes varies. A major advantage of these agents is their ability to reach the central nervous system. Ceftazidime* has specific antispeudomonal activity. Ceftriaxone and cefotaxime* are useful in hospital-acquired and any other gram-negative septicaemia and meningitis.

Monobactams (Aztreonams*) is against gram-negative bacteria including pseudomonas and lactamase producing enterobacteriaeae. Carbapenems have a much broader spectrum, including gram-positive, gram-negative and some anaerobic bacteria.

Aminoglycosides

This group of antibiotics (gentamicin, tobramycin*, netilmicin, amikacin*, Kanamycin*, neomycin, streptomycin) act by inhibiting protein synthesis in bacteria. They have good activity against aerobic gram-negative bacilli, including brucella. When given together with penicillin, they have good activity against enterococci. Streptomycin is useful against my bacteria. Aminoglycosides are not absorbed when given orally and should be administered parenterally for systemic effects.

Aminoglycosides are ototoxic and nephritic. The therapeutic index is low and blood levels needs to be monitored. In spite of this disadvantage, they
are used widely for their action on gram-negative bacilli. Gentamicin is the least expensive and has good activity against 90% of gram-negative isolated in Tuvalu. It is the aminoglycosides of choice for empirical treatment of severe gram-negative sepsis including nosocomial infections.

Recent studies have shown that aminoglycosides may be given in a single daily dose, having efficacy similar to that of multiple dose and toxic effects may be lower. The recommended dose is 5-7mg.kg/day (based on lean body weight) as a single daily dose. This regimen is now preferred in many places. Monitoring is advisable if treatment is for more than 3 days. However, single daily dose is not recommended in pregnant women and endocarditis. In patients with impaired renal function, doses and/or frequency of administration must be modified according to serum levels and the degree of impairment. *Whenever possible it is desirable to determine peak and trough serum gentamicin levels periodically and to adjust the dosage to maintain the desirable serum levels. In general, peak levels of 4 to 10 g/ml and trough levels not exceeding 0.5 to 1 g/ml are sought. Note: The loading dose is usually 2.5 – 7mg/kg irrespective of renal function and should be given slowly over 20 minutes. Subsequent doses must be adjusted according to renal function.*

Bacterial resistance to gentamicin is mainly mediated by three different types of enzymes that destroy the drug. Netilmicin* and amikacin* are destroyed by fewer enzymes and therefore have a broader spectra. These drugs should only be used when the bacteria under question is proven to be resistant to gentamicin. Netilmicin* may be less nephritic.

**Tetracyclines**

Tetracyclines also act by inhibiting protein synthesis and have broad spectrum of activity. This includes staphylococci, neisseriae, H.influenzae, some members of enterobacteriaceae, mycoplasma, clamydiae, rickettsiae and spirochaetes. For chlamydial and rickettsial infections this is the drug of choice. This group also has action against protozoa like Entamoeba histolytica and plasmodium sp.

The spectrum of activity of different tetracyclines is similar, but they are different in their pharmacokinetics. Most tetracyclines are excreted through the kidneys except doxycycline, which is safer in patients with renal impairment, but caution is required in pre-existing hepatic or renal disease, as they can lead to worsening of function. Doxycycline has a longer half-life than tetracycline.

Because of their effect on growing bones and teeth, these drugs are contraindicated in pregnancy, lactating mothers and in children.

**Chloramphenicol**

Also a broad-spectrum antibiotic, it acts by inhibiting protein synthesis. The spectrum includes both aerobes and anaerobes. It can be used topically, orally or parenterally. Bioavailability after oral administration is as good as parenteral use and the oral preparation can be used to initiate treatment in emergencies if the injection is not available. Chloramphenicol is not safe in pregnancy and in neonates as it may cause Grey baby
syndrome. This drug can also cause bone marrow suppression. Its use as far as possible should be limited to specific indications like typhoid fever, invasive salmonellosis, meningitis, brain abscess and occasionally anaerobic infections.

**Macrolides**

Erythromycin, roxithromycin*, azithromycin and clarithromycin act by inhibiting protein synthesis. They have similar antimicrobial spectra but differ in their pharmacokinetics and adverse effects.

They are active against gram-positive organisms, H.influenzae, neisseriae, mycoplasma sp, Chlamydia and rickettsiae. They also act on toxoplasma, which is a protozoa.

Erythromycin is absorbed orally and is distributed well. It does not cross the blood brain barrier. The main adverse reaction is gastric irritation. Some patients develop jaundice. Parenteral preparations can cause phlebitis and occasionally cardiac arrhythmias (in high doses).

Its main use is in respiratory infections and as an alternative to penicillin in those hypersensitive to penicillin. It is the drug of choice in neonatal and obstetric chlamydial infection and is used in campylobacter infection. The newer macrolides have better bioavailability and fewer side effects. Azithromycin, in addition to its use is similar to that of erythromycin, is also used to treat toxoplasmosis. Clarithromycin is used in treating mycobacterium avium complex (MAC) infections and *H.Pylori*.

**Quinolones**

These drugs interfere with transcription of DNA. The first drug to be used in this group, nalidixic acid, had a very narrow spectrum mainly limited to gram-negative bacilli. This drug is used widely in the treatment of UTI, since it concentrates in the urine.

The newer Quinolones, norfloxacin* and ciprofloxacin have a broader spectrum of activity. Norfloxacin is used in the treatment of urinary and gastrointestinal infections. Ciprofloxacin reaches high levels in the blood and is very effective against enterobacteriaceae, pseudomonas sp, and mycobacteria. *Ciprofloxacin is not very effective against Streptococcus pneumonias*. It is therefore useful in treating gram-negative infections like hospital acquired septicaemias and gram-negative pneumonias. It is also useful in treating chloramphenicol resistant *Salmonella typhi* infections. Bacterial resistance develops rapidly if these agents are widely used.

They are well absorbed when given orally and have a good penetration into cells like macrophages. They do not cross the blood brain-barrier. Unlike many other antibiotics they reach the prostate.

Nalidixic acid* can cause GI upset and skin reactions. Quinolones have many adverse effects including dizziness, depression, and they can precipitate seizures. They may interact with many other drugs, for example theophylline.
Quinolones/Ciprofloxacin is not recommended in pregnant women, infants, children and breastfeeding mothers.

**Rifampicin**

Rifampicin is used in the treatment of tuberculosis and infections with S.aureus. Rifaputin* is used in the treatment and prophylaxis and MAC infection. Since resistance emerges rapidly, these drugs should always be used in combination with other antibiotics.

Rifampicin colours urine, tears and other body fluids red. It can accelerate the metabolism of other drugs including oral contraceptives, warfarin, and phenytoin.

**Nitroimidazoles**

Metronidazole and tinidazole* are active against all anaerobic bacteria and protozoa like T.vaginalis, G.lamblia and E.hystolitica. Metronidazole is usually well tolerated. Common minor side effects include nausea, vomiting, metallic taste in mouth and disulfuram like reaction with alcohol.

Tinidazole has longer half-life and therefore can be administered less frequently.

**Glycopeptides**

Vancomycin acts by inhibiting peptidoglycan (cell wall) synthesis. All gram-positive organisms and susceptible. However, the drug is reserved for treating Gram-positive infections resistant to β-lactams. Its oral use for antibiotic associated diarrhea should be limited to those caused by *clostridium difficile* and unresponsive to metronidazole.

*Vancomycin is given IV slowly over at least over one hour (10mg/min) to prevent anaphylactoid reaction. Renal toxicity can occur, especially if given with aminoglycosides. Therefore, pay attention to dosage schedules and monitor serum levels and renal function.

**ANTIVIRAL AGENTS**

Several agents are now licensed for use; only Lamivudine tablets, Zidovudine (AZT) elixir and tablets, acyclovir injection and eye ointment are available on Tuvalu EML.

Acyclovir is a nucleoside analogue, effective against Herpes Simplex virus types I and II and Varicella zoster virus. Topical application or oral therapy is used for skin, mucous membranes and eye infections. Parenteral use is indicated for herpes encephalitis.

Famciclovir*, penciclovir* and valaciclovir* are recent modifications of acyclovir.

<table>
<thead>
<tr>
<th>Other Antiviral Drugs</th>
<th>Clinical Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amantadine*</td>
<td>Prevention and treatment of influenza A, during outbreaks</td>
</tr>
<tr>
<td>Ganciclovir*</td>
<td>CMV infection in the immunocompromised</td>
</tr>
<tr>
<td>Drug</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tribavirin*</td>
<td>Effective against many viruses. Used for treatment of RSV infection in small children, Lassa fever and hanta virus infection</td>
</tr>
<tr>
<td>Zidovudine (AZT)</td>
<td>Treatment &amp; post-exposure prevention of HIV/AIDS</td>
</tr>
<tr>
<td>Lamivudine</td>
<td></td>
</tr>
<tr>
<td>Dideoxyinosine*(Didanosine)</td>
<td></td>
</tr>
<tr>
<td>Dideoxycytosine* (Zalcitabine)</td>
<td></td>
</tr>
<tr>
<td>Protease inhibitors:</td>
<td>Treatment &amp; exposure prevention of HIV/AIDS</td>
</tr>
<tr>
<td>Saquinavir*</td>
<td></td>
</tr>
<tr>
<td>Indinavir*</td>
<td></td>
</tr>
<tr>
<td>Interferon alpha*</td>
<td>Treatment of hepatitis B, hepatitis C</td>
</tr>
<tr>
<td>Idoxuridine*</td>
<td>Topical treatment for HSV</td>
</tr>
</tbody>
</table>

At present in Tuvalu, anti HIV drugs are available through the glocal fund project and for specific ARV should consult with HIV coordinator.

**ANTIFUNGAL AGENTS**

**Azoles**

There are two main groups.

a. For systemic Use: Ketoconazole, fluconazole* and itraconazole*

Fluconazole* and ketoconazole are active against yeasts like candida, cryptococci, and histoplasma. These agents are useful in the treatment of systemic infections due to these organisms.

Fluconazole* is well-absorbed following oral administration and has good CNS penetration.

Ketoconazole can cause hepatic toxicity

Itraconazole* has activity against asperillus

b. For topical Use: Miconazole*, clotrimazole and econazole

These are used in the treatment of superficial candidiasis and dermatophytosis.

**Amphotericin B**

It is useful most systemic fungal infections. Its use is associated with many side effects including flu-like reactions, GI effects and nephrotoxicity. **It should be given IV slowly over 4-6 hours.**

**Flucytosine**

The drug is used mainly in combination with amphotericin in the treatment of systemic candida and cryptococcal infections. Adverse effects include bone marrow suppression and hepatotoxicity.
**Griseofulvin**  
When given orally, it concentrates in keratinized tissues and prevent further invasion by dermatophytes.

**Terbinafine***  
A new drug effective against dermatophytes when used orally or topically.

**Whitfield Ointment/Lotion (salicylic acid 10%)**  
Still the mainstay of treatment of dermatophytes in Tuvalu.

**Nystatin**  
Suspension is useful for oral thrush.

- Not on EDL

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**INFECTIOUS DISEASES**

**Notifiable Infectious Diseases:**

**Note:** In Tuvalu, certain infectious diseases are “notifiable”.
A clinician who knows or suspects anyone suffering from a notifiable disease is obliged by law to notify the Director of Health, through the Public Health Department Infectious Disease Section.

**Notifiable Diseases:**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Disease</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Infectious Conjunctivitis</td>
<td>Poliomyelitis</td>
</tr>
<tr>
<td>Anthrax</td>
<td>Tuberculosis</td>
<td>Psittacosis</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Influenza</td>
<td>Puerpueral fever</td>
</tr>
<tr>
<td>Cholera</td>
<td>Leptospirosis</td>
<td>Rabies</td>
</tr>
<tr>
<td>Dengue</td>
<td>Malaria</td>
<td>Rheumatic fever</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Meningitis (all forms)</td>
<td>Rubella</td>
</tr>
<tr>
<td>Dysentery</td>
<td>Mumps</td>
<td>Tetanus</td>
</tr>
<tr>
<td>(all forms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encephalitis</td>
<td>Ophthalmia neonatorum</td>
<td>Trachoma</td>
</tr>
<tr>
<td>Filariasis</td>
<td>Paratyphoid fever</td>
<td>Leprosy</td>
</tr>
<tr>
<td>Food Poisoning</td>
<td>Typhoid fever</td>
<td>Viral haemorrhagic fever</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>Pertussis</td>
<td>Yaws</td>
</tr>
<tr>
<td>Hepatitis A or B</td>
<td>Plague</td>
<td>Yellow fever</td>
</tr>
<tr>
<td>HIV1 or HIV2</td>
<td>Pneumonia (all forms)</td>
<td>Measles</td>
</tr>
<tr>
<td>SARS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
One cannot over-emphasize the need to notify these diseases so that appropriate Public Health Surveillance and response activities can be carried out in a timely and effective manner.

**Gastrointestinal/food poisoning**

*Table 8: Common causes of food poisoning*

<table>
<thead>
<tr>
<th>Cause</th>
<th>Incubation</th>
<th>Food</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staph. Aureus</em></td>
<td>1–6 hours</td>
<td>Meat, milk</td>
<td>D, V, P, Shock</td>
</tr>
<tr>
<td><em>Bacillus cereus</em></td>
<td>1–16 hours</td>
<td>Rice</td>
<td>D, V, P</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>6–48 hours</td>
<td>Meat, eggs</td>
<td>D, V, P</td>
</tr>
<tr>
<td><em>E.coli</em></td>
<td>1–2 days</td>
<td>Any food</td>
<td>DVP</td>
</tr>
<tr>
<td><em>Campylobacter</em></td>
<td>1–3 days</td>
<td>Meat, milk</td>
<td>Fever, P, D</td>
</tr>
<tr>
<td><em>Shigella</em></td>
<td>1–3 days</td>
<td>Any food</td>
<td>D, V, fever</td>
</tr>
<tr>
<td><em>Vibrio parahaem</em></td>
<td>2–3 days</td>
<td>Seafood</td>
<td>Watery D</td>
</tr>
<tr>
<td><em>Cholera</em></td>
<td>12h–6 days</td>
<td>Seafood</td>
<td>D (watery), shock.</td>
</tr>
<tr>
<td><em>Rotavirus</em></td>
<td>1–7 days</td>
<td>Seafood</td>
<td>D, V, fever, cough.</td>
</tr>
<tr>
<td><em>Botulism</em></td>
<td>2–96 hours</td>
<td>Preserved food</td>
<td>V, paralysis</td>
</tr>
<tr>
<td><em>Scombrotoxin</em></td>
<td>1 hour</td>
<td>Fish</td>
<td>D, flushing, sweating</td>
</tr>
<tr>
<td><em>Chemicals</em></td>
<td>&lt; 2 hours</td>
<td>Food, water</td>
<td>Various</td>
</tr>
<tr>
<td><em>Mushrooms</em></td>
<td>24 hours</td>
<td>Mushrooms</td>
<td>D, V, P, Illusions</td>
</tr>
</tbody>
</table>

D = diarrhoea V = Vomiting P = Abdominal Pain

**Treatment:**
Mostly rehydration using ORS (*oral rehydration solution*). *Antiemetic* is rarely needed in adults and anti-diarrhoecal is usually not required. IV fluid may be needed in cases of prolonged vomiting. Obviously, such cases may need admission for further investigation and management.

**Infestations**

<table>
<thead>
<tr>
<th>Infection</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intestinal worms</td>
<td>For adult and children over 2 years: <em>Mebendazole</em> 100mg ‘o’ bd for three days OR for adult and children: pyrantel 10mg/kg as a single dose.</td>
</tr>
<tr>
<td>Lice (head)</td>
<td><em>Permethrin solution</em> 1%</td>
</tr>
<tr>
<td>Scabies</td>
<td><em>Benzyl benzoate application</em> 25% OR <em>Permethrin cream</em> 5%</td>
</tr>
</tbody>
</table>

**HIV and the A&E Staff**
Universal precautions as recommended by the “Health department infection Control Manual” must always be observed at A & E. Remember the following precautions:

- Ensure up to date immunization against tetanus and hepatitis B.
- Cover any open wounds/weeping dermatitis.
- Wear gloves during contact with patients’ blood/fluid.
- Wash hands before/after every patient care.
- Consider double gloves during invasive procedures.
- Use goggles/masks to protect if aerosolization is anticipated.
- Wear mask if patient has TB.

**Fungal infections**

Fungal infection of the skin (ringworm, tinea cruris or pedis) is common and usually responds to:

- Topical antifungal creams such as *miconazole* or *terbinafine applied to the affected part, twice daily for a period of 3-5 days.*
- Less costly and apparently just as effective (certainly in ringworm) in Tuvalu is *Whitfield’s ointment* – mixture of benzoic and salicylic acids in an ointment base.
- *Oral griseofulvin* is an alternative to topical treatment and should be reserved for resistant infections.
- Vaginal candidiasis is common in diabetics and responds to vaginal cream/pessary containing one of the *topical antifungal such as nystatin or terbinafine.* Improving the diabetic control is the key to eradication.
- Systemic fungal infection is rare except in the very debilitated or immunocompromised. If suspected, consult with consultant in infectious diseases.

**Epiglottitis**

This is a medical emergency; commonly seen in children under 5 years of age, but occasionally seen in older children and adults. It is usually caused by *Haemophilus influenza* type b. It is uncommon in countries that immunize its children with vaccine for this infection (Hib vaccine).

Symptoms include:

- Sore throat
- Hoarseness
- Stridor
- Drooling and apprehension.

Diagnosis is confirmed by:

- Direct visualization of a ‘cherry red’ epiglottis (but do not manipulate epiglottis or it may cause laryngeal spasm).
- Blood culture is usually positive for *haemophilus influenza* type b.

Admit case.

**Treatment:**

- *Ceftriaxone 80-100mg/kg/day as a single dose or divided 12-hourly, IV (not to exceed 4g/day or 2g/dose).*

OR
• Cefotaxime 200mg/kg/day, divided 6-8 hourly, IV (not to exceed 12g/day).

OR

Amoxicillin in susceptible isolates

OR

• Chloramphenicol (50mg/kg up to) 1g IV immediately and followed by 25mg/kg up to 1g 6-8 hourly; in penicillin sensitive patients.
  • These regimens are continued for 5 days. However to eradicate haemophilus carrier status, give rifampicin (neonate <1 month 10mg/kg; child: 20mg/kg) up to 600mg daily for 4 days to both contacts and cases.
  • Vaccinate all <5 years old contacts with Hib vaccine.
  • Please remember to urgently refer cases with stridor for surgical assessment in case of need for urgent tracheostomy.
  • The use of nebulised adrenaline and steroid to help clear airway is described below in viral croup. This can be used in acute epiglottitis too.

Diabetic Foot Infection
• By far the most important infections of the soft issues.
• Need URGENT attention.
• Obtain surgical opinion early especially if debridement is needed.
• In minor infections - metronidazole 400mg ‘o’ 8-hourly PLUS (flu)cloxacillin 500 mg orally 6-hourly for 10 days.

In more severe infections, always consult and refer. Usual treatments include:
• Metronidazole 400mg orally 8-hourly

PLUS

• Cloxacillin 1G IV 6-hourly

PLUS

• Gentamicin 5mg/kg single IV dose infused over 30 minutes

OR

• Metronidazole 800mg orally 8-hourly for 10 days

PLUS

• Cephalothin 1-2G IV 4-hourly.
• Cover needed for anaerobes, gram positive and gram negative organisms.
• Cephalothin provides cover for both gram positive and gram negative organisms.
• Failed treatment of infection in diabetics often is the first step towards amputation.
Infections and Other Related Conditions

Needle-stick injury (refer to the “Infection Control Manual for Princess Margaret Hospital”)

Skin, Muscle And Bone Infections

Osteomyelitis
Usually caused by Staphylococcus aureus.
- Give IV cloxacillin 2g 6-8 hourly until patient is afebrile and then substitute to ‘o’ (flu)cloxacillin for at least 4, usually 6 weeks.
- Managed only after consultation/assessment by surgeon and consideration of the microbiological sensitivity of the causative agent. As an example, surgical drilling of affected bone may be indicated and vancomycin may be used (1g IV bd for same duration) in the rare event where the infection is caused by an MRSA (methicillin resistant staph aureus).

Pyomyositis
- Relatively rare form of muscle infection with abscess formation; may need surgical drainage if localized pus develops.
- Give cloxacillin 1-2g IV 6-hourly for at least 7 days and later change to oral treatment.

Septic arthritis
- Treat only after consultation and hospital referral.
- Give cloxacillin 2g IV 6-hourly for at least 7 days followed by ‘o’ (flu)cloxacillin 500mg-1g; 6-hourly for a further 3-4 weeks.
- Surgical drainage is usually needed if pus develops in the joint space.

STI (SEXUALLY TRANSMITTED INFECTIONS)

Descriptions:
Sexually transmitted infections are seen in all societies and the range of infections that are sexually transmissible are increasing all the time. Common infections include: Gonorrhoea, Chlamydia, Herpes, Trichomonas, Human papilloma virus, Hepatitis B virus, Syphilis, Lymphogranuloma venereum, Donovanosis, HIV and so forth.

Management objectives:
- Early diagnosis and treatment
- Educate patients on STI and risk of HIV
- Counsel on how to prevent STI by reducing high risk behaviours
- Counsel and advocate the use of condoms
- Advise to abstain from sexual activities until fully treated
- Advise to get partner/s screened and treated
- Notify relevant public authority when a STI case is diagnosed.

Diagnosis:
- Swab all urethral discharge cases for microbiological investigations
- Refer all ulcerated cases for laboratory investigations
- Do HIV and syphilis (RPR) tests for all cases of suspected or confirmed STI
• If laboratory tests cannot be done, treat the case based on clinical diagnosis.

**Treatment Options For Common Causes Of Cervicitis And Vaginitis**

Table 9: Treatment of cervicitis and vaginitis

<table>
<thead>
<tr>
<th>Causes</th>
<th>Recommended regimen</th>
<th>Alternative regimen</th>
<th>For pregnant women and breastfeeding mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial vaginosis</td>
<td>Metronidazole¹ 400mg bd with food for 5 days OR Metronidazole 400mg or 500mg orally bd for 7 days</td>
<td>Amoxycillin 500mg tds for 7 days. NB. Amoxycillin is less effective than metronidazole¹</td>
<td>Preferably after the first trimester metronidazole¹ 200 or 250mg orally tds a day for 7 days</td>
</tr>
<tr>
<td>Trichomonas</td>
<td>Metronidazole 2g orally in a single dose</td>
<td>Metronidazole 500mg orally twice a day for 7 days</td>
<td>Preferably after the first trimester Metronidazole¹ 200 or 250mg orally tds for 7 days</td>
</tr>
<tr>
<td>Candida albicans (yeast)</td>
<td>Clotrimazole² 100mg vaginal tablets a day for 3 days OR Miconazole 200mg vaginal suppository, one a day for 3 days</td>
<td>Nystatin 100,000 units vaginal tablet, one a day for 14 days</td>
<td>Clotrimazole² 100mg vaginal tablets a day for 3 days OR Nystatin 100,000 unit vaginal tablet, one a day for 14 days OR Miconazole 200mg vaginal suppository, one a day for 3 days</td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>Amoxycillin 2-3g +/- amoxicillin/clavulanic acid 500mg – 1g OR Amoxycillin 2-3g PLUS ‘o’ probenecid 1g as a single oral dose</td>
<td>Ciprofloxacin⁴ 500mg orally as a single dose</td>
<td>Amoxycillin 2-3g, +/- Amoxicillin/clavulanic acid 500mg-1g</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1g ‘o’ as a single dose OR Doxycycline 100mg bd for 7 days</td>
<td>Erythromycin base 500mg ‘o’ qid for 7 days</td>
<td>Erythromycin base 500mg ‘o’ qid for 7 days or azithromycin 1g ‘o’ as a single dose</td>
</tr>
</tbody>
</table>

¹ Patients taking metronidazole or tinidazole should be cautioned to avoid alcohol. Use of metronidazole is not recommended in the first trimester of pregnancy.

² Single-dose clotrimazole (500mg) available in some places is also effective for yeast infection (CA).
3 Doxycycline, tetracycline, ciprofloxacin, norfloxacin and ofloxacin should be avoided in pregnancy and when breastfeeding.

d The use of quinolone should take into consideration the patterns of Neisseria gonorrhoeae resistance, such as in the WHO South-East Asia and Western Pacific Regions.

e Ofloxacin, when used as indicated for chlamydial infection, also provides coverage for gonorrhoea.

f Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity; only erythromycin base or erythromycin ethylsuccinate should be used.

### Treatment Options For Common Causes of Urethritis

#### Table 10: Treatment of urethritis

<table>
<thead>
<tr>
<th>Causes</th>
<th>Recommended Regimens</th>
<th>Alternative regimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Amoxycillin 2-3g, +/- Amoxycillin/clavulanic acid 500-1g</td>
<td>Ciprofloxacin 500mg ‘o’ as a single dose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1g ‘o’ as a single dose, OR Doxycycline 100mg bd for 7 days</td>
<td>Erythromycin 500mg ‘o’ qid for 7 days</td>
</tr>
</tbody>
</table>

(*Ensure local data support adequate effectiveness)

### Treatment Options For Common Causes Of Genital Ulcer Disease

#### Table 11: Treatment of genital ulcers

<table>
<thead>
<tr>
<th>Causes</th>
<th>Recommended regimen</th>
<th>Alternative regimen</th>
<th>For pregnant women and breastfeeding mothers</th>
</tr>
</thead>
</table>
| Syphilis                | Benzathine penicillin 2.4million units by single intramuscular injection | Doxycycline$^4$ 100mg ‘o’ bd for 14 days | Benzathine penicillin 2.4million units by single intramuscular injection OR Erythromycin$^5$

1) Early syphilis erythromycin$^b$ 500mg ‘o’qid for 15 days or

2) late syphilis erythromycin$^b$ 500mg qid for 30 days

---

Additional therapy for HSV-2 where common (>30%)
<table>
<thead>
<tr>
<th></th>
<th>Aciclovir 200mg ‘o’ 5 times a day for 5 days, or acyclovir 400mg ‘o’ tds for 5 days</th>
<th>Famciclovir 250mg orally 3 times a day for 7 days, or valaciclovir 1g bd for 7 days</th>
<th>Use acyclovir only when benefit outweighs risk. Dosage is the same as for primary infection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>herpes</strong></td>
<td>Recurrent infection Aciclovir 200mg ‘o’ 5 times a day for 5 days or acyclovir 400mg ‘o’ tds for 5 days</td>
<td>Recurrent infection Famciclovir 500mg bd for 5 days or valaciclovir 500mg bd for 5 days</td>
<td></td>
</tr>
</tbody>
</table>

In areas where chancroid, granuloma inguinale or lymphogranulomavenerum are are important causes of genital ulcers, the following treatment can be added:

<table>
<thead>
<tr>
<th>Chancroid</th>
<th>Erythromycin 500mg ‘o’ qid for 7 days OR Azithromycin 1g ‘o’ as a single dose</th>
<th>Ceftriaxone 250mg as a single IMI OR Ciprofloxacin 500mg ‘o’ bd for 3 days</th>
<th>Erythromycin 500mg ‘o’ qid for 7 days OR Azithromycin 1g orally a single dose OR Ceftriaxone 250mg as a single IMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granuloma Inguinale (donovnosis) (treatment should be continued until lesions have completely epithelialized)</td>
<td>Doxycycline 100mg ‘o’ bd OR Azithromycin 1g ‘o’ as a single dose followed by 500mg once a day</td>
<td>Erythromycin 500mg ‘o’ qid OR Trimethoprim (80mg)/sulphamethoxazole (400mg), 2 tablets ‘o’ bd</td>
<td>Azithromycin 1g orally as a single dose OR Erythromycin 500mg ‘o’ qid</td>
</tr>
<tr>
<td>Lymphogranulomavenerum</td>
<td>Doxycycline 100mg ‘o’ qid for 14 days</td>
<td>Erythromycin 500mg ‘o’ qid for 14 days</td>
<td>Erythromycin 500mg ‘o’ qid for 14 days</td>
</tr>
</tbody>
</table>

4 These drugs are contraindicated for pregnant or breastfeeding women.
5 Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity; only erythromycin base or erythromycin ethylsuccinate should be used.
6 The use of quinolone should take into consideration the patterns of Neisseria gonorrhoeae resistance, such as in the WHO South-East Asia and Western Pacific regions.

**Cardiovascular System Infection**

**Bacterial Endocarditis**
Fever of unknown origin, especially if in association with cardiac murmur, must be considered suspicious. If in doubt treat after blood cultures have been taken. Urgent internal medicine consultation is essential.

**Investigations**

- Blood cultures. Three venepunctures inoculating 2 bottles each time (even only 10 minutes apart) or 6 venepunctures (12 bottles) if antibiotics given in last 2 weeks.
- CXR.
- ECG.
- MSU x 2 before therapy.
- Na+, K+, glucose, creatinine, bilirubin, ALP, AST.
- FBC + diff.
- Echocardiogram.

**Treatment**

- Initial therapy – benzylpenicillin 2.4g every 4 hour PLUS gentamicin. (Flu)cloxacillin should be added if staphylococcal sepsis suspected (e.g. IV drug user, acute presentation, early embolic lesions).
- Gentamicin dose of 1mg/kg not exceeding 80mg IV every 8 hours for 48 hours. Seek advice about subsequent dosage.
- Revise therapy in the light of the organism(s) isolated and its potential clinical significance and sensitivities, e.g. urgent valve replacement may be needed if staphylococcal or fungal endocarditis suspected.
- Closely monitor cardiac function, renal function and antibiotic levels.

**Central Nervous System Infection**

**Meningitis**

Meningitis is the inflammation of the meninges caused by infection due to either bacteria, virus or fungus. Signs and symptoms include intense malaise, severe headache, fever, photophobia and vomiting. The patient is irritable and prefers to lie still. Neck stiffness and a positive Kernig’s sign appear within a few hours. However, in milder cases and many viral meningitis, there may be few signs only. In uncomplicated meningitis, consciousness is not impaired, although patient may be delirious with high fever. Papilloedema may occur. The appearance of drowsiness, laterilizing signs and cranial nerve lesions indicate complication such as venous thmbosis, severe cerebral oedema or hydrocephalus. Or, it may mean there is an alternative diagnosis such as encephalitis or brain abscess.

Causative agents:

- **Bacteria**: Neisseria meningitides, Haemophilus influenzae, Streptococcus pneumonia, Staphylococcus aureus, Listeria monocytogenes, Gram negative bacilli, Mycobacterium tuberculosis, Treponema pallidum.
- Viruses such as Echovirus, Coxsackie, mumps, Herpes simplex, HIV and EB virus.
- Fungi such as candida and Cryptococcus
- The first three bacteria as listed above, accounts for 70% of all meningitis and the remaining 30% is caused by the remaining agents (except Hib vaccinated children where Listeria monocytogenes takes over Haemophilus influenzae place)
In neonates, Listeria monocytogenes, group B streptococcus and gram negative bacilli are the important pathogens.

**Treatment:**
Ideally, treatment should follow CSF laboratory findings. However, if a lumbar puncture could not be done; one should not delay treatment, especially if case is suspected of meningococcal meningitis.

**Pre-hospital treatment**
Benzylpenicillin 60mg/kg up to 3g IV or IMI stat

In patients hypersensitivity to penicillin, give ceftriaxone 50mg/kg up to 2g IV stat

**Urgently refer case for hospital treatment**
- Give ceftriaxone (child: 100mg/kg up to) 4g IV daily in one or two divided doses for 7-10 days
- PLUS
- Benzyl penicillin (child:60mg/kg to) 1.8g 4-hourly IV for 7-10 days
- OR
- Amoxycillin* (child 50mg/kg up to) 2g IV 4-hourly for 7-10 days
- Above are empirical treatments
- Treatment should be guided later by CSF laboratory findings.
- Giving dexamethasone shortly before antibiotics has been shown to improve to prognosis of bacterial meningitis. Dexamethasone 10mg (child: 0.15 mg/kg up to 10mg) IV, starting before or with first dose of antibiotic then 6-hourly for 4 days. If dexamethasone is not available, hydrocortisone (200mg [child: 4mg/kg up to 200mg] IV0 may be used for the initial dose. Data suggest there is no benefit in commencing corticosteroids after the first dose of antibiotic.
- *Streptococcus pneumoniae and listeria monocytogene are treated with benzyl penicillin.*
- Neisseria and Haemophilus are treated with ceftriaxone and if sensitive to ampicillin, change to the later antibiotic.
- If Cryptococcus neoformans is isolated, give amphotericin B OR fluconazole if available. Always suspect this agent in HIV cases with meningitis.

**Prophylaxis**
- Contacts with Neissaeria Meningitis cases are treated with rifampicin (neonate <1 month: 5mg/kg; 10mg/kg up to) 600mg bd for 2 days.
- Alternatively, give IMI ceftriaxone 250mg (child:125mg) as a single dose.

**Specific causes of meningitis or encephalitis:**

**Herpes simplex encephalitis:**
- Aciclovir 10mg/kg tds for at least 14 days

Classic features are headache, neck stiffness, fever photophobia and drowsiness. However, they may not be present in early cases. Neonates may present with anorexia, apnoea or fits. Meningitis should be considered in any febrile patient with headache, neck stiffness, neurological signs or conscious level.
Meningococcal meningitis
This can cause coma and death within few hours of first symptoms. Skin rash occurs in 50% cases. (Starts with maculopopular rash before petechiae)

Management
- Start antibiotics immediately (unless a LP can be done almost immediately, do not wait for investigation or confirmation).
- Give IV or IMI benzylpenicillin (60mg/kg up to 2.4g)
- OR
- Ceftriaxone (100mg/kg up to 2g) IV
- OR
- Chloramphenicol IMI or IV; (25mg/kg per dose up to 2g; except in neonates).
- Consult with appropriate Ward’s consultant regarding the need for steroid.

LP is needed for diagnostic purposes but careful with intra cranial pressure (usually manifested as confusion/coma, hypertension, bradycardia, papilloedema).

Patients must be admitted for full treatment, under strict isolation procedures.

Streptococcus pneumoniae
In adults, S.pneumoniae is the most likely organism.
- Assuming lumbar puncture has been performed (Please note that LP is contraindicated in cases suspected of raised intra-cranial pressure; who may present with: slow pulse, rising blood pressure,
- Progressive depression of consciousness).

- Give penicillin G, 3 MU IV 4-hourly for 10 days
- PLUS
- Chloramphenicol: 750mg - 1G 6-hourly for 10-14 days.
- Penicillin G is effective against S. pneumoniae and the meningococcus.

ALL suspected meningitis cases must be discussed with specialist/consultant if their immediate transfer to hospital is not practically possible.

In the rare case of H.influezae meningitis in an adult, give ceftriaxone for up to 21 days combined with single daily dose gentamicin for 3 days; both drugs given IV.

Other causes of meningitis:
Viral, fungal, TB, H.influenzae and listeria. These other causes would need ward investigations for proper diagnosis and appropriate treatment.

b) H. influenzae prophylaxis

H. influenza meningitis.

All contacts of the index case – family members, school students etc.
- Adult – rifampicin 600mg ‘o’ daily for 4 days or 600mg bd for 2 days
- Child - over 4 weeks – Rifampicin 10mg/kg/dose (max. 600mg) ‘o’ daily for 4 days
  OR
- Ceftriaxone 250mg IMI as a single dose - if unable to take
- Rifampicin or pregnant.

**Dengue Fever**

Please refer to the Guidelines for the management and control of dengue fever, produced by the Epidemic Taskforce of MOH.

**Descriptions:**
Dengue fever is a vital disease transmitted from human to human by being bitten by an infected mosquito. It normally presents with:
Fever > 38°C, >2 days; plus any two of the following:
Body aches, retro-orbital pain, rash, giddiness, bleeding, low blood pressure
(<100/60mmHg);
And in children: with any two of the following: poor drinking, low urine output, bleeding, rash, cold/blue extremeties, leukopaenia.
It can present as dengue haemorrhagic fever where the following laboratory findings are added to the above presentations: low platelet count
(<100 x 10^9/L), haematocrit for adult (>50%) and in children (40%).
The most serious presentation is the Dengue Shock Syndrome (DSS), whereby the patient presents in shock.

**Management objectives:**
Try to confirm the diagnosis by laboratory testing, as soon as possible, especially in the absence of an outbreak.
Push oral fluids at home, for adults: 4-6L/24 hours and for children: push 2-3L/24 hours or 7ml/kg/hour.
Use oral paracetamol and remember that NSAIDs and aspirin are contraindicated
Educate patients and guardians of danger signs that need hospital care such as: poor drinking, vomiting, bleeding, coldness of extremeties, less urine, drowsy or restless child, child is unable to sit up and any bleeding.
Push fluids in early, to prevent DSS. (use oral or IV fluid)
Admit severe cases especially dengue haemorrhagic fever and impending DSS.
Counsel friends and relatives of public health measures needed prevent the spread of dengue fever such as using mosquito nets, reduce breeding sites of the vector, avoid people movement especially at the evening and nights and so forth.

**Treatment:**
For non-complicated dengue fever:
- Treatment comprises of oral paracetamol and lots of oral fluids as noted above.(can be done at home)
● For dengue haemorrhagic fever: In mild cases, treatment can be done as an outpatient case. For severe ones, admit for hospital care. In such cases, IV fluid is usually necessary, monitored by serial haemocrit and platelet counts.

● In dengue shock syndrome, one needs urgent admission, and immediate IV fluid therapy, using either N/S or Hartmann’s solution. Infuse 10-20ml/kg bolus fast; this may be repeated 2-3 times, in profound shock. Once haemocrit and haemoglobin every 4-6 hours to guide fluid replacement.

● If the initial 3-4 boluses of IV fluid do not give any improvements, change IV fluid to gelofusin® at 10-20ml/kg/bolus and give 1-2 boluses.

● The severity of the DSS can be reduced, by prompt and adequate IV fluid replacement.

● In refractory shock, despite adequate fluid replacement and haematocrit is dropping for >10%, fresh blood transfusion is indicated.

● Please note that plasma leakage lasts for about 24-48 hours. After this period, IV fluid must be reduced or stopped especially if there is pleural effusion or ascites. If there is pulmonary oedema; give small doses of frusemide.

**Diabetic Foot Infection**

● By far the most important infections of soft tissues.

● Need URGENT attention

● Obtain surgical opinion early especially if debridement is needed.

● In minor infections – metronidazole 400mg ‘o’ 8-hourly

  PLUS

  (flu) cloxacillin 500mg orally 6-hourly for 10 days.

● The treatment listed here does not negate the management of diabetes nor does it reduce the relevance of this section. The importance of the overall management of diabetes should still be considered priority significance in relevance to foot infection.

In more severe infections, always consult and refer. Usual treatments include:

● Metronidazole 400mg orally 8-hourly

  PLUS

● Cloxacillin 1G IV 6-hourly

  PLUS

● Gentamicin 5mg/kg single IV dose infused over 30 minutes

  OR

● Metronidazole 800mg orally 8-hourly for 10 day

  PLUS

● Cephalothin 1-2G IV 4-hourly.

● Cover needed for anaerobes, gram positive and gram negative organisms.

● Cephalophin provides cover for both gram positive and gram negative organisms.

● Failed treatment of infection in diabetes often is the first step towards amputation.

**Eye Infections**

*Acute Conditions:*
**Stye (External hordeolum)**

**Descriptions:**
Is an acute small abscess of an eye-lash follicle. It presents as a tender inflamed swelling(s) on the lid margin, which points through the skin. More than one lesion may be present.

**Treatment objectives:**
- Symptomatic relief
- Prevent complications

**Treatment**
- No antibiotic treatment is required in most cases. Warm (not hot!) compress with a warm towel is beneficial.
- Topical antibiotic may be used. Systemic antibiotic (‘o’(flu)cloxacillin) is only indicated in severe cases (associated cellulitis).

**Conjunctivitis (‘mata fai’)**

**Descriptions:**
An inflammatory, often purulent condition of the conjunctiva. It is commonly caused by virus or bacteria. Conjunctivitis is the most common eye condition seen at the clinics and hospital.

**Management objectives:**
- Relieve symptoms
- Treat the cause
- Identify conditions for referral

**Management**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Viral Cause</th>
<th>Bacterial Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctiva</td>
<td>Diffuse injection</td>
<td>Diffuse injected</td>
</tr>
<tr>
<td>Vision</td>
<td>Not affected</td>
<td>Not affected</td>
</tr>
<tr>
<td>Pain</td>
<td>No pain</td>
<td>No pain</td>
</tr>
<tr>
<td>Discharge</td>
<td>Usually watery</td>
<td>Usually mucopurulent. Eyes usually stuck together in the morning</td>
</tr>
<tr>
<td>Pupillary light response</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Number of eyes affected</td>
<td>Commonly both eyes</td>
<td>Commonly one eye initially but can affect both eyes</td>
</tr>
<tr>
<td>Duration</td>
<td>Resolves after a few days</td>
<td>Few days and response well treatment</td>
</tr>
<tr>
<td>Treatment</td>
<td>Advise on self-limiting nature of illness. Stress infectiousness to others</td>
<td>Antibiotics drops or ointment. Use chloramphenicol eye drops 6-hourly for 5 days OR Chloramphenicol ointment tds for 5 days OR</td>
</tr>
</tbody>
</table>
Warning: No steroid or steroid antibiotic combination eg. Soframycin/dexamethasone (sofradex or Framoptic –D), should ever be used.

This will aggravate viral conjunctivitis and can lead to disastrous results if the patient happens to have viral keratitis (infection of cornea).

Referral:
If patient does not improve after three days.

Subconjunctival haemorrhage
The patient presents with deep red haemorrhage under the conjunctiva. It can be a result of trauma or spontaneous (no trauma). The patient is usually very worried. If there is no infection or significant trauma to the eye, then patient is reassured that it will resolve over a period of one to three weeks.

Iritis
Inflammation of the iris is not very common but may be mistaken for conjunctivitis and treated inappropriately resulting in permanent damage to the eye.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Iritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctiva</td>
<td>Injected but mostly around the cornea</td>
</tr>
<tr>
<td>Vision</td>
<td>Usually blurred</td>
</tr>
<tr>
<td>Pain</td>
<td>Moderate pain associated with photophobia</td>
</tr>
<tr>
<td>Discharge</td>
<td>None</td>
</tr>
<tr>
<td>Number of eyes affected</td>
<td>Can be one or both</td>
</tr>
<tr>
<td>Duration</td>
<td>Few days to a week. Responds well to treatment</td>
</tr>
<tr>
<td>Pupillary light response</td>
<td>Poor</td>
</tr>
<tr>
<td>Treatment</td>
<td>Regular steroid drops and mydriatics (pupil dilators). Please contact doctor at the Princess Margaret Hospital.</td>
</tr>
</tbody>
</table>

Eye Injuries
All eye injuries should be examined in good light and ideally under magnification. If local anaesthetic drops are available, put in a drop or two before examining. This will make the patient more comfortable and therefore make your examination easier. If fluorescein strips are available, these should be used as they will make it easier to see foreign bodies using the blue light in your ophthalmoscope.

*No foreign body present*
- Reassure patient and give antibiotic drops or ointment. *Chloramphenicol eye drops, 6-hourly*

OR
• **Framycetin (soframycin®) eye drops 6-hourly**

**OR**

• **Chloramphenicol eye ointments 8-hourly.**
  • Continue drops for about five days. Patient should be reviewed and if there is no improvement, they should be discussed with Eye Department staff.

**Foreign body present**
If you are trained to remove foreign bodies, then go ahead. If you are not trained to do this then refer patient to someone who can.

**Gastrointestinal Infections**

**Acute diarrhoea of unknown cause**
No antibiotic is indicated unless there is evidence to suggest invasion by a pathogen; such as persistent fever and bloody diarrhoea. In the absence of these signs, codeine can be used as anti-diarrhoeal. Codeine 30mg

**Diverticulitis**
For mild infections:

- Amoxycillin + clavulanate (875/125mg) ‘o’ bd for 5-7 days
- **OR**
- Metronidazole 400mg bd ‘o’ 5-7 days
- PLUS
- Cephalexin 500mg ‘o’ qid 5-7 days.

For severe infections, treat as for acute peritonitis due to perforated viscus.

**Acute peritonitis**

- Amoxycillin (ampicillin) (child 50mg/kg up to) 2g IV qid
- PLUS
- Gentamicin 4-6mg/kg (child <10 years old 7.5mg/kg; child >10 years old, 6mg/kg) IV daily
- PLUS
- Metronidazole (child 12.5mg/kg up to) 500mg IV bd.
- Refer case for surgical review.

**Shigellosis**

- Antibiotic is indicated in all cases, due to public health reasons, although it is effective clinically in only moderate to severe infections.
- Use cotrimoxazole (child:4/20mg/kg up) 160/800mg ‘o’ bd for five days,
- **OR**
- Ampicillin (child 25mg/kg up to) 1g ‘o’ qid for 5 days. Oral* ampicillin rather than amoxicillin is used because of its relatively poor GIT absorption.

* Oral ampicillin not available in Tuvalu
**Amoebiasis**

- Use metronidazole (child: 15mg/kg up to) 600mg ‘o’, tds for 6-10 days

**Intestinal helminths**

- Use mebendazole 100mg bd for 3 days

For children under 6 months and women in the first trimester of pregnancy; mebendazole should not be used. Use pyrantel (combantrin®)

**Epididymo-orchitis from an Urinary tract source:**

- Use trimethoprim (child: 6mg/kg up to) 300mg ‘o’ daily for 14 days,
- OR
- Amoxycillin + clavulanate (child: 22.5mg/kg up to) 875/125mg ‘o’ bd for 14 days,
- OR
- Cephalexin (child: 12.5mg/kg up to) 500mg‘o’ qid for 14 days.

- For severe infections,
- Give IV ampicillin (child: 50mg/kg up to) 2g qid
- PLUS
- Gentamicin 4-6mg/kg (child: <10 years old, 7.5mg/kg and >10 years old, 6mg/kg) IV daily. Continue IV treatment until there is a clinical improvement then change to an appropriate oral medication to complete 14 days course.

**Epididymo-orchitis sexually acquired**

- Amoxycillin 500mg ‘o’ tds for 10-14 days
- PLUS
- Doxycycline 100mg bd ‘o’ for 10-14 days.

Sexually transmitted infections: Please refer to pages 155.

**HIV**

Please refer to appropriate publications on HIV treatment.

**Leprosy**

This is a chronic bacterial infection with Mycobacterium leprae, of the skin, peripheral nerves and upper airways. It presents as a continuous spectrum, with lepromatous (multibacillary) at one end and tuberculoid (pauci-bacillary) leprosy, at the other. In the lepromatous form, there are multiple nodules, macules, papules and diffuse infiltrations which are usually symmetrical. The tuberculoid skin lesions on the other hand, are usually single, sharply demarcated, anaesthesia, wasting, trophic ulcers and the nerves themselves may be enlarged and tender, especially at the ulna nerve (elbow), peroneal nerve (near head of fibula) and the greater auricular nerve.

Diagnosis is confirmed by the demonstration of AFB is skin smears or from biopsies of typical skin lesions (supported by typical histological appearance).
Treatment of all leprosy cases should be supervised by the infectious diseases section of the Public Health Division.

WHO regime include rifampicin 600mg ‘o’ monthly; clofazimine 300mg ‘o’ monthly and 50mg ‘o’ daily; dapsone 100mg ‘o’ daily. This regime is given for 12 months. The monthly medications are closely supervised by the infectious Disease section of public heath.

For tuberculoid leprosy, a shortened regime can be given: Rifampicin 600mg monthly and dapsone 100mg oral daily. This is given for only 6 months.

Treatment is given until skin smears are negative.

It is important to monitor reactions of the disease itself as well as common reactions to treatment.

**Malaria**

Malaria cases in Tuvalu have always been imported ones. Local transmission does not happen because the vector (Anopheles mosquito) which transmits the malaria parasites is fortunately, not present in the country.

Signs and symptoms of malaria infection include fever, chills, sweats, headache and there may be cough, shortness of breath and diarrhoea. In severe infections, there may be pulmonary oedema, cerebral oedema, liver failure, renal failure, shock and death.

Diagnosis is by the identification of the malaria parasites in a blood film. (in someone with travel; history to a malaria endemic country).

**Treatment:**

**Plasmodium falciparum**

*Quinine sulphate* (child: 10mg/kg up to) 600mg (45kg: 450mg) ‘o’ tds for 7 days.

*PLUS*

*Doxycycline* (child > 8 years old: 2mg/kg up to) 100mg ‘o’ bd for 7 days. Need not commence on day one. (Not to be given to children < 8 years old)

In cerebral malaria, give quinine dihydrochloride (20mg/kg), diluted in 500ml N/S solution, run slowly over 2-4 hours. Repeat every 8 hours at 10mg/kg. Once patient improves, change to oral.

* Quinine Sulphate 300mg tablet available in Tuvalu EML

**Plasmodium vivax**

Chloroquine 155mg* base 4 tablets (child: 10mg base/kg) ‘o’ initially then 2 tablets (child: 5mg base/kg) six hours later and on days 2 and 3.

To eliminate the liver phase, give primaquine (child: 0.3mg/kg up to) 15mg daily ‘o’ for 14 days.

* Chloroquine 150mg tablets available in Tuvalu EML
**Malaria prophylaxis**
Avoid the vector when traveling to endemic areas using insect repellants, wear light colourd long sleaved shirts and trousers during the evening, stay in mosquito Screened rooms from dusk till dawn, avoid wearing perfumes and aftershaves at night. *Chloroquine two tablets ‘o’ weekly*
*OR*
*Doxycycline 100mg daily ‘o’ (2 days prior to 4 weeks after leaving malarious areas)*

All cases of malaria are notifiable and must be treated after consultation with the physician at the hospital. Consider the resistant pattern of malaria parasites.

**Mycobacterium Infections (Tuberculosis)**

**Descriptions:**
Tuberculosis is by far, the most important of the mycobacterial infections, in terms of its clinical implications as well as its public health impacts. It causes a whole spectrum of clinical infections ranging from pulmonary infection, meningeal infection, peritoneal infection, bone infection, genital infection and others. It is associated with HIV infection. Public healthwise, it is easily transmissible from one person to another and the recently identified multi-drug resistant strains have proven to be very difficult challenges, to health workers throughout the world. It remains as one of the major global causes of mortality and morbidity.

**Management objectives:** To diagnose cases as fast as possible using chest X-ray and sputum for acid fast bacilli (eg: 3 sputums should be collected: one each morning, for three consecutive days)
- To refer cases cases to the infectious section for treatment, as soon as possible
- For the treatment to utilize the recommended DOTS (Directly Observed Treatment Strategy)
- To ensure contacts are traced, for the possibility if positive sputum test. This is needed for case finding and to reduce the risks of transmission of bacteria in the community.
- To counsel patient and relatives on the mode of transmission and how to prevent the spread of the infection.
- To ensure tat the tuberculosis management team, do carry out frequent reviews of its activities and implement necessary remedial actions where needed, in a timely fashion.

**Standard short course therapy for tuberculosis**
- Consist of 2 months of daily rifampicin, isoniazid, pyrazinamide and ethambutol followed by
- 4 months of rifampicin and isoniazid.
- Ethambutol should be withdrawn once sensitivity shows the mycobacterium to be sensitive to the drugs.

Daily course:
- *Rifampicin (child: 10mg/kg up to) 600mg (<50kg: 450mg) ‘o’ daily for 6 months*
PLUS
Isoniazid (child: 10mg/kg up to) 300mg ‘o’ daily for 6 months
PLUS
Pyrazinamide 2g (<50kg or child: 35mg/kg up to 1.5g) ‘o’ daily for two months
PLUS
Ethambutol (child ≥6 years) 15mg/kg ‘o’ daily for 2 months
OR
Twice weekly:
Rifampicin 15mg/kg up to 900mg ‘o’ for 6 months,
PLUS
Isoniazid 15mg/kg ‘o’ for 6 months,
PLUS
Pyrazinamide 3.5g (<50kg or child: 75mg/kg up to 3g) ‘o’ for 2 months
PLUS
Ethambutol (child ≥6 years) 45mg/kg ‘o’ for 2 months.

WHO treatment categories

Category Description
I new cases of smear-positive pulmonary tuberculosis and other newly diagnosed seriously ill patients with severe forms of tuberculosis (i.e. disseminated tuberculosis, tuberculous meningitis, tuberculosis spondylitis with neurological complications, tuberculosis pericarditis, peritonitis, bilateral or extensive pleurisy, smear-negative pulmonary tuberculosis with extensive parenchymal involvement, intestinal tuberculosis, genito-urinary tuberculosis, etc.)
relapse and failure patients, those who interrupted treatment, and "other"
II patients who were previously treated for more than 1 month not under a DOTS treatment program
III new cases of smear-negative pulmonary tuberculosis and extra-pulmonary

Category I - short course regimen

- Isoniazid 300 mg orally daily for 6 months PLUS
- Ethambutol 800 mg orally daily for 2 months PLUS
- Rifampicin 600 mg orally daily for 6 months PLUS
- Pyrazinamide 1500 mg orally daily for 2 months PLUS
- Pyridoxine 25 mg orally daily for 6 months

Respiratory Tract Infections

Cough or Difficulty Breathing
This can be caused by any of the following:
- Pneumonia
- Severe anaemia
- Congenital heart disease
- Tuberculosis
- Pertussis
- Foreign body
- Effusion or empyema
- Pneumothorax
- Pneumocystis carinii in AIDS cases.

**Pneumonia:**
This is an infection of the lung usually caused by either virus or bacteria. Specific causes cannot be determined by clinical or CXR appearance. It is classified as very severe and severe to facilitate treatment plans.

**Very severe pneumonia.**
Very severe pneumonia is classified as a cough with breathing difficulty plus at least one of the following:
- Central cyanosis;
- Inability to breastfeed or vommiting every time;
- Convulsion, lethargy or unconsciousness;
- Severe respiratory distress.
In addition, some or all signs of pneumonia or severe pneumonia may be present, such as:

**Fast breathing:**
- age <2 months ≥60/min.
- age 2 to 11 months ≥50/min.
- age 1 to 5 years ≥40/min.

**Other associated features:**
- nasal flaring, grunting in young infants;
- indrawn chest wall;
- signs of pneumonia on auscultation;
- pleural rub;
- abnormal vocal resonance.

Management of very severe pneumonia:
Always admit to hospital for CXR, pulse oximetry if available and further treatments.
Antibiotic therapy:
- **Ampicillin 50mg/kg IMI every 6 hours and gentamicin 7.5mg/kg IMI once a day; for five days.**
- If child is well, **continue treatment in hospital or at home with oral amoxicillin (amoxil®) 15mg/kg tds plus IMI gentamicin once daily for another 5 days.**
Alternatively:
• Give chloramphenicol (25mg/kg IMI or IV every 8 hours), until child improves then change to orally, 4 to 6 hourly for a total course of 10 days.
• If child does not improve within 48 hours, switch to gentamicin 7.5mg/kg IMI once a day plus cloxacillin (50mg/kg IMI or IV every 6 hours), for Staph pneumonia. When child improves, change cloxacillin to ‘o’ 6-hourly for a total course of 6 weeks.

Oxygen therapy if available:
• Give oxygen to all children with severe to very severe pneumonia. If pulse oximetry is available, use this guide oxygen therapy. Give oxygen to children with oxygen saturation <90%.

Supportive care
• If child has fever ≥39ºC, give paracetamol.
• If wheeze is present, give short acting bronchodilator.
• Remove by gentle suction of any thick secretions in the throat which the child cannot clear.
• Encourage breast feeding and maintenance fluid.

Severe Pneumonia:
Check that signs of very severe pneumonia is not there. (Such as central cyanosis, severe respiratory distress, vomiting everything, convulsion etc.).
Diagnosis is made if cough with difficulty breathing and at least one of the following signs:
• lower chest indrawing;
• nasal flaring;
• grunting;
In addition, fast breathing: <2 months age ≥60/min
2-11 months age ≥50/min
1-5 years age ≥40/min
PLUS

Give:
• Benzylpenicillin (50,000 units/kg IMI or IV for at least 3 days)
• When child improves, change to oral amoxicillin (25mg/kg bd for a total of 5 days).
• If child does not improve in 48 hours, switch to chloramphenicol 25mg/kg tds IMI or IV until child improves, then change to oral and give it 6 hourly for a total of 10 days course.

Non-severe pneumonia:
The child has pneumonia but does not have the signs and symptoms of severe or very severe pneumonia.

Treat as an outpatient case:
• Use cotrimoxazole (4mg/kg of trimethoprim; 20mg/kg of sulphamethoxazole), bd for 3 days
**OR**

- Amoxicillin 25mg/kg bd for 3 days.

Follow-up:
- Encourage mother to feed child and review child in 2 days time or earlier if child is more ill.
- If improved, finish the 3 days course. If not improving, and there are signs of severe or very severe pneumonia, admit and manage accordingly.

**Pleural effusion and empyema.**
A child with severe or very severe pneumonia can develop pleural effusion or empyema.

**Clinical signs include:**
- Chest is dull to percussion with reduced air entry over area;
- Pleural rub can be heard in its early development;
- CXR shows fluid in one or both sides of chest;
- Especially in empyema, fever persists in spite of antibiotic treatment.

**Treatment:**
- Drainage by pleural tap/s.
- Antibiotic such as chloramphenicol 25mg/kg IMI or IV tds until the child improves then ‘o’ 6-hourly for a total of 4 weeks;
- If infection is due to S.aureus, give cloxacillin 50mg/kg IMI or IV every 6 hours and gentamicin 7.5mg/kg IMI or IV once a day. When child improves continue (flu)cloxacillin ‘o’ 6-hourly for 3 weeks total.
- Failure to improve on the above warrants consideration of tuberculosis (especially if HIV positive).

**Skin, Muscle and Bone Infections**

**Osteomyelitis**
Usually caused by Staphylococcus aureus.
- Give IV cloxacillin 2g 6-8 hourly until patient is afebrile and then substitute to ‘o’ (flu) cloxacillin for at least 4, usually 6 weeks.
- Managed only after consultation/assessment by surgeon and consideration of the microbiological sensitivity of the causative agent. As an example, surgical drilling of affected bone may be indicated and vancomycin may be used (1g IV bd for same duration) in the rare event where the infection is caused by an MRSA(methicillin resistant staph aureus).

**Pyomyositis**
- Relatively rare form of muscle infection with abscess formation; may need surgical drainage if localize pus develops
- Give cloxacillin 1-2g IV 6-hourly for at least 7 days and later change to oral treatment.

**Septic arthritis**
- Treat only after consultation and hospital referral.
- Give cloxacillin 2g IV 6-hourly for at least 7 days followed by ‘o’ (flu)cloxacin 500mg-1g; 6 hourly for a further 3-4 weeks.
- Surgical drainage is usually needed if pus develops in the joint space.

**Staphylococcal Infections**

*Staph.aureus* can cause impetigo, scalded skin syndrome, toxic shock syndrome, septicaemia, joint/bone/soft tissue infections, endocarditis, and meningitis.
*Treatment is with (flu)cloxacin or erythromycin.*

**Bacterial infection**

**Acne**

Acne (pimples) commonly causes facial complexion problems, that occurs in young people and some adults. It may also involve the neck, chest, back and upper arms. The bacteria *Propionibacterium acnes* sometimes multiply and cause inflammation and acne. Food does not cause acne but in certain individuals, some foods like chocolate, nuts, carbonated beverages and milk may aggravate acne. In women, acne may worsen during menstruation. Cosmetics may also have adverse effects on acne.

*Treatment:*
Acne can be effectively treated. However, response may sometimes be slow and long-term therapy may be required. Suggested treatments listed below are based on the clinical presentation of acne.

**SUGGESTED THERAPY FOR DIFFERENT PRESENTATIONS OF ACNE**

**Mild mainly comedonal or papulopustular acne**
- Apply benzoyl peroxide* or a topical retinoid* at night. Apply every second night for the first 2 weeks to reduce irritation.
- Benzoyl peroxide 2.5% to 5% cream or gel

**OR**
- Tretinoin* 0.025% cream (specialist drug)

**OR**
- Isotretinoin 0.05% gel (specialist drug)
• Use a gel in individuals with oily skin, and a cream for those with dry or sensitive skin. To reduce irritation; cleanse with a lowirritant, pH-balanced, soap-free cleanser; twice a day.
  * Benzoyl peroxide and Isotretinoin and Tretinoin are not available in the Tuvalu EML

**Skin Conditions**

• Improvement with retinoids should be evident by 6 weeks and increase for up to 6 months. If inadequate control after 6 weeks, ADD erythromycin* 2% gel topically, in the morning.
  * Erythromycin gel formulation not available in Tuvalu EML

**For mild truncal acne, consider**

• Salicylic acid 5% lotion topically, daily.
  • To reduce risk of antibiotic resistance, apply antibiotic to entire field usually affected by acne, not just to individual lesions. Stop topical antibiotics once papular inflammatory component has settled. Use benzoyl peroxide for long-term maintenance.

**Moderate papulopustular acne +/- trunk involvement +/- nodules**

• Apply benzoyl peroxide 2.5 – 10% cream to face at night as for mild comedonal or papulopustular acne, increasing strength and application as tolerated

**PLUS**

• Doxycycline 50 to 100mg orally, daily

**OR (if doxycycline is not tolerated or contraindicated eg. In pregnancy)**

• Erythromycin 250 to 500mg orally, twice daily. If there is no response by 6 weeks or insufficient response by 12 weeks, increase dose or change antibiotic. If antibiotic resistance is suspected, combine with benzoyl peroxide in preference to a retinoid and consider referral for to dermatologist for systemic isotretinoin. A 3- to 6-month course of antibiotics is recommended. Females have the option of adding an oral contraceptive with a favourable androgenic profile, while on antibiotics. Improvement with oral contraceptives can be slow; therefore, a 3- to 6-month trial is recommended.

**Moderate to severe acne +/- nodules +/- cysts**

For the face, use a topical retinoid at night and an oral antibiotic:

• Tretinoin 0.05% cream (Specialist drug)

**OR**

• Isotretinoin 0.05% gel (Specialist drug)

**PLUS EITHER**

• Doxycycline 100 to 200mg orally, daily

**OR**
• **Erythromycin 500mg ‘o’ twice daily. (if tetracyclines are not tolerated or are contraindicated eg in pregnancy)** If the cystic acne is particularly severe or there is a family history of cystic scarring acne, start antibiotics, together with an oral contraceptive in females unless contraindicated, and organise early referral to dermatologist for oral isotretinoin. If there is no response by 6 weeks, or if condition improves and then relapses, consider changing the antibiotic, adding a low-androgenic oral contraceptive in females, and/or referring to a dermatologist for isotretinoin therapy. Unless contraindicated, females should have been taking the oral contraceptive for at least one cycle with a negative pregnancy test before starting oral isotretinoin.

**Maintenance therapy and follow-up**
A minimum trial of at least 6 weeks is usually necessary before assessing response following a change in therapy. Best results often require combination therapy, which can be expensive over a long period.

**Impetigo and Folliculitis**

**Impetigo** is a skin infection caused by *Streptococcus pyogenes* and/or *Staphylococcus aureus* bacteria. It is often called "school sores" because it affects mostly children but can be seen at any age and is quite contagious.

There are 2 distinct presentations of impetigo:
(i) crusted or nonbullous impetigo – yellow crusts and erosions, itchy or irritating but not painful.
(ii) Bullous impetigo – always caused by Staphlococcus aureus, mildly irritating blisters that erode rapidly leaving a brown crust.

**Folliculitis** is the name given to a group of skin conditions in which there are inflamed hair follicles. The result is a tender red spot, often with a surface pustule. Folliculitis can be due to infection, occlusion, irritation and specific skin diseaseses.

**Treatment Impetigo and Folliculitis**
Until culture results is available, suspect *S. aureus* as a pathogens. Diagnosis can be confirmed by skin swab to indentify the infective organism and establish antibiotic susceptibility.

**For mild or localized infections, use**
• *Saline or soap and water topically, 8-hourly to remove crusts*

**PLUS**
• *Neomycin/ bacitracin topically, 8-hourly for -10 days*

**For severe, widespread or recurrent infections, use**
• *Cloxacin (flu)chloxacin (child: 12.5mg/kg up to ) 250mg orally, 6-hourly for 10 days.*
For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use
• Cephalexin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days.
For patients with immediate penicillin hypersensitivity, use
• Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days.
If Streptococcus pyogenes is confirmed:
• Saline or soap and water topically, 12-hourly to remove crusts

PLUS

• Benzathine penicillin (child: 30–45mg/kg up to) 900mg IMI, as one dose

OR

• Phenoxypricillin (child: 10mg/kg up to) 500mg orally 6-hourly for 10 days.
For patients with hypersensitivity, use
• Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days.

Recurrent or resistant impetigo
Refer to dermatologist

Boils and carbuncles

Boils (also called furuncles) (“fakafoa”) are caused by an infection of the hair follicles with the bacteria Staphylococcus aureus. They are painful, erythematous, tender, papular lesions that are related to infection of the hair follicle. They are most commonly seen on the neck, axillae, buttocks and thighs. Spread to involve several follicles will produce a carbuncle. Superficial infection of the follicle causes pin-pint pustules over the face or legs, especially in children. With recurrent boils, patients should be screened for diabetes mellitus.

Carbuncles are collection of boils with multiple drainage channels. The infection is usually caused by Staphylococcus aureus, is painful and normally results in extensive slough of the skin.

Treatment of boils (“fakafoa”) and carbuncles
Small lesions may be treated with drainage alone. Large lesions, spreading cellulites or the presence of systemic symptoms require antibiotic treatment in addition to surgical incision and drainage. Investigate by microscopy and culture. While awaiting culture results, use
• (Flu)cloxacin (child: 25mg/kg up to) 500mg ‘o’, 6-hourly for 5 to 7 days.

For patients hypersensitivity to penicillin (excluding immediate hypersensitivity), use
• Cephalexin (child: 25mg/kg up to) 500mg ‘o’, 6-hourly for 5 to 7 days.
For patient with immediate penicillin hypersensitivity, use
• Erythromycin (child: 12.5 to 25mg/kg up to) 250mg ‘o’, 6-hourly for 10 days.
Staphylococcal scalded skin syndrome
Staphylococcal scalded skin syndrome. SSSS is an illness characterised by red blistering skin that looks like a burn or scald, hence its name staphylococcal scalded skin syndrome. SSSS is caused by the release of two exotoxins (epidermolytic toxins A and B) from toxigenic strains of the bacteria Staphylococcus aureus. SSSS has also been called Ritter's disease or Lyell's disease when it appears in newborns or young infants. SSSS occurs mostly in children younger than 5 years, usually starts with fever, irritability and widespread redness of the skin. Within 24-48 hours fluid-filled blisters form. These rupture easily, leaving an area that looks like a burn.

Treatment of staphylococcal scalded skin syndrome
Treatment usually requires hospitalisation, as intravenous antibiotics are generally necessary to eradicate the staphylococcal infection.
- **Cloxacillin IV 1g 6-hourly. Depending on response to treatment convert to 'o therapy, (flu)cloxacillin 500mg 6-hourly; child up to 2 years: quarter of adult dose; child 2–10 years: half of adult dose.**

Erysipelas and cellulitis
Erysipelas is a type of cellulitis generally caused group A streptococci most commonly seen in the skin as widespread erythema and cellulitis. The organisms gain entry through fissures in the skin, e.g. in a toe-cleft, and the skin becomes red, swollen and tender. Constitutional symptoms of fever, malaise and hallucinations often accompany the cutaneous features. With recurrent disease the area affected, e.g. the foot and the lower leg, may become lymphoedematous. Erysipelas may affect both children and adults. The risk factors associated with this infection include local trauma (break in the skin), skin ulceration, and impaired venous or lymphatic drainage.

Cellulitis
Cellulitis is a common bacterial infection of the skin, which can affect all ages. It usually affects a limb but can occur anywhere on the body. Symptoms and signs are usually localised to the affected area but patients can become generally unwell with fevers, chills and shakes. If there is no increased warmth over the skin it is unlikely to be cellulitis.

Treatment of Erysipelas and cellulitis
Mild early cellulites and Erysipelas
To cover *Staphylococal aureus* and *Streptococcus pyogenes*, use
- *(Flu)cloxacillin or cloxacillin (child: 25mg/kg up to) 500mg ‘o’, 6-hourly for 7 to 10 days. If S. pyogenes is confirmed, or suspected due to clinical presentation or local susceptibility pattern, use*
  - **Phenoxymethylpenicillin (child: 10mg/kg up to) 500mg ‘o’, 6-hourly for 10 days or procaine penicillin (child: 50mg/kg up to) 1.5g IMI, daily for at least 3 to 5 days. For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use**
  - **Cephalexin (child: 25mg/kg up to) 500mg ‘o’, 6-hourly for 7 to 10 days.**
  - **For patients with immediate penicillin hypersensitivity, use**
  - **Erythromycin (child: 12.5 to 25mg/kg up to) 250mg ‘o’, 6-hourly for 10 days**
If culture is negative, or not possible, continue therapy for 10 days on the assumption that the infection is due to *S. pyogenes* (as trials have shown that 5 days therapy does not
eradicate streptococci and is not sufficient to prevent poststreptococcal glomerulonephritis). If patients have recurrent attacks, long term preventive treatment with penicillin may be considered.

**Severe cellulitis.**
If the patient has systemic features or is not responding to oral therapy after 48 hours, commence IV therapy. Rest and elevation of the affected area are advisable. If the skin has eroded, use nonstick dressings. IV therapy should be continued until the patient is afebrile and the rythematous rash cleared. This may vary from 3 days to 2 weeks. The patient can then change to oral therapy for further 10 days. To treat infection with either streptococci or staphylococci, use
- **Cloxacillin (child: 50mg/kg up to) 2g IV, 6-hourly.**

For patients with penicillin hypersensitivity, use
- **Clindamycin (child: 10mg/kg up to) 450mg IV then clindamycin (child: 10mg/kg up to) 450mg ‘o’, 8-hourly.**

**Preventable measures**
Examine patient for tinea pedis, if present treat aggressively (see p.?). After treatment, the patient should keep oral antibiotics on hand for immediate use if there is a recurrence. In case of frequent recurrence, continuous prophylaxis is recommended with
- **Phenoxymethylpenicillin 250mg ‘o’ bd.** Patient with recurrent cellulitis should be referred to an infectious diseases physician assessment.

**Ecthyma**
Ecthyma is a skin infection caused by *Streptococcus pyogenes* and/or *Staphylococcus aureus* bacteria characterised by crusted sores beneath which ulcers form. It is a deep form of impetigo as the same bacteria causing the infection are involved but ecthyma causes deeper erosions of the skin.

**Treatment**
Treatment depends on the extent and severity of infection. Any underlying disease or skin infection such as scabies or dermatitis should also be treated.

**Topical antiseptics or antibiotics**
- **Neomycin/ bacitracin topically, 8-hourly for 7 days**

**OR**
- A topical antiseptic such as povidone iodine or hydrogen peroxide may be used instead. Apply it at least three times a day to the affected areas and surrounding skin. The treatment should be applied after removing crusts. Look carefully for new lesions to treat. Continue for several days after healing.

**Oral antibiotics**
- **(Flu)cloxacillin (child: 25mg/kg up to) 500mg orally, 6-hourly for 7 to 10 days.**
For patient hypersensitivity to penicillin (excluding immediate hypersensitivity), use
• Cephalexin (child: 25mg/kg up to) 500mg orally, 6-hourly for 7 to 10 days. For patients with immediate penicillin hypersensitivity, use
• Erythromycin (child: 12.5 to 25mg/kg up to) 250mg ‘o’, 6-hourly for 10 days.
The duration of treatment varies; several weeks of therapy may be necessary to completely resolve ecthyma.

Fungal infection

Tinea
Tinea is a type of fungal skin infection caused by a variety of fungi; affecting different parts of the body which include the trunk, scalp, groin, feet and the nails.

<table>
<thead>
<tr>
<th>Types of tinea</th>
<th>Part of the body affected</th>
<th>Causative micro-organism</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinea capitis</td>
<td>Scalp</td>
<td>Trichophyton sp. Microsporum sp.</td>
<td>Infection of the scalp but sometimes also involved the hair. More common in children than in adults.</td>
</tr>
<tr>
<td>(scalp ringworm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinea pedis</td>
<td>Web of the feet</td>
<td>Trichophyton rubrum Trichophyton interdigitale Epidermophyton floccosum</td>
<td>Commonest type of fungal infection cause by spread by direct contact, most through bare feet in bathrooms and health clubs. Leather or plastic footwear that does not “breathe” encourages tinea pedis (rare in children).</td>
</tr>
<tr>
<td>(athlete’s foot)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinea cruris</td>
<td>Groin</td>
<td>Trichophyton sp. Microsporum.sp</td>
<td>A rash develops in the groin commonly affecting men more often than women. Has a itchy spreading red border.</td>
</tr>
<tr>
<td>(Jock itch)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinea barbae</td>
<td>Beard and moustache areas of the face</td>
<td>Trichophyton mentagrophytes varequinum Trichophyton verrucosum</td>
<td>Less common than tinea capitis. Generally affects only men.</td>
</tr>
<tr>
<td>Tinea unguinium of the nails</td>
<td>Nails</td>
<td>Trichophyton sp. Microsporum sp.</td>
<td>Long-term treatment required to eradicate the infection. Usually associated with tinea pedis.</td>
</tr>
<tr>
<td>(lafa)</td>
<td>Trunk, legs and arms</td>
<td>Trichophyton sp. Microsporum sp.</td>
<td>Advice patient to clean underclothing and bedsheets while under treatment.</td>
</tr>
</tbody>
</table>

Note: The pharmacological treatment for tinea fungal infection are detailed on the table below.

<table>
<thead>
<tr>
<th>TYPES OF TINEA</th>
<th>TREATMENT</th>
<th>ORAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinea capitis</td>
<td>Name</td>
<td>Griseofulvin (child: 15 to 2mg/kg</td>
</tr>
<tr>
<td>Disease</td>
<td>Treatment Options</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Tinea cruris</td>
<td>Clotrimazole 1% topically, cream at night and use a talc powder form by day for 2 to 4 weeks. OR Terbinafine 1% topically, daily for 7 days.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months) OR terbinafine (child: &lt;20kg: 62.5mg; 20 to 40kg: 125mg) 250mg orally, daily for at least 2 weeks, depending on the response.</td>
<td></td>
</tr>
<tr>
<td>Tinea Pedis Tinea coporis</td>
<td>Whitfield’s ointment to be applied twice daily until the infected skin shed (usually at least 4 weeks) OR Clotrimazole 1% topically, cream at night and use a talc powder form by day for 2 to 4 weeks. OR Terbinafine 1% topically, daily for 7 days (medicine not in Tuvalu EML).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months) OR terbinafine (child: &lt;20kg: 62.5mg; 20 to 40kg: 125mg) 250mg orally, daily for at least 2 weeks, depending on the response. (medicine not in Tuvalu EML).</td>
<td></td>
</tr>
<tr>
<td>Tinea Baebae</td>
<td>Clotrimazole 1% topically, cream at night and use a talc in powder form by day for 2 to 4 weeks or terbinafine 1% topically, daily for 7 days (medicine not in Tuvalu EML).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Griseofulvin (child: 10 to 20mg/kg up to) 500mg to 1g orally, daily for at least 4 weeks (up to 3 months) OR terbinafine (child: &lt;20kg: 62.5mg; 20 to 40kg: 125mg) 250mg orally, daily for at least 2 weeks, depending on the response. (medicine not in Tuvalu EML).</td>
<td></td>
</tr>
<tr>
<td>Tinea unguium</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Griseofulvin (child: 15 to 20mg/kg up to) 500mg orally, daily for at least 12 months or terbinafine: (child: &lt;20kg: 62.5mg orally; 20 to 40kg: 125mg) 250mg orally, daily for 6 weeks for fingernails and 12 weeks for toenails. (medicine not in Tuvalu EML).</td>
<td></td>
</tr>
</tbody>
</table>

**Ptyriasis Versicolor (Tane) Also Known As Tinea Versicolor**
Common condition in adolescents and young adulthood caused by Malassezia yeasts, which are normal commensals of the skin. It is seen in young adults, particularly those between 20 and 30 years of age. It is common in tropical climates and is exacerbated by heavy sweating. Patient present with small patches of hyperpigmentation or hypopigmentation; well-demarcated by heavy sweating.

**Topical**

- *Salicyclic acid lotion 10% to be applied 2 to 3 times daily.*
  
  OR

- *Clotrimazole 1% topically, 2 to 3 times daily for at least 10 days*
  
  OR

- *Selenium sulphide* selsun®
  
  *Selecnium sulphide not available in Tuvalu EML*

  **Note:** Griseofulvin is ineffective against these yeasts.

**Candidiasis**

Candida is the name for a group of yeasts (a type of fungus) that commonly infect the skin causing ‘candidiasis’, ‘candidosis’ or ‘moniliasis’. The most common Candida (C) species to result in candidiasis is *C. albicans*. Other species are *C. tropicalis*, *C. parapsilosis*, *C. glabrata*, *C. guilliermondi*.

(a) **Cutaneous candidiasis**

Topical agents

- *Clotrimazole 1% topically, 2 to 3 times daily. Continued for 14 days after symptoms resolve.*

  **Note:** Griseofulvin is not active against Candida albicans. If necessary for inflammation, ADD

- *Hydrocortisone 1% cream topically, 2 to 3 times daily.*

  If there is poor response or topical treatment is impracticable, refer to dermatologist.

(b) **Vulvovaginal candidiasis**

Vulvovaginal candidiasis can be treated with:

- *Nystatin 100 000 units/5g vaginal cream (1 applicatorful)*

  **OR**

- *Nystatin 100 000 units pessary intravaginally, 12-hourly for 7 days*

**Viral infection**

**Warts And Molluscum Contagiosum**

**Warts** are benign tumours caused by infection with Human Papillomavirus (HPV). Warts are particularly common in childhood and are spread by direct contact or autoinoculation.
This means if a wart is scratched, the viral particles may be spread to another area of skin. It may take as long as twelve months for the wart to first appear.

Common warts arise most often on the backs of fingers or toes, and on the knees. Plantar warts (verrucas) include one or more tender inwardly growing ‘myrmecia’ on the sole of the foot. Facial warts often take the form of multiple tiny plane lesions. Genital warts are very common. They are often transmitted sexually and predispose to cervical and vulval cancer. In children, warts frequently resolve spontaneously within 2 years, making aggressive therapy inappropriate.

**Molluscum contagiosum** is a viral skin infection resulting in small, harmless skin growths. Molluscum contagiosum resemble acne at first. Later, when the spots enlarge, they often have a waxy, pinkish look with a small central pit. Sometimes there are as many as a hundred spots on one individual.

**Common warts, plantar warts, plane warts, genital warts, molluscum contagiosum, use**

- **Podophyllin** with or without occlusion applied daily. First, the skin should be softened in a bath or bowl of hot soapy water. Apply to normal skin with vaseline (petroleum jelly) or cover with adhesive elastic plaster with a hole left for the wart, and apply the substance to the wart. Apply more tape over the top to increase occlusion.

* Podophyllin not available in Tuvalu EML

Note: Podophyllin must not be used in pregnancy or in women considering pregnancy. It is not recommended for use on wart areas of more than 10 square centimetres, as it can be toxic. It must not be used in pregnant women. The treatment for plane warts are the same as for common warts, plantar warts, genital warts, however used with caution on the face; a small area should be tested first and the preparation applied sparingly and accurately. Plane warts on the face are very difficult to treat and are often best left untreated.

**Herpes Zoster (Shingles)**

The first sign of shingles is usually pain, which may be severe, in the areas of one or more sensory nerves, often where they emerge from the spine. The pain may be just in one spot or it may spread out. The patient usually feels quite unwell with fever and headache. The lymph nodes draining the affected area are often enlarged and tender.

**Treatment**

Antiviral treatment can reduce pain and the duration of symptoms, but it is much less effective if started more than one to three days after the onset of the shingles.

- **Paracetamol** to reduce fever and pain (do not use aspirin in children as this is associated with Reye’s syndrome).
- **Calamine lotion** and/or oral antihistamines to relieve itching.
- **Bath lesions with saline 3 times daily to remove crusts and exudates.**
- **Oral antiviral medication** is recommended in the following circumstances such as facial shingles, those with poor immunity, the elderly
  - **Aciclovir** (child: 20mg/kg up to) 800mg orally, 5 times daily for 7 days (safe in children and pregnancy)
  - **Oral antibiotics** may be needed for secondary infection.
(Flu)cloxacillin (child: 12.5mg/kg up to) 250mg orally, 6-hourly for 10 days.

OR

Erythromycin (child: 12.5 to 25mg/kg up to) 250mg orally, 6-hourly for 10 days

Post-herpetic neuralgia may be difficult to treat successfully. It may respond to tricyclic antidepressant medications such as amitriptyline or anti-epileptic medication such as carbamazepine and sodium Valproate.

**Chickenpox (varicella)**

Chickenpox is a highly contagious disease caused by the varicellazoster virus (*Herpes zoster*). In children with a normal immune system and uncomplicated varicella, antivirals are not recommended because the benefits are only marginal. However adults and children with existing skin disease (eg. Atopic dermatitis) are more at risk for severe disease with complications. In immunocompromised patients with severe disease with complications of varicella (eg. Pneumonitis or cephalitis), use

- Aciclovir 10mg/kg IV, 8-hourly for 7 to 10 days.

For less severe disease, use oral therapy as for herpes zoster Superinfection of varicella skin lesions with streptococcus pyogenes and/or Staphylococcus aureus may occur and should be treated as for impetigo or cellulitis as appropriate. For most healthy patients with chickenpox symptomatic therapy is usually all that is required.

- Paracetamol to reduce fever and pain (do not use aspirin in children as this is associated with Reye's syndrome).
- Calamine lotion and/or oral antihistamines to relieve itching.
- Consider oral aciclovir (antiviral agent) in people older than 12 years who may be at increased risk of severe varicella infections. Aciclovir (child: 20mg/kg up to) 800mg ‘o’, 5 times daily for 7 days (preferred in children and pregnancy)

**German measles (Rubella)**

Rubella, also known as German measles is a viral disease characterised by rash, swollen glands and fever. The disease is usually mild and of little significance unless you are pregnant. Infection of a pregnant woman (congenital rubella syndrome) commonly results in miscarriage, stillbirth, or birth of an infant with major birth abnormalities.

**Treatment**

There is no specific treatment for rubella. The disease is usually mild and self-limiting. Rest, maintaining fluid intake and possibly paracetamol for fever, discomfort or joint pains is all that is usually required.

**Measles**

Measles is a highly contagious disease caused by the measles virus. Initially the symptoms are like the common cold with fever, conjunctivitis (sore red eyes), cough, and characteristic Koplik spots (small white spots in the mouth). Between days 3 to 7 of the
illness a red blotchy rash appears on the face that then becomes more generalised. Measles is also known as English measles, rubeola and morbilli.

**Treatment**
There is no specific treatment for measles which is why immunisation is so important. Treatment for mild cases of measles is supportive.

- Give *paracetamol for fever*
- Maintain fluid intake to prevent dehydration
- Provide nutritional support if necessary
- Observe high-risk individuals carefully to prevent complications. Severe cases of measles usually require hospitalisation. Antibiotics may be given to treat secondary bacterial infections from complications such as otitis media, infectious diarrhoea, pneumonia and sepsis.

**Herpes simplex labialis (cold sores)**
Herpes simplex is one of the commonest infections of mankind throughout the world. There are two main types of herpes simplex virus (HSV); type 1, which is mainly associated with facial infections and type 2, which is mainly genital, although there is considerable overlap.

**Complications:** Urethritis proctitis, neurogenic (nerve) pain, meningitis, widespread infection in debilitated patients.

**Treatment**

**Minor attacks**
Mild cases of viral oral ulceration can be treated symptomatically with systemic analgesics and topical anaesthetic drugs (e.g., Lignocaine gel). Mouthwash may prevent secondary infection and act as an adjunct to oral hygiene. Topical corticosteroids are contraindicated. For antiviral therapy, use

- *Aciclovir 5% cream topically, every 4 hours while awake for 4 days at the first sign of recurrence.*

**Severe primary attack**

**Severe recurrent attack or recurrent attack complicated by erythema multiforme.**
Oral antiviral therapy is recommended in severe herpes simplex virus infections on any part of the skin or oral mucosa, particularly in primary and progressive infection, or if the patient has difficulty eating or swallowing, or when the attacks is complicated by erythema multiforme.*

Use:

- *Aciclovir (child: 10mg/kg up to) 400mg ‘o’, 8-hourly for 5 days (preferred in children and in pregnancy, seek expert advice)*

  If unable to swallow, use

- *Aciclovir (for all ages) 5mg/kg IV, 8-hourly for 5 days.*

Frequent disabling recurrences, frequent recurrences complicated by erythema multiforme, or in HIV-infected patients with chronic lesions.
• **Aciclovir (child: 10mg/kg up to) 200mg orally, 12-hourly for up to 6 months (safe in children and pregnancy)**

If there is a breakthrough during prophylaxis, higher doses may be successful. Treatment should be stopped after 6 months and restarted in the event of recurrence.

**Infestations**

**Scabies**

Scabies is caused by infestation with the mite *Sarcoptes scabiei var. hominis*, a human pathogen that is spread by close physical contact between infected persons. Human scabies is not acquired from animals. Scabies is common in school-age children. If untreated, it will usually spread to all members of a patient’s family. Scabies is acquired by skin-to-skin contact with someone else with scabies. The contact may be quite brief such as holding hands. Norwegian scabies (crusted scabies) is a very contagious variant in which there is little itch but numerous mites. These cause a generalised scaly rash that may affect the scalp.

**Treatment**

• **Benzyl Benzoate application 25%.**

  Child <2 years – *dilute with 3 parts of water*; Child 2-12 years and sensitive adult: *dilute with equal parts of water*.

  **Direction for use:**
  1. Bath in the evening (bathing with warm water not necessary anymore. This will also minimize the risk of systemic absorption leading to systemic toxicity).
  2. Apply over the whole body paying particular attention to the webs of the fingers and toes.
  3. Repeat without bathing on the following day and wash off 24 hours later; a third application may be required in some cases.

  Please note: Treat the whole family members, wash clothing bed sheets and blankets and mattress to be left in the sun.

  Note: Avoid contact with eyes and mucous membranes; do not use on broken or secondarily infected skin; pregnancy and breast-feeding. Do not apply to the head and neck except in the elderly who have experience treatment failure, application to the scalp, neck, face and ears may be needed.

  **OR**

  • **Permethrin 5% cream**

  Child >6 months.

  o Apply over the whole body to try skin from neck down paying particular attention to hands and genitalia, and under the nails with a nailbrush.

  Note: May need to extend to the face, neck, scalp and ears in elderly, children and for those who have experienced treatment failure.

  o Leave on the skin for a least 8 hours (usually overnight) and reapply to hands if they are washed. Wash off after 8-12 hours.
The time may be increased to 24 hours if there has been treatment failure.

- **Systemic antibiotics if necessary**
- **Oral antihistamines** (promethazine) may be useful at night to minimize scratching due to the allergic reaction caused by the mites and their products.

**Note:** All antiscabetic agents have a better success rate if used on 2 occasions, 1 week apart.

**Please note:** Gamma benzene hexachloride cream is no longer recommended.

**Pediculosis**

*a) Pediculosis Capitis (Head Lice)*

This condition is prevalent in school children. In children, infestation should be suspected when excoriation is seen and impetigo is evident around the hair margin. Infestation occurs from the close touching of heads and is often widespread within a class of schoolchildren.

**Treatment**

Some cases can be cured by wet combing (applying hair conditioner to wet hair and using a fine nit comb) every day for 10 to 14 days until no lice are found. This method has only about a 40% success rate. Alternative, topical insecticides can be used. The currently recommended topical treatment for head lice is:

- **Permethrin 1% topically, leave for a minimum of 20 minutes.**
  - All lice treatment should be repeated 7 to 10 days later, and the conditioner and combing method (above) should be used the next day to check that there are no further live mites on the scalp.
  - In between treatments use the same combing method twice, removing all eggs less than 1.5cm from the scalp with head lice comb or pulling them off with fingernails. These eggs may contain viable larvae. Wet combing should be repeated weekly for several weeks after cure to detect recurrence.
  - Wash hands thoroughly after using lice treatment.
  - Do not blow dry hair.
  - Lice treatment should not be used on children under 2 years of age without medical supervision.
  - Wash pillow cases on hot cycle and combs and brushes in hot water (600C).
  - Family and close physical contacts should be examined and treated if live lice are found. The patient’s school should be notified but it is not necessary to exclude children with head lice from school after their initial treatment.
  - The presence of nits on the hairs more than 1.5cm from the scalp only indicates previous, not active, infestation.

**Resistant head lice**

For head lice that are resistant to one of the topical insecticides above, the recommended treatment is:

- Repeat treatment using another insecticides (p.)

OR
• Wet combing.
Combing is easier with shorter hair styles, but shaving the head is not necessary.
If it fails, use

Trimethoprim + sulfamethaxazole (child: 2 + 10 mg/kg up to) 80 + 400mg orally, 12
hourly for 3 days. Repeat after 10 days.
Effectiveness of the trimethoprim + sulfamethaxazole is due to the destruction of symbiotic
bacteria in the gut of the lice.

b) Pediculosis Corporis (Body Lice)
This condition is usually found only in those with gross lack of hygiene, such as vagrants.
The skin affected individuals is often thickened, pigmented and excoriated; lice, often few
in number, may be evident on seams of clothing worn next to the skin. The clothes
should be autoclaved.

Treatment.
Treat as for head lice, applying the preparation to the whole body, but avoiding contact
with eyes and mucous membranes. The parasites and eggs are found in clothing and
bedclothes, which should be discarded, hot washed or sealed in plastic bags for 30 days.

c) Pediculosis Pubis (Pubic Lice)
Phthirus pubis colonises pubic, axillary, beard, and body hair. It may also involve
eyebrows and eyelashes. It is transmitted by close physical contact, often sexual. It is most
often seen in adults. Contact tracing is essential. Examine the whole body surface including
eyelashes and eyebrows. Shaving pubic hair is also helpful. Underwear and bedclothes
should be washed. Treatment failure may be due to re-infection, and family and sexual
partner(s) should therefore be checked and treated as appropriate. Treatment of the
infestation are the same for the head lice.

Infestation of the eyelashes
White soft paraffin is applied thickly to the eyelashes twice a day for 8 days to suffocate
the mites. The nits may then be physically removed with fine forceps. This may be
difficult, requiring slit lamp control. In this situation, referral to an ophthalmologist is
recommended.

Streptococcal Infections
Streptococcus pyogenes and other strep. species may be present without symptoms, but
can cause pharyngitis, tonsillitis (sore throat), cellulites, erysipelas, lymphangitis, scarlet
fever, endocarditis or Septicaemia. Later sequelae may include rheumatic fever and
glomerulonephritis.

Strep. and/ or staphylococci may cause necrotizing fascitis, impetigo or toxic shock
syndrome. Treatment is penicillin or erythromycin. Necrotic tissue and pus need to be
debrided and drained. Suspected streptococcal throat infection should be swabbed for MCS
and treated for 10 days with phenoxyethyl penicillin or benzathine penicillin:one dose.
Typhoid Fever
This is a systemic disease caused by S. typhi, characterized by fever, headache, arthralgia, anorexia, abdominal pain and tenderness and constipation. Infection is transmitted by the oro-rectal route especially from “carriers” of the typhoid bacilli, through poor hygienic practices during food preparation. (About 3% of untreated patients with typhoid fever will become healthy “typhoid carriers” who continue to excrete the bacilli through their faeces).

Diagnosis is based on a positive culture of the blood during the first two weeks after febrile illness, or a positive stool culture at the 3rd to 5th week after the onset of illness. Without antibiotic treatment, the mortality rate is 12%. With adequate antibiotic treatment, it goes down to:<1%.

Based on the microbiological susceptibility, the following treatments are recommended:

- Amoxycillin (child: 25mg/kg up to) 1g orally, 6-hourly for 14 days
  OR
- Cotrimoxazole (child: 4/20mg/kg up to) 160/800mg orally, 12-hourly for 14 days
  OR
- CHloramphenicol (child: 25mg/kg up to) 500-750mg, orally 6-hourly for 14 days.

Alternative regimes include:

- Ciprofloxacin (child: 15mg/kg up to) 500mg orally; 12-hourly for 14 days.
  OR
- If oral therapy cannot be tolerated, or clinical response is delayed, such as fever for more than 7 days; give ceftriaxone (child: 75mg/kg up to) 3g IV daily until susceptibility results become available and an appropriate oral regimen can be chosen.

For chronic typhoid carriers; treatment is by giving oral ciprofloxacin at a dose of 500mg - 750mg, 12-hourly for 28 days. The treatment protocols will be carried out by the Public Health Infectious disease section staff.

Urinary Tract Infections

Acute cystitis
Example of common causative microorganisms are Escherichia coli and Staphylococcus saprophyticus. The following patients need further investigations to exclude any underlying pathology:

- Male of any age
- Females below 5 years of age
- Pre-menarche females with recurrent UTI
Treatment:
Non-pregnant women
- Cephalexin* 500mg bd ‘o’ for 5 days,
  OR
- Nitrofurantoin 50mg qid for 5 days,
  OR
- Amoxycillin/clavulanate 500/125mg ‘o’ bd for 5 days.
* Cephalexin not in Tuvalu EML

Fluoroquinolones should be used as first-line agents as they are the only orally active agents available for infections due to Pseudomonas aeruginosa and other multi-resistant bacteria.
- If resistant to all the above, give ciprofloxacin 500mg ‘o’ bd for 3 days.

Treatment failures are usually due to either multi-resistant organisms, pyelonephritis, stones, or re-infection with the same organism.

Cystitis in Men
An underlying urinary tract abnormality is common and there is often associated infection of the posterior urethra, prostate or epididymis. Cases should be fully investigated to exclude any abnormality. Any regime used for cystitis in non-pregnant women could be used but duration should be for 14 days.

Pregnant women
- Cephalexin 250mg ‘o’ qid for 10-14 days,
  OR
- Nitrofurantoin 50mg ‘o’ qid for 10-14 days,
  OR
- Amoxycillin + clavulanate 500/125mg ‘o’ bd for 10 to 14 days.
- Amoxycillin is only recommended if susceptibility of the organism is proven.

Children
- Cephalexin 12.5mg/kg up to 500mg ‘o’ qid for 5-10 days,
  OR
- Amoxycillin + clavulanate 22.5mg/kg up to 500/125mg ‘o’ bd for 5-10 days,
  OR
- Cotrimoxazole 4/20mg/kg up to 160/800mg ‘o’ for 5-10 days.
- After initial infective episode, prophylactic antibiotic should be started until urinary tract investigation is completed.

Cystitis confirmed by a positive culture warrants investigations to exclude an underlying abnormality for: males of any age, females below 5 years old and all pre-menarcheal female with recurrent UTI. Fluoroquinolones should be avoided in children unless deemed necessary on microbiological grounds.

Acute pyelonephritis
Mild to moderate infection
- Cephalexin (child: 12.5mg/kg up to) 500mg ‘o’ qid, OR
- Amoxycillin + clavulanate (child: 22.5mg/kg up to) 500/125mg ‘o’ tds, OR
- If causative bacteria is resistant to the above agents or it is *Pseudomonas aeruginosa*, then use ciprofloxacin 500mg bd.
- Ciprofloxacin should be avoided in children unless deemed necessary on microbiological grounds.
- Treatment should be continued for a total of 14 days. Followup urine for culture should be done at the completion of the therapy.

Severe infection
- Give parenteral antibiotic especially if there is associated septicaemia.
- Ampicillin or amoxicillin (child: 50mg/kg up to) 2g IV qid, PLUS
- Gentamicin 4-6mg/kg (child: <10 years; 7mg/kg, ≥10years; 6mg/kg) IV daily.
- Treat for 14 days; towards the end of the therapy, use oral appropriate antibiotics.
- If the aminoglycoside (gentamicin) cannot be used, give ceftriaxone (child: 50mg/kg up to) 1g IV daily.

Worms (Intestinal Helminths)
Ascaris, trichuris and hookworm are all found in Tuvalu.

For all of these infections, give mebendazole 100mg as a single dose and repeat after 2-4 weeks.
If the condition relapses, give mebendazole 100mg twice daily for 3 days For children under 10kg, give 50mg twice daily for 3 days
GYNAECOLOGY AND OBSTETRICS

Obstetrics Conditions
Abortion (Incomplete/spontaneous)
Termination of pregnancy before 20 weeks gestation after the last normal menstrual period, or when fetus weigh less than 500g. Where abortion is to be induced this need to be strictly based on medical indications, as it is ILLEGAL to induce abortion in Tuvalu currently.
Management objectives:
• Ensure the complete removal of the products of conception
• Control of bleeding
• In Rh negative mothers, to prevent iso-immunization
• Anti-D immunoglobulin (<12 weeks: 150mcg, > 12 weeks 300mcg IMI within 72hrs of abortion.
• Give psychological support

Non-drug treatment:
• Monitor vital parameters such as pulse and BP, plus Hb and hematocrit where this can be done.
• Treat for shock if indicated (crystalloids to maintain BP>100/60mmHg)
• Give counseling (F/planning, STD, problems relating to single parents and teenage pregnancies) and support to patient.

Drug treatment:
• Misoprostol 400-600micrograms oral, SL, PV or PR are equally effective, repeated every 8hrs for 24hrs, or until pt passes POC. If after 24hrs of starting this therapy nothing happened pt needs D&C, or
• IMI ergometrine 0.5mg every 6hrs for 4 doses, if this fails do D&C
• NOTE: Beware of the scarred uterus as rupture of uterus can occur, leading to severe hemorrhage and possibly death. Minimum effective doses should be given for these cases.
• In Rh negative mothers, give anti-D immunoglobulin IMI, 150mcg if <12 weeks gestation. If more than 12 weeks, give 300mcg within 72 hours of delivery.
• Refer those who continue to bleed significantly despite 24hrs of above management for further evaluation and management at hospital, or those who are in shock or septic.

Anaemia and Antepartum Haemorrhage

Anaemia in pregnancy
Anaemia is haemoglobin of less than 11g/dL, commonly due to iron deficiency, folate deficiency or both and should be suspected when the patient is clinically pale (++), or symptomatic (SOBOE, lethargic, dizziness).

Prevention:
At the antenatal clinic, patients should have their hemoglobin checked at booking, between 28-32weeks gestation, and after 36 weeks. All antenatal mothers should be given routine daily folate and iron, especially in multiple pregnancies.

Routine prevention regimens:
• Ferrous sulphate 200mg ‘o’ daily with food
• Folic acid 5mg daily ‘o’.

Referrals
• All patients with Hb <8g/dL.
• Hb <10g/dL of patients over 34 weeks gestation and those with underlying cardiac problems
• Patients whose Hb is not responding to antenatal haematinics; Hb rise of less than 1.5g/dL over two weeks OR a Hb rise of less than 2g/dL over 3 weeks in early pregnancy.
• Symptoms and signs of chronic blood loss
• Pallor, plus signs of other chronic diseases (e.g. chronic cough, presence of hepatosplenomegaly, dyspnoea etc)
• Evidence of heart failure
• Anaemia thought to be sudden onset or with continued brisk bleeding.

NOTE: All patients for referral should be discussed with on-call medical officer at PMH

Drug treatment of established anaemia
In cases with established iron deficiency anaemia (by a hypochromic, microcytic peripheral blood film picture), give ferrous sulphate ‘o’ at 200mg tds on empty stomach for one month, then continue the preventive regime as noted above.

Antepartum Haemorrhage
This is vaginal bleeding in pregnancy after 28 weeks of gestation to the end of the second stage of labour.

1. Secure large bore IV line (cannula sizes FG 16 or 14) and collect bloods for FBC and X-match. If the bleeding is very brisk you may need 2 of these, and resuscitate with crystalloids to maintain BP >100/60
2. Inform on-call doctor immediately and ready for referral
3. Monitor vital signs while waiting every ½ to 1hr depending on the degree of shock or revealed bleeding.
4. Examine patient and note findings: take fundal height, note presence of tenderness of abdomen, and listen to fetal heart. DO NOT PERFORM VE!
5. Counsel the patient and family regarding condition and the plan as per doctor’s orders.

Cracked nipples during breast feeding
The areola and nipples are protected by the secretions of lubricant from Montgomery’s glands. Excessive buffing (by a towel), elaborate nipple exercise and removing the baby form the breast before suction is broken are causes of cracked nipples, which may lead to infection and mastitis.

Management objectives:
• PREVENT cracked nipples (proper positioning and attachment)
• avoid initial excessive sucking
• break sucking before removing baby from nipple
• be gentle on those nipples

Treatment
• Clean with mild soap and water
• Use an emollient like baby oil, between feeding and remove by gentle washing before feeding
• If too painful, express milk and nurse baby on other breast until recovered
• Watch for infection and treat
• Allow milk to dry on nipples between feeds by fanning; to be washed off later before next feed.

**Diabetes in pregnancy (GDM)**

Gestational diabetes is diagnosed by a FBS > 6.0mmol/L or 2 hours postprandial glucose (after 75g glucose GTT) level of >7.8mmol/L. GTT is advisable where there is family history of diabetes, obesity, previous big baby, large for date baby, previous IGT, previous IUFD and polyhydramnios, or glucosuria. GTT is best done at 28 to 32 weeks gestation.

Refer any case with FBS>6.0mmol/L for GTT and further management at PMH.

Please note that all GDM should be managed in the hospital.

**Management of GDM at antenatal:**

- Admit for 4 points
- Diet and exercise if 4 points only slightly elevated
- Repeat 4 points in 2 weeks
- If not controlled on diet alone, admit and give insulin (isophane or soluble) depending on result of 4 points as per doctor’s order.
- Repeat 4 points after 24hrs of commencement of new insulin regimen and if euglycemic discharge on same regimen and recheck in 4pts in 1 week. If continue to be euglycemic, space follow up as per doctor’s advice (e.g. 2 to 4 weeks); However, if 4 points are abnormal readjust insulin regimen and recheck 4pts after 24 hrs until euglycemia is achieved.
- Aim at blood sugar level of 4-6mmol/L while avoiding hypoglycaemia.
- Dietician should counsel regarding diabetic diet
- Doctor should counsel regarding condition and its possible complication including FDIU, polyhydramnios and premature labor, macrosomia and shoulder dystocia, trauma to birth canal, instrumental delivery, C/section, and neonatal complications (hypoglycemia, hypocalcemia, hyperbilirubinemia, eye themia etc) and so forth.

**Management in labour**

Must be supervised by obstetrician

- Determine risk of CPD and shoulder dystocia and manage accordingly.
- Hourly check of blood sugar, aiming at 4-8mmol/L
- If required:
  - Avoid hypoglycaemia by giving IV 5% (1L) dextrose infusion and KCl (10mmol) run each litre every 8 hours.
  - Avoid hyperglycemia with a separate infusion: insulin 50 units in 500ml of N/S solution or gelfusion®, infuse at 1 unit per hour (10ml/hour), when labour is established. Hourly glucose check to monitor the need for IV glucose especially in high insulin dose pregnancy cases.
- Routine labor monitoring and adjust management according to obstetric indication

**Post-natal care**

- Stop insulin after delivery
- Test sugar level before meals and 2 hours postprandial.
- Resume normal diet
• Arrange for a repeated GTT after 6 weeks and refer for follow up at diabetes clinic. Diabetics who are pregnant are treated in the same way
• Neonatal care as per Pediatric orders (beware of baby weighing > 4kg as they may develop hypoglycemia, so breastfeed within the hour of delivery and check blood sugar if problems noted)

Hypertension in pregnancy
Pregnancy induced hypertension (PIH) is also known as gestational hypertension. This is hypertension developed, or first noted, after 20 weeks gestation in a previously normotensive individual, without significant proteinuria. Preeclampsia is essentially gestational hypertension with the presence of significant proteinuria, defined as dipstick proteinuria ++ or more, or quantified proteinuria of >300mg in a 24-hour urine sample.

• Eclampsia is the presence of seizure in patients with hypertension

Management objectives:
• Reduce maternal and fetal morbidity and mortality
• Refer patients according to level of severity of hypertension

Mild Hypertension
Defined as BP <160/110 without symptoms of PET and significant proteinuria. Counsel patient: advise TCI stat if symptomatic of severe hypertension or PET e.g. headaches, visual disturbance, epigastric pains, irritable, feeling unwell. Regular ANC follow-up (e.g. weekly)

Severe Hypertension
Defined as BP >160/110mmHg without symptoms of PET or significant proteinuria. Admit to hospital for stabilization of BP and to rule out PET. Do PET bloods (FBC, UEC, Platelets, U/Acid)

Medications for stabilization of BP
Aldomet up to 500mg qid & Nifedipine up to 20mg bd
If unable to control with max doses of above meds, refer to doctor’s orders

PET (or preeclampsia is either mild or severe)
Mild preeclampsia:
Defined as BP >140/90 but less than 160/110mmHg, with proteinuria (++) on dipstick or 300mg/24hr urine specimen or heated urine protein >1/3 specimen, without symptoms of CNS, liver, kidney, or blood disturbance.

Admit
Rule out severe preeclampsia (do PET bloods)
Fetal surveillance (CTG) and growth, AFI plus or minus Doppler scans
BP check 4hrly
Dexamethasone if <34 weeks gestation
Counsel patient and family regarding possible complications
Deliver if unstable BP or condition
**Severe preeclampsia**
Admit
PET bloods
Stabilize BP
MgSO4
Deliver

**Caution**
Magnesium overdose is characterized by respiratory depression, absent knee jerks etc. Antidote is calcium gluconate as 1g IV slowly over 2-3 minutes (10ml of a 10% solution).

**Referral**
Immediate referral of any hypertensive pregnant mother after patient has been stabilized.

**Eclampsia**
This is the presence of seizure in a patient with severe PIH. Treatment includes:
- Airway
- Oxygen
- IV magnesium sulphate 4g IV stat over 15 minutes (dilute 4g in 200ml 5% dextrose water and run it over 15-20 minutes); at 1g/hour (5g in 500ml N/S and run at 35dpm)
- MgSO4 can also be given 5g IMI every 6 hours.
- If magnesium sulphate is not available, give IV diazepam (valium®) or phenytoin in the usual manner of treating seizures.
- Phenytoin can be infused at initially with 500mg in 100ml N/S and run it over 20 minutes.
- Control BP with IV hydralazine 5mg every 15 minutes or infusion by diluting 40mg in 40ml N/S and give 10mg every hour and double every 30 minutes until satisfactory response. (Cuban protocol: 75mg in 1L N/saline and start at 10dpm, increasing every 10dpm every 15min until BP controlled, or until 40dpm)
- In severe cases, baby has to be delivered to save mother’s life. (decision to be made by the obstetrician)
- Refer to 14.1.5 for antidote for magnesium toxicity.

**Normal Labour**
Normal delivery is characterized by:
- the onset of regular uterine contractions at term
- accompanied by progressive cervical dilatation
- eventual delivery of baby

Labour is divided into three stages:
- first stage: from onset of labour to full dilatation of cervix
- second stage: from full dilatation to full expulsion of the baby
- third stage: from the delivery of the baby to the delivery of the placenta.

Management objectives:
- Support for the normal birth process
- Monitor the status of the mother and baby
• Reduce maternal and perinatal morbidity and mortality

Non-drug treatment:
• Psychological support of mother
• Hydration and nourishment of the mother

Table 23: Drug treatment of pain in labour

<table>
<thead>
<tr>
<th>Problem</th>
<th>Drug and dosage</th>
<th>Indications and precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analgesics</td>
<td>Pethidine IMI 75-100mg immediately PLUS Metoclopramide 10mg OR Promethazine 12.5mg-25mg</td>
<td>Maternal pains (not to be given if cervical dilation &gt;5cm), first stage</td>
</tr>
<tr>
<td></td>
<td>Lignocaine</td>
<td>Local anaesthetic for episiotomy at the second stage do not exceed 20ml</td>
</tr>
<tr>
<td>Inadequate or incoordinated uterine contraction</td>
<td>Oxytocin IV 5-10 units in 1000ml of 5% dextrose water. Initiate at 5-10dpm then increase by 5dpm every every 30 minutes intervals until 60dpm or 4-5 contractions every 10 minutes (response is achieved)</td>
<td>Only for primiparas titrate for individual needs contraction frequency should never exceed 5 per 10 minutes only use for incoordinated or inadequate contractions</td>
</tr>
<tr>
<td>Rh incompatibility</td>
<td>Anti-D immunoglobulin IMI 150mcg for &lt;12 weeks and 300mcg for &gt;12 weeks as single dose ideally within first 24 hours and preferably not after 72 weeks</td>
<td>Must be given whenever required for Rh-negative mother</td>
</tr>
<tr>
<td><strong>Baby</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neonatal conjunctivitis prophylaxis</td>
<td>An ophthalmic antibiotic ointment such as 1% chloramphenicol</td>
<td>In selected cases where obstetrician feel that there is a reasonable risk of neonatal infection</td>
</tr>
<tr>
<td>Bleeding prophylaxis</td>
<td>Vitamin K IMI 1mg, immediately after birth</td>
<td>Can be used routinely to prevent hypoprothrombinaemia</td>
</tr>
</tbody>
</table>

**Referral (usually urgent)**
• Prolonged labour
• Obstetric haemorrhage (APH or PPH)
• Incomplete delivery of placenta
• Other complications of mother and baby.

**Pre-labour Rupture of Membrane (PROM)**
This is premature rupture of membrane before labour has begun. Preterm PROM occurs before 37 weeks and term PROM occurs after 37 weeks.
Diagnosis is seeing a pool of liquor and confirmed by speculum examination.

Management depends on confirmation of PROM and gestational age of baby. If there is foul smelling watery vaginal discharge, fever, chills, abdominal tenderness and increased fetal heart rate; it may mean there is chorio-amnionitis.

**Treatment of term PROM:**
• Aseptic speculum examination to confirm diagnosis
• Do a high vaginal swab for bacteriological examination if culture and sensitivity can be done
• 80% will proceed to labour with conservative management
• if no uterine activity in 24-36 hours, augmentation with syntocinon should be started, to induce labour.
• *Prophylactic erythromycin 500mg ‘o’ qid.*

**Preterm PROM**
• *Give a course of dexamethasone at 28-34 weeks for certain LMP and if fundal height is less than 34cm for uncertain dates.*
• BD maternal temperature and pulse
• Weekly low vaginal swab without speculum
• Induce delivery and give antibiotics at first sign of chorioamnionitis (tender abdomen, foul smelling liquor, low grade maternal fever, maternal pulse >95bpm)

**Chorioamnionitis**
• *Erythromycin at 500mg tds for 5 days, has been shown to prolong labour by about 7-10 days but does not reflect improvement in the perinatal mortality.*
• Antibiotic regime should follow microbiological findings on vaginal swabs.
• Induce labour where indicated
• Delayed labour needs to be delivered by Caessarean section.

**Preterm Labour**
This is labour before 37 weeks gestation.

Aim of treatment is to arrest labour for 48 hours to give time for the dexamethasone given to the mother to enhance fetal maturity in the baby. This reduces respiratory distress at birth.

**Drugs used:**
• *Nifedipine 20mg SR ‘o’ stat, then 10mg orally qid for 2 to 3 days.*
• *Salbutamol infusion (10mg in 1L fluid). Start at 10dpm then increase by 10dpm half hourly until contraction stops or mother’s pulse rate >120/min. Maintain this rate for another 12 hours.*
This should allow two days course of dexamethasone to work

**Puerperal Sepsis**

This is an infection of genital tract within 42nd day following delivery or miscarriage in which two or more of the following are present:

- pelvic pain
- fever > 38.5°C
- abnormal vaginal discharge or bleeding
- delay in the rate of reduction of the size of the uterus

Risk factors for puerperal sepsis:

- prolonged rupture of membrane (24-48 hours)
- Localised infection in perineum, vagina, cervix or uterus
- Poor hygiene
- IUFD
- Lowered host immunity (anaemic, malnourished etc)
- Prolonged or obstructed labour
- Frequent vaginal examinations
- Caesarean section
- Instrument deliveries
- Unrepaired tears
- PPH
- Diabetes

Investigations:

- HVS, FBC, MSU and Blood culture

**Treatment:**

- *Ampicillin 2g IV stat then 1g qid*

  **PLUS**

  - *Gentamicin 5mg/kg IV every 24 hours (max dose of 240mg/day)*

  **PLUS**

  - *Metronidazole 500mg IV tds, then change to oral 400mg tds*
  - Treat for 1-2 weeks.

**Gynaecology Conditions**

**Abnormal menstrual bleeding**

This is increased menstrual flow either in volume, duration and/or frequency, including menorrhagia or dysfunctional uterine bleeding. In managing these cases, always assess current contraceptive use.
Drug Treatment:
Adolescent: Cyclic medroxyprogesterone (provera®) or norethisterone (primolut®) or monophasic contraceptive pills
- Medroxyprogesterone orally 10mg bd for 7-10 days
  OR
- Norethisterone orally 10mg bd for 7-10 days.
- Allow a 5 days break for a withdrawal bleeding like a menstrual flow.
- Then regulate her menstrual period taking
  - Combined OCP like microgynon®
- This should continue for at least 3 months before discontinuing.

Reproductive years:
- As above plus or minus
- Clomiphene

Perimenopausal:
- As above

Other drug treatment used:
- Ibuprofen ‘o’ 200-400mg tds after food when needed for 2-3 days (Ibuprofen may reduce blood loss in menorrhagia associated with IUCD, PID or anovulatory menorrhagia following puberty.
- If bleeding is severe and signs of anaemia are there, give ferrous sulphate 200mg bd or tds on empty stomach for 1 month.

Referral
- if no improvement
- every girl under 12 years of age with vaginal bleeding before the development of secondary sexual characteristics
- for the investigation of other causes such as sexual abuse, tumors of the genital tract
- severe anaemia

Other gynaecological conditions
Dysmenorrhoea
Pain associated with the menstrual cycle.
- Primary where no know cause is identified
- Secondary where a cause is identified (eg: uterine myoma, adenomyosis, endometriosis, pelvic infection etc).

Management objectives:
- Determine cause and treat accordingly
- Symptomatic relief
Non-drug treatment:
- Mostly for primary dysmenorrhoea
- Reassure woman with dysmenorrhoea of nature of condition
- Encourage patient to carry on with normal everyday activities
- Exercise, massage and warm/hot compress to lower abdomen
Drug treatment:
Two main groups of drugs are used: the NSAIDS and the OCP. The NSAIDs decrease prostaglandin production and the OCP causes atrophy of the endometrium and reduce bleeding.
- **Primary dysmenorrhoea:** give *ibuprofen* 200-400 mg tds after food when needed, for duration of menses then start OCP.
- For secondary dysmenorrhoea, treat the underlying pathology where present eg PID, tumor etc.
Refer if there is poor response to treatment or if an organic cause is suspected.

**Ectopic pregnancy**
This is pregnancy outside the uterus presenting with missed menstruation, sudden lower abdominal pain, shock, anaemia and sometimes vaginal spotting. Shock would be more than pv bleeding would suggest. Signs of peritonism present (abdominal tenderness (+++), rigidity, rebound tenderness).
All suspected cases should be discussed urgently with on-call doctor for urgent evacuation.

**Post menopausal bleeding**
Bleeding at two years or more after menstruation had normally ceased.
Refer all cases to exclude underlying malignancy and other pathology.

**Vaginal discharge**
(Normal vaginal discharge is white and generally not malodorous. The pH is 4 and it contains epithelial cells, bacteria but no significant white cells)
In abnormal vaginal discharge:

- successive vaginal secretion with staining of underwear
- change in vaginal secretion colour or odor
- itching or redness of vulva
- burning or pain on passing urine or during intercourse
- *lower* abdominal pain

One or more of the following may be present during examination:
- vaginal discharge
- lower abdominal tenderness
- pain on moving cervix
- cervical tumor

Common causes of vaginitis:
- *Candida*: treated with *clotrimazole vaginal cream* nightly for three days or pessary once; or *nystatin pessary* every night for 14 days.
- *Bacterial vaginosis*: treated with *metronidazole*
- *Trichomoniasis*: treated with *metronidazole* orally either 2 g once or 400 mg bd for five days.
- *Atrophic vaginitis*: treated by *oestrogen cream*. 
In a pregnant woman, lower abdominal pain related to pelvic infection is rare. If a pregnant woman has lower abdominal pain, such a patient is usually ill and requires referral. Always look for STI and treat appropriately. STI’s such as syphilis, gonorrhoea, chlamydia and trichomoniasis.

Non-drug treatment:
• Counsel on risk-reduction-behaviors and increased risk of transmitting HIV if one has STI;
• Promote use of condoms
• Counsel on the need for sex-partners to be investigated and treated

Drug treatment:
• Amoxicillin 500mg ‘o’ tds for 7 days

PLUS

• Doxycycline 100mg ‘o’ bd for 7 days

PLUS

• Metronidazole 2g immediately and 400mg ‘o’ bd for 7 days

Caution: Metronidazole is contraindicated at first trimester of pregnancy and doxycycline is contraindicated in pregnancy, breast-feeding and in children less than 12 years old.

If there is evidence that candidiasis is the cause of the discharge, add clotrimazole pessary inserted into the vagina, 500mg at night as a single dose.

Referrals:
• history of missed or overdue period (consider ectopic pregnancy)
• recent abortion or delivery
• abdominal vaginal bleeding
• temperature above 39°C
• abdominal rebound tenderness or other GIT symptoms
• pregnant woman with lower abdominal pain related to pelvic infection.
• Cervical mass/tumor

**Cardiac Cases**
Any known cardiac case who is now pregnant should be referred to PMH for evaluation as soon as pregnancy is confirmed or suspected
DENTAL AND ORAL CONDITIONS

Paediatric Problems

Teething
Tooth eruption (1° -6mnths) can cause mild gingivitis and soreness and, as a consequence, irritability, disturbed sleep, dribbling, reduction of amount eaten, increased fluid intake, flushing of the cheeks, and a circum-oral rash. Mild to moderate fever has also been observed at times, although, high fever or convulsions have not been linked to the process.

Treatment:
• Analgesic/antipyretic like elixir paracetamol
• “Teething ring” or something hard to chew on, like hard biscuits.

Trauma to soft tissue and primary (milk) teeth
Small superficial oral lacerations heal spontaneously and no antibiotic is indicated. Lacerations with foreign body/ 2°infection need surgical debridement and antibiotic.
Antibiotics used are:

• *Amoxicillin 15-25mg/kg tid for 5-7 days*

*OR*

• *Phenoxymethyl penicillin 12.5mg/kg qid for 5-7 days*

*OR*

• *Penicillin G(crystalline), 15-30mg/kg IV every six hours.*

If hypersensitive to penicillin, use:

• *Erythromycin 10-25mg/kg ‘o’ qid 5-7 days*

Alveolar bone in a child is elastic and rarely fractures. Injuries to the primary teeth are usually loosening with/without displacement. Fractures to crown or root can happen.

Treatment includes elixir paracetamol for pain/fever, oral penicillin or Amoxicillin if infected and referral for dental assessment.

**Trauma to secondary/permanent teeth.**
Permanent teeth start to erupt into the oral cavity at 5-6 years and continues up to the age of 21. After the initial eruption, root formation/development continues for a period of 18-30 months. Injuries during this phase have the potential to interrupt root development. Injuries involved are mostly fractures of the root or crown and displacement. (luxation, intrusion, extrusion or avulsion) Treatment includes oral paracetamol for pain and immediate dental referral. Successful outcome depends on timely re-establishment of a normal periodontium (supporting structures around tooth).

**Toothache**
Toothache in a child is usually caused by either caries impacted with food, abscess, root infection or an erupting tooth. *Treatment includes paracetamol for pain/fever, phenoxymethyl penicillin or amoxicillin for infection and referral for further dental treatment.*

**Infections**

**Bacterial infections**
Causative organisms are usually a mixture of aerobic and anaerobic oral flora. All cases should ideally be referred to a dentist or dental therapist for appropriate treatment.

**Gingivitis**
Presents as red swollen gums, that easily bleed on brushing teeth. Antibiotic is normally not indicated in most cases. Local dental care such as regular tooth brushing to control bacterial plaque is usually sufficient.

**Acute necrotizing ulcerative gingivitis (ANUG)**
This is a painful yellowish-white ulcer of the interdental papillae and gingival margins which bleeds easily. Causative bacteria are a mixture of the anaerobes: *Borellia vincenti, Fusobacterium fusiform, Bacteroidis* and *Treponema* species. The appearance of ANUG in an individual may suggest an underlying systemic condition or HIV infection.

**Treatment:**
- Address underlying condition
- Advise adequate oral hygiene
- *Metronidazole (10mg/kg up to) 400mg tds for 5 days*
- Peroxide or Perborate mouth rinse 3 times daily - hold for 2 minutes
  - **PLUS**
  - 0.2% chlorhexidine gluconate mouthwashes (if available), adjunct to toothbrushing
  - Refer for dental debridement.

**Periodontal abscess**
Localised collection of pus in a periodontal pocket of a tooth. There is pain on lateral movement of the tooth and it may be quite mobile.

**Treatment:**
- *Amoxicillin 500mg ‘o’ tds (15-25mg/kg tds) and metronidazole 400mg ‘o’ tds (15mg/kg stat, 7.5mg/kg tds) for 5 days*
- Refer for dental treatment.

**Chronic periodontitis**
This is usually caused by gram negative anaerobes which are also prominent in active disease. Tooth/teeth involved are usually mobile and painful.

**Treatment:**
- *Metronidazole 400mg ‘o’ tds (15mg/kg stat, 7.5mg/kg tds) for 5 days (in moderately severe cases)*
  - 0.2% chlorhexidine gluconate mouthwash bd
  - **OR**
  - *Phenoxymethylenicillin (child 7.5-15mg/kg) up to 500mg orally 6-hourly for 5 days,*

If not responding to the above:
- *Doxyycline 100mg bd (2mg/kg bd) ‘o’5 days: restrict to child >8years*

Use erythromycin in place of penicillin in penicillin allergy
Pocket dental treatment for localized pus formation.
Facial swelling and infection
Facial swelling can either be due to odontogenic causes (caries, retained roots, periodontitis etc) or non-odontogenic causes (soft tissue infection, fractures, osteomyelitis, sialoadenitis, foreign body etc). Infections can spread to the soft tissue around jaws, neck and cause cellulitis and suppuration. It can easily be life-threatening. (Ludwig’s angina, Cavernous sinus thrombosis)
In the absence of systemic signs and symptoms, odontogenic infections can usually be treated by local dental care, such as removal of the infected pulp tissue.

If accompanying systemic signs and symptoms are present, the following treatment should be given:

• ‘o’ amoxicillin and metronidazole for 5 days

Patients hypersensitive to penicillin should be given either erythromycin.
If progressive trismus arises and airway is compromised (involvement of the submandibular space), admit case and give:

• Penicillin G (crystalline) 1.2-2.4g(1-2MU) IV qid; (paeds.50,000-100,000 units/kg qid

OR

• Ampicillin 1-2g IV qid; (paeds. 25-50mg/kg qid)

PLUS

• Metronidazole 500mg-1g IV tds(paeds.15mg/kg stat, 7.5mg/kg tds)

PLUS

• Gentamicin 3-5mg/kg/day IV; (paeds.4mg/kg/day)

Pus must be drained surgically by the dentist. Be careful of poorly controlled diabetic and hypertensive patients, who may need antibiotic cover.

Septicaemia
Septisaemia due to skin infection or cellulitis are usually caused by Staphylococcus aureus or Streptococcus pyogenes.

Treatment is with IV cloxacillin 1-2 g, 4 to 6-hourly (paeds. 25mg-50mg/kg per dose)

Patients hypersensitive to penicillin, give

• Vancomycin 1g bd IV(paeds. 10mg/kg qid)

In children, facial or periorbital cellulitis may be caused by Haemophilus influenzae or Streptococcus pneumonia in addition to the above pathogens, add one of the following to the above:
• Ceftriaxone 50-100mg/kg/day (paeds); 1-2g daily adult IV once daily (max. 2g/day).
Children hypersensitive to penicillins or cephalosporins, give chloramphenicol
100mg/kg/day (max 3g/day) IV in 3 or 4 divided doses (paeds. 40mg/kg stat, then 25mg/kg qid)

Viral infections

a) Primary Herpetic Stomatitis:

Causative agent is Herpes Simplex Virus 1 (HSV 1). It presents with multiple oral ulcers
accompanied by fever, malaise, anorexia and irritability. In children, they may have
drooping of the saliva.

Treatment:
• For symptomatic relief; soft diet and adequate fluid intake, since this is a self limiting
illness.
• Antipyretic such as paracetamol.
• Local antiseptic mouthwashes such as chlorhexidine 0.2% solution./Salt water wash
• Aciclovir, 200mg 5 times daily ‘o’ for 5-7 days. Timing is important, within 48-72 hrs of
the onset of symptoms.
  • Topical anaesthetics xylocaine viscous 2%

b) Herpes simplex labialis (cold sore):
Causative agent is HSV 1. The virus is latent in the trigeminal ganglia and is reactivated as
herpes labialis. Papules are followed by blisters then pustules.

Treatment:
• Aciclovir cream (5%) applied qid early, before blisters appear.

c) Herpes zoster (shingles):
Causative agent is Varizella Zoster Virus (VZV), the same one that causes chicken pox. It
presents as an acute painful, vesicular rash along the dermatomal distribution of the
sensory nerves; commonly of the Trigeminal or the Intercostal nerves.

Treatment:
• Aciclovir 800mg ‘o’ 5 times daily for 7 days; beneficial only if started within 72 hours
from the onset of the vesicles. Ophthalmic herpes zoster should be referred to the
Ophthalmologist.

Fungal Infection

a) Oral candidiasis:
A white creamy plaque which leaves a red base when wiped off. Causative agent is usually
Candida albican, when triggered off by: the use of antibiotics, steroids, unhygienic
dentures, smoking and in immunocompromised hosts. It can be seen in neonates too.

Treatment:
• Eliminate predisposing factors
• *Nystatin pastilles 200,000 units* - 2 tablets qid ‘o’ as lozenges.
• For severe cases in immunocompromised hosts, give *nystatin suspension 1ml ‘o’ qid, 5-7 days*

**Protocol For Painful Tooth/Teeth**
Where possible, refer case to the dental department for identification and treatment of cause of pain. Variation in an individual’s response to pain is affected by fatigue, anxiety and sometimes depression. While one is waiting for definitive dental treatment, the following analgesics could be given:

**Mild Pain :**
• *Paracetamol 500mg-1g ‘o’ 4 to 6-hourly*

  OR

• *Aspirin® 300-600mg 4 to 6-hourly (avoid in children, breast feeding mothers, people with gastric diseases and those with bleeding tendencies)*

  OR

• *Other NSAIDS such as ibuprofen 400mg-1.6g bd*

**Moderate Pain :**
*ADD codeine 15-60mg qid ‘o’ to the above medications*

**Severe Pain:**
• *Pethidine 25mg-100mg SC/IMI 2 to 3-hourly PRN*

  OR

• *Morphine 2.5mg-10mg SC/IMI 2 to 3-hourly PRN*

**Antibiotic Prophylaxis**
*(Refer to antibiotic guidelines)*

**Bone Problems**

*Alveolar osteitis (dry socket)*
Severe dull pain post dental extraction, two-three days later. Tooth socket appear ‘dry’ with exposed bone and no blood clots, gingiva is inflamed.

**Treatment:**
• Analgesics
• Dental referral for LA debridesmnt and curettage to initiate socket healing.
Facial fractures
Mandibular fracture (broken jaw)
For simple, undisplaced ones, advise soft diet. PRN analgesia is sufficient. (No surgical intervention required).

For compound displaced fractures:
- *Amoxicillin 500mg tds ‘o’*

*OR*

- *Penicillin G 1.2g IV qid*

PLUS

- *Metronidazole 500mg IV bd if infected;*
- *Check tetanus toxoid status and give it if not covered;*
- *Refer for dental surgery.*

In children, closed condyle or TMJ fractures, encourage early jaw movement (to prevent ankylosis), soft diet and paracetamol as analgesics. (Do not use aspirin®).

Midface fractures

Le Fort types I, II and III or isolated midface fractures, refer for dental surgery. If compound fracture, *initiate benzyl penicillin 1.2g qid IV and metronidazole 1g qid IV for 5-7 days while awaiting transfer for surgery.*

Cerebrospinal fluid leaks

Fractures of the facial middle third and skull, which injures the dura can cause CSF leaks and present as otorrhoea or rhinorrhoea. They predispose to meningitis and must be covered with antibiotics until the leak stops.

Recommended treatment :

- *Rifampicin 600mg ‘o’ mane*

*OR*

- *Chloramphenicol 500mg ‘o’ qid*

*OR*

- *Ceftriaxone IMI 250mg daily.*
- *Continue for two days after CSF leak stops.*

Neurological Problems

Trigeminal neuralgia
Characterised by an unilateral, sharp, stabbing and intermittent pain in division of the trigeminal nerve but no sensory loss. Diagnosed by relief following nerve block using bupivacaine 0.5%.

**Treatment:**
- *Carbamazepine* 100-200mg ‘o’ once or bd,
- Dose can be increased to 400-600mg and even up to 1.2g/day.

**Bell’s Palsy**
Acute unilateral, lower motor neurone type of facial palsy of unknown aetiology (maybe viral). Most recover spontaneously. It is advisable to protect the eye with pad or artificial tears to prevent corneal damage when eyelids cannot close properly. Steroids is of unproven value but still, certain authorities advise giving oral prednisolone 5-10mg bd for 5 days, early during the disease to aid recovery.

**Ulcers And Other Oral Conditions**

**Oral ulcers**
Oral ulceration is probably the most common oral mucosal disease seen. It can potentially be the most serious too. There are many causes and one must make careful history and examination to help diagnosis. Antibiotic is rarely indicated. A corticosteroid cream application may help but if the ulcer does not heal in 2-3 weeks time, refer it immediately for dental assessment.

**Human and animal bites**
Human bites, clenched fist injuries and animal bites often become infected.

**Treatment:**
- Adequate cleaning and debridement
- Prophylactic penicillin if no infection seen eg IMI procaine daily for 5 days OR ‘o’ (flu)cloxacillin qid for 5 days.
- If infected, ADD metronidazole tds for 5 days
- Further surgical drainage and debridment may be needed.

In all cases, give *tetanus toxoid if not given already*.

**Oral Burns**
A common chemical burn seen in adults is caused by putting aspirin® in the buccal sulcus to relieve headache. Treatment is to treat cause of headache and don’t put aspirin® in the buccal sulcus. Burnt mucosa heals itself quite quickly. Chemical burns in children is usually due to ingestion of caustic liquids. Regular saline mouthwash should be done. In severe burns, admit case for IV fluids and antibiotics (usually penicillin). Periodic followup is needed to check for scarring and adhesions.
a) Conscious sedatives
To be used in anxious patients such as those who are phobic to needles, or in children.
*Use diazepam 5-30mg 0.5-1 hour before procedure. They can also be given in divided doses such as 5mg nocte, 5mg in the morning and 5mg at 0.5-1 hour before dental procedure.*

In children, *diazepam 2mg (or according to age), is given either orally, IMI or PR at 0.5 1 hour before the procedure; OR midazolam 0.1mg/kg ‘o’, SC, IMI or IV; or ketamine 1-2mg/kg IV with an experienced operator with standard anaesthetics equipment on standby.*

b) Anti-emetic medications
Important especially for post-operative Oral & Maxillofacial Surgery (OMFS) patients on inter-maxillary fixation (Wired jaws).

- **Metoclopramide** 10mg qid PRN IV or IMI

  **OR**

- **Prochlorperzine** 12.5 mg qid PRN IMI; or 5-10 mg ‘o’; or 25mg PR. (rectally);

  **OR**

- **Promethazine** 25-50mg bd IMI.
PAEDIATRIC CONDITIONS

Common Emergency Conditions In Children

Managing a choking infant:
• Lay infant on your arm or thigh in a head down position;
• Give 5 blows to infant’s back with heel of hand;
• If obstruction persists, turn infant over and give 5 chest thrusts with 2 or 3 fingers, about 2cm below level of nipples but at the midline;
• If necessary, repeat sequence with back-slaps

Managing a choking child (over one year of age).
• Give 5 blows to the child’s back with the heel of hand with child sitting, kneeling or lying;
• If the obstruction persists, go behind the child and pass arm around child’s body, form a fist with one hand immediately below the child’s sternum, place the other hand over the first one and pull upwards into the abdomen, repeat this Heimlich’s maneuver 5 times;
• If necessary, repeat this sequence with the back slaps again.

Problems Of Neonates And Young Infants.

Routine care of the newborn at delivery.
• Dry baby with a clean towel;
• Observe baby and look for satisfactory breathing or crying, good muscle tone and good pink colour;
• Give baby to mother as soon as possible, place on chest or abdomen;
• Cover baby to prevent heat loss;
• Encourage breast-feeding within first one hour;
• (the last two steps prevents hypothermia and hypoglycaemia).
• Remember to give BCG and hepatitis B vaccine to all new born babies.
• Vitamin K 1mg IMI once. (Use the 1mg/0.5ml ampoule; NOT the 10mg/ml ampoule)

Paediatric Conditions

Neonatal resuscitation.
At risk babies who may need resuscitation:
• Babies born to mothers who have chronic illnesses;
• Mother who had previous fetal or neonatal death;
• Mother with PET, multiple pregnancy or preterm delivery;
• Abnormal presentation of foetus;
• Prolapsed cord;
• Prolonged labour;
• Premature rupture of membrane;
• Meconium stained liquor;
However, many babies in need of resuscitation cannot be predicted.

Figure 5 Steps in Neonatal Resuscitation:

Dry the baby with clean cloth and place where the baby will be warm. Look for breathing or crying, good muscle tone and colour pink. Position the head of the baby in the neutral position to open airway; Clear airway if necessary; stimulate; reposition and give oxygen as necessary. Use correctly fitting mask and give baby 5 slow ventilation with bag. Check
position and mask fit; Adjust position if necessary; provide ventilation with bag and mask; If chest not moving well, suction airway. Check the heart rate (HR). (cord pulsation or listening with stethoscope). Continue to bag at a rate of about 40 breaths per minute. Make sure the chest is moving adequately. Use oxygen if available. Every 1-2 minutes stop and see if pulse or breathing has improved. Stop compression once HR >100/min.

Stop bagging once respiratory rate >30/min. Continue oxygen until pink and active.

Routine Care
Routine Care and Observe
Carefully. Observe Carefully.
Compress the chest. 90 compressions coordinated with 30 breaths/min (3 compressions/breath/2 seconds). Use both thumbs on sternum just below a line connecting nipples; with fingers of both hands holding the side and back of chest wall. Compress the A-P diameter of the chest. Yes No Pink and Breathing Not breathing & cyanosed. Breathing If not breathing Call for help HR <60/min HR >60/min.

Prevention of neonatal infections

• Use basic hygiene and cleanliness during delivery.
• Special attention to cord and eye care;
• Exclusive breast feeding;
• Strict procedures for hand-washing for all staff and family members, before and after handling babies;
• Do not use water for humidification in incubators because of risk of pseudomonas infection;
• Avoid incubators;
• Remove IV line when no longer needed;
• Avoid unnecessary blood transfusions;
• Strict sterility to for all procedures such as injections etc.

Management of child with perinatal asphyxia.

Initial management is effective resuscitation, (see above).

Problems in the days after birth:

• Convulsion: Treat with phenobarbitone and check the glucose level.
• Apnoea: Common after severe birth asphyxia. May be associated with convulsions.

Manage by nasal oxygen, bag and mask. (CPAP if available).
• Inability to suck: Feed with EBM via NG tube. Be extra careful with delayed emptying of stomach to avoid regurgitation.
• Poor motor tone: Recovery of motor tone or ability to suck within one week indicate some good outcome. If no recovery after one week; usually means significant brain damage and one would expect problems.
Danger signs in newborns and young infants:

- Unable to be breast fed.
- Convulsion.
- Drowsy or unconscious.
- Respiratory rates <20/min or apnoea >15 seconds.
- Respiratory rate >60/min.
- Grunting and severe chest indrawing.
- Central cyanosis.

Emergency management of danger signs:

- Clear airway.
- Give nasal oxygen.
- Bag and mask if needed.
- Give ampicillin and gentamicin.
- Check glucose. If you can’t, assume hypoglycaemia and give IV glucose.
- Give vitamin K if not given already.
- Refer and admit to hospital.

Serious bacterial infections in neonates.

Risk factors include:
- Maternal fever (during labour or just before delivery);
- Rupture of membrane more than 24 hours before delivery;
- Foul smelling amniotic fluid.

Danger signs include:
- Deep jaundice;
- Severe abdominal distension;
- Painful swollen joints, reduced movement and irritability if these parts are handled;
- Many or severe skin pustules;
- Umbilical redness extending to periumbilical skin or umbilicus draining pus;
- Bulging fontanelle.

Refer all these cases for admission.

Neonatal meningitis usually presents with the following signs:
- Bulging fontanelle;
- Convulsion;
- Irritability;
- Reduced feeding;
- High pitched cry;
- Apnoeic episodes.

Treatment includes giving either ampicillin and gentamicin OR Ceftriaxone. Refer all cases for admission as soon as possible.
Other common neonatal problems.

Jaundice: More than 50% of normal newborns and 80% of preterm infants have some jaundice. Jaundice can be divided into normal or abnormal.
Abnormal (non-physiological jaundice)
• Jaundice on first day of life;
• Jaundice that lasts longer than 14 days in term babies or jaundice that lasts longer than 21 days in pre-term babies;
• Jaundice with fever;
• Deep jaundice with palms and soles with deep yellow colour.

Normal (Physiological jaundice)
• Skin and eyes yellow but none of the above (in abnormal jaundice);
Possible causes of abnormal jaundice:
• serious bacterial infection;
• haemolytic diseases due to blood group incompatibility or G6PD deficiency;
• Intrauterine infection (TORCHES), or congenital syphilis;
• Liver disease such as hepatitis or biliary atresia;
• Hypothyroidism.

Investigations for abnormal jaundice include:
• FBC
• Blood type of mother and baby including Coomb’s test;
• Syphillis test;
• G6PD and liver function test;
• TFT and liver ultrasound;
• Septic workup.

Treatment :
• Phototherapy and referral to hospital where treatment will be further guided by serum bilirubin and the treatment of potential cause.

Cough Or Difficulty Breathing

This can be caused by any of the following:
• Pnemonia
• Severe anaemia
• Congenital heart disease
• Tuberculosis
• Pertussis
• Foreign body
• Effusion or empyema
• Pneumothorax
• Pneumocystis carinii in AIDS cases.

**Pneumonia:**
This is an infection of the lung usually caused by either virus or bacteria. Specific causes cannot be determined by clinical or CXR appearance. It is classified as very severe and severe to facilitate treatment plans.

**Very severe pneumonia.**

Very severe pneumonia is classified as a cough with breathing difficulty plus at least one of the following:
- Central cyanosis;
- Inability to breastfeed or vommiting every time;
- Convulsion, lethargy or unconsciousness;
- Severe respiratory distress.

In addition, some or all signs of pneumonia or severe pneumonia may be present, such as:

**Fast breathing:**
- age <2 months ≥60/min.
- age 2 to 11 months ≥50/min.
- age 1 to 5 years ≥40/min.

**Other associated features:**
- nasal flaring, grunting in young infants;
- indrawn chest wall;
- signs of pneumonia on auscultation;
- pleural rub;
- abnormal vocal resonance.

**Management of very severe pneumonia:**

Always admit to hospital for CXR, pulse oximetry if available and further treatments.

**Antibiotic therapy:**
- *Ampicillin 50mg/kg IMI every 6 hours and gentamicin 7.5mg/kg IMI once a day; for five days.*
- *If child is well, continue treatment in hospital or at home with oral amoxicillin (amoxil®) 15mg/kg tds plus IMI gentamicin once daily for another 5 days.*

**Alternatively:**
- *Give chloramphenicol (25mg/kg IMI or IV every 8 hours), until child improves then change to orally, 4 to 6 hourly for a total course of 10 days.*
- *If child does not improve within 48 hours, switch to gentamicin 7.5mg/kg IMI once a day plus cloxacillin (50mg/kg IMI or IV every 6 hours), for Staph pneumonia. When child improves, change cloxacillin to ‘o’ 6-hourly for a total course of 6 weeks.*

**Oxygen therapy if available:**
- *Give oxygen to all children with severe to very severe pneumonia. If pulse oximetry is available, use this guide oxygen therapy. Give oxygen to children with oxygen saturation <90%.*
Supportive care
• If child has fever ≥39°C, give paracetamol.
• If wheeze is present, give short acting bronchodilator.
• Remove by gentle suction of any thick secretions in the throat which the child cannot clear.
• Encourage breast feeding and maintenance fluid.

Severe Pneumonia:
Check that signs of very severe pneumonia is not there. (Such as central cyanosis, severe respiratory distress, vomiting everything, convulsion etc.). Diagnosis is made if cough with difficulty breathing and at least one of the following signs:
• lower chest indrawing;
• nasal flaring;
• grunting;
In addition, fast breathing: <2 months age ≥60/min 2-11 months age ≥50/min 1-5 years age ≥40/min
PLUS
Chest indrawing and other auscultation signs of pneumonia.

Treatment of severe pneumonia
Admit for hospital treatment.
Give:
• Benzylpenicillin (50,000 units/kg IMI or IV for at least 3 days)
• When child improves, change to oral amoxicillin (25mg/kg bd for a total of 5 days).
• If child does not improve in 48 hours, switch to chloramphenicol 25mg/kg tds IMI or IV until child improves, then change to oral and give it 6 hourly for a total of 10 days course.

Non-severe pneumonia:
The child has pneumonia but does not have the signs and symptoms of severe or very severe pneumonia.

Treat as an outpatient case:
• Use cotrimoxazole (4mg/kg of trimethoprim; 20mg/kg of sulphamethoxazole), bd for 3 days

OR
• Amoxicillin 25mg/kg bd for 3 days.

Follow-up:
• Encourage mother to feed child and review child in 2 days time or earlier if child is more ill.
• If improved, finish the 3 days course. If not improving, and there are signs of severe or very severe pneumonia, admit and manage accordingly.


**Pleural effusion and empyema.**

A child with severe or very severe pneumonia can develop pleural effusion or empyema. Clinical signs include:

- Chest is dull to percussion with reduced air entry over area;
- Pleural rub can be heard in its early development;
- CXR shows fluid in one or both sides of chest;
- Especially in empyema, fever persists in spite of antibiotic treatment.

**Treatment:**

- Drainage by pleural tap/s.
- Antibiotic such as chloramphenicol 25mg/kg IMI or IV tds until the child improves then ‘o’ 6-hourly for a total of 4 weeks;
- If infection is due to S.aureus, give cloxacillin 50mg/kg IMI or IV every 6 hours and gentamicin 7.5mg/kg IMI or IV once a day. When child improves continue (flu)cloxacillin ‘o’ 6-hourly for 3 weeks total.
- Failure to improve on the above warrants consideration of tuberculosis (especially if HIV positive).

**Epiglottitis**

This is a medical emergency; commonly seen in children under 5 years of age, but occasionally seen in older children and adults. It is usually caused by *Haeomophilus influenza* type b. It is uncommon in countries that immunize its children with vaccine for this infection (Hib vaccine).

Symptoms include:

- Sore throat
- Hoarseness
- Stridor
- Drooling and apprehension.

Diagnosis is confirmed by:

- Direct visualization of a ‘cherry red’ epiglottis (but do not manipulate epiglottis or it may cause laryngeal spasm).
- Blood culture is usually positive for *haemophilus influenza* type b.

**Admit case.**

**Treatment:**

- Ceftriaxone 80-100mg/kg/day as a single dose or divided 12-hourly, IV (not to exceed 4g/day or 2g/dose).
- OR
- Cefotaxime 200mg/kg/day, divided 6-8 hourly, IV (not to exceed 12g/day).
- OR
• **Amoxicillin in susceptible isolates**
  
  • **OR**
  
  • **Chloramphenicol (50mg/kg up to) 1g IV immediately and followed by 25mg/kg up to 1g 6-8 hourly; in penicillin sensitive patients.**
    • These regimens are continued for 5 days. However to eradicate haemophilus carrier status, give rifampicin (neonate <1 month 10mg/kg; child: 20mg/kg) up to 600mg daily for 4 days to both contacts and cases.
    • Vaccinate all <5 years old contacts with Hib vaccine.
    • Please remember to urgently refer cases with stridor for surgical assessment in case of need for urgent tracheostomy.
    • The use of nebulised adrenaline and steroid to help clear airway is described below in 19.3.4 in viral croup. This can be used in acute epiglottitis too.

**Viral Croup**

*Definition:*
A condition caused by various respiratory viruses, which leads to the obstruction of the upper airway. It can be life threatening when severe. It is divided into mild and severe.

Mild croup is characterized by:
  • Fever
  • Hoarseness of voice
  • Barking and hacking cough
  • Stridor heard only when child is agitated.

Severe croup, which occurs mostly in infants, is characterized by:
  • Stridor when child is quiet
  • Rapid breathing and indrawing of lower chest wall.

*Treatment:*

**Mild croup:**
Managed at home with supportive care, including:
  • Encourage oral fluids
  • Breast feed and feed as appropriate
  • Paracetamol for fever

**Severe croup:**
Admit and treat as follows:
  • **Steroid treatment - One dose of oral dexamethasone (0.6mg/kg) or oral prednisolone 1mg/kg twice a day for three days. (Please note that 1mg prednisolone is equivalent to 5mg hydrocortisone or 0.15mg dexamethasone).**
  • **Adrenaline treatment - Give the child a trial of 2ml of nebulised adrenaline (1:1000 solution). Repeat hourly if effective. (Remember, its effect may last only 2 hours).**
  • Please note that antibiotic is not necessary.
• Signs such as severe indrawing chest wall and restlessness are most likely to be indications for tracheostomy and not for oxygen.
• Avoid using mist tents as they are ineffective and they separate infant from mother.
(Oxygen is only indicated in severe airway obstruction, just before tracheostomy.)

Coughs or Cold

These are common, self-limited viral infections requiring only symptomatic care. Antibiotics should not be given. Most episodes end within 2 weeks. Coughs > one month may be due to asthma or tuberculosis.

Common features of the “common cold” Cough, nasal discharge, mouth breathing and fever.

The following are absent:
• fast breathing;
• lower chest indrawing;
• stridor when child is calm;
• general danger signs.

Wheeze may occur in young children.

Treatment of cold:
• Treat as an outpatient;
• Soothe throat and relieve cough with safe remedy such as warm sweet drink;
• Relieve high fever (≥39°C) with paracetamol if fever is causing distress.
• Do not give antibiotics. (They are not effective and they do not prevent pneumonia).
• Do not give medicated nose drops;
• Do not give remedies that contain atropine, codeine or alcohol (they may be harmful).

Follow-up:
• Feed child
• Watch for fast breathing or difficulty breathing. Return if these develops.
• Return if child becomes more sick or unable to drink or breast feed.

Conditions presenting with wheeze (bronchiolitis and asthma)

In the first 2 years of life, wheezing is mostly caused by acute viral respiratory infections, presenting as bronchiolitis, coughs and colds. After 2 years of age, most wheezing is due to asthma. Sometimes, children with pneumonia present with wheeze, especially those below 2 years of age.

Bronchiolitis:
This is a lower respiratory tract viral infection, which typically, severely affects infants. It comes in annual epidemics and is characterized by airways obstruction and wheezing.

Respiratory syncitial virus is a common causative agent. Secondary bacterial infection can be common in some situations. Episodes of wheezes may occur for months after the initial one but will eventually stop.
Diagnosis:
• Wheeze not relieved by 3 doses of rapid acting bronchodilator
• Hypereinflation of chest with increased resonance to percussion
• Lower chest indrawing
• Fine crackles or ronchi on auscultation
• Difficulty feeding, drinking owing to respiratory distress

Treatment:
Most children can be treated at home, except the following, who will need to be admitted for hospital treatment:

Signs of severe or very severe pneumonia:
• Central cyanosis
• Inability to drink or is vomiting
• Convulsions, lethargy or unconsciousness
• Lower chest wall indrawing
• Nasal flaring
• Grunting in young infants

Or signs of respiratory distress:
• Obvious discomfort in breathing
• Difficulty in drinking, feeding or talking

Antibiotic treatment:
• For home treatment, give cotrimoxazole (4mg/kg trimethoprim, 20mg/kg sulphamethoxazole) twice a day or amoxicillin (25mg/kg 2 times a day) orally for 3 days, if child has fast breathing.
• If there is respiratory distress (such as the child has lower chest wall indrawing but is able to drink and feed, and there is no central cyanosis); give benzyl penicillin 50,000 units/kg IMI or IV every 6 hours for at least 3 days. When the child improves, switch to oral amoxicillin for 3 days.
• If there is sign of severe pneumonia (central cyanosis and inability to drink), give chloramphenicol (25mg/kg IMI or IV every 8 hours) until child improves. Then switch to oral and give it for a total of 10 days.

Other treatments:
• Give oxygen in severe cases
• Give paracetamol in fever
• If child does not respond to treatment, do a chest X-ray to exclude tension pneumothorax which may complicate this condition.

Asthma:
This is a chronic inflammatory condition with reversible airways obstruction, characterized by recurrent episodes of wheezing often with cough, which responds to bronchodilators and anti-inflammatory drugs. Antibiotics is not indicated unless there is sign of pneumonia.
**Diagnosis:**

- History of recurrent episodes of wheezes and coughs
- Lower chest wall indrawing
- Prolonged expiratory audible wheeze
- Reduced air intake when obstruction is severe
- Absence of fever
- Good response to treatment with brochodilators

**Treatment:**

- First wheeze episode with no respiratory distress - treat at home with supportive care only.
- In respiratory distress or recurrent attacks, give salbutamol by nebulizer or inhaler.
- If child respond to this treatment, send home on inhaler
- If no response and child is getting worse (cyanosed and not drinking); admit and give the following:
  - Oxygen
  - Give nebulized salbutamol (dose as recommended), on a regular basis (use air or oxygen to drive the nebulizer at a rate of 6-9 litres per minute)
  - If no response after 3 doses, give IV aminophylline 5-6mg/kg, up to 300mg over 20 minutes. Follow-up dose is 5mg/kg every 6 hours as an infusion. Do not give this if child had received any form of aminophylline in previous 24 hours. Stop infusion if pulse rate >180/minute, or child is vomiting and has headache and convulsion.
  - If no response to above, do Chest X-ray to exclude pneumothorax
  - Followup treatment may include oral or inhaled steroids depending on severity of case.

**Rheumatic Fever**

**Descriptions:**

This is an inflammatory disease that occurs in children and young adults (first attack usually occurs between 5 and 15 years of age), as a result of infection with group A *Streptococci*. It affects the heart, skin, joints and central nervous system. Pharyngeal infection with group A *Streptococci* (occasionally skin infections), may be followed by the clinical syndrome of rheumatic fever.

Diagnosis is made using Jone’s criteria:

- Major criteria: carditis, polyarthritis, chorea, erythema marginatum and subcutaneous nodules;
- Minor criteria: Fever, arthralgia, previous rheumatic fever, raised ESR or C-reactive protein, leukocytosis, prolonged PR interval on ECG Plus evidence of past *streptococcal* infections, such as positive group A *Streptococci* throat infection or raised anti-streptolysin O titre, or history of scarlet fever and so forth. A positive is at least the presence of either: two major criteria, or one major criterion and two minor criteria.

Rheumatic valvular disease usually affects the mitral and aortic valves, causing any combination of the following: mitral stenosis (commonest), mitral regurgitation, aortic stenosis or aortic regurgitation

**Management objectives:**

- Diagnose and manage acute rheumatic fever cases
- Treat *streptococcal* group A infections in both pharyngeal and skin infections.
- Give prophylaxis treatment for *streptococcal* group A infection in cases with rheumatic heart disease and those with recurrent acute rheumatic fever,
• Give endocarditis prophylaxis for cases with rheumatic valvular disease
• Refer cases with chronic valvular disease for further cardiac surgery treatment
• Followup cases who has had valvular replacement surgery to ensure there is no complications.
• Advise community on risk factors for transmission of group A Streptococci such as over crowding living conditions and so forth.

_Treatment of acute rheumatic fever:_
• **Admit** to hospital; do the usual blood tests, ECG, chest X-rays etc.
• Rest in bed give supportive therapy (eg treat heart failure and give oxygen if needed)
• Eradicate any residual streptococcal group A infection with a single shot of IMI benzathine penicillin or oral phenoxymethyl penicillin for one week
• Give aspirin
• In active carditis give prednisolone, 60-120mg in four divided doses until clinical syndrome has improved and ESR has fallen to normal.
• Prevent recurrence by giving monthly benzathine penicillin or oral daily phenoxymethyl penicillin.

_Prevention of recurrence of rheumatic fever._
• No cardiac involvement – benzathine penicillin 1.2 megaunits, IMI every 28 days up to the age of 18.
• With cardiac involvement – as above but recommended up to the age of 40 years. Compliance with oral prophylaxis is poor in most communities (where it has been researched); however it is included in many guidelines. Where compliance to oral medication is good, one can give phenoxymethyl penicillin ‘o’ 250-500mg bd.

**Diarrhoea**

_Dehydration in Children_

<table>
<thead>
<tr>
<th>Table 15: Signs and Symptoms of dehydration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs/Symptoms</td>
</tr>
<tr>
<td>↓ urine output</td>
</tr>
<tr>
<td>Dry mouth</td>
</tr>
<tr>
<td>↓ skin turgor</td>
</tr>
<tr>
<td>Sunken anterior</td>
</tr>
<tr>
<td>Fontanelle</td>
</tr>
</tbody>
</table>
Sunken eyes - + ++ Metabolic acidosis and temperature worsen this
Tachypnoea - +/- + Due to hypovolaemia, pyrexia and irritability
Tachycardia - +/- ++ Drowsiness/irritability
Drowsiness/irritability - +/- +

**EMERGENCY TREATMENT OF DEHYDRATION**

**MILD DEHYDRATION**
- Continue normal feeds/drinks of small amounts, frequently.
- Add ORS or home-based fluids according to the table below and until diarrhea stops.
- Teach mother how to mix the ORS.

**Table 16 Mild dehydration**

<table>
<thead>
<tr>
<th>Age</th>
<th>Volume of ORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 3 months</td>
<td>50ml after each diarrhoea or vomiting</td>
</tr>
<tr>
<td>4-6 month</td>
<td>50-100ml after each diarrhoea or vomiting</td>
</tr>
<tr>
<td>6-12 month</td>
<td>100-150ml after each diarrhoea or vomiting</td>
</tr>
<tr>
<td>1-2 years</td>
<td>150-200ml after each diarrhoea or vomiting</td>
</tr>
<tr>
<td>&gt;2 years</td>
<td>+200ml after each diarrhoea or vomiting</td>
</tr>
</tbody>
</table>

- Advise mother to return if baby’s diarrhoea deteriorates, unable to drink, or has fever or blood in stool.

**MODERATE DEHYDRATION**
- Monitor the child and follow the instructions as below.
- Review and admit if no improvement.
- Give this volume of fluid (e.g. ORS), within first 4 hours

**Table 17 Moderate dehydration**

<table>
<thead>
<tr>
<th>Age</th>
<th>Below 4m</th>
<th>4-12m</th>
<th>12-24m</th>
<th>2-4yrs</th>
<th>Over 4 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt</td>
<td>Below 5kg</td>
<td>5-8kg</td>
<td>8-11kg</td>
<td>11-16kg</td>
<td>Above 16kg</td>
</tr>
<tr>
<td>MLs</td>
<td>200-400</td>
<td>400-600</td>
<td>600-800</td>
<td>800-1200</td>
<td>1.2-2.0L</td>
</tr>
</tbody>
</table>

*Use the child’s age only if you cannot measure the weight.

- The estimated volume of ORS required can be estimated by multiplying the weight in kg, by 75.
- Show mother how to prepare the ORS.
- Review child after 4 hours. If well, send home with advise to drink more fluid more frequently, continue feeding and return when: feverish, deterioration in diarrhoea, not drinking and/or blood in stool.

**SEVERE DEHYDRATION**
- Admit child for rehydration and management.
Table 18 Severe dehydration

<table>
<thead>
<tr>
<th>IV fluid (Ringers lactate (hartmanns) or N/S)</th>
<th>30ml/kg in</th>
<th>Then 70ml/kg in</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12 months</td>
<td>1 hour*</td>
<td>5 hours</td>
</tr>
<tr>
<td>Above 12 months</td>
<td>30 minutes</td>
<td>2.5 hours</td>
</tr>
</tbody>
</table>

* Repeat dose if radial pulse is very weak and non-detectable.

- Reassess child every 15-30 minutes.
- If hydration status is not improving, increase speed of IV fluid.
- If able to drink, give ORS 5ml/kg/hr. Reassess child after 3 hours and 6 hours and decide what to put him on.

**When an IV line cannot be inserted:**
- If child is unable to drink and an IV line cannot be inserted; insert an NGT and give ORS at 20ml/kg/hour, for the first 6 hours.
- Reassess every hour for 3 hours. If there is abdominal distension, reduce the infusion rate. If there is vomiting, refer case for IV fluid therapy. If hydration status is not improving in 3 hours, refer case for IV treatment.

---

**ESSENTIAL MEDICINES LIST REVISED 2010**

**2010 TUVALU ESSENTIAL DRUG LIST**

<table>
<thead>
<tr>
<th>WHO</th>
<th>Drug name, strength and dosage form</th>
<th>Outer</th>
<th>Restrict use</th>
<th>Cost $A</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>ANAESTHETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td><strong>GENERAL ANAESTHETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Halothane inhalation</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isoflurane inhalation</td>
<td>56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ketamine 50mg/ml injection</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nitrous oxide gas inhalation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxygen gas inhalation</td>
<td>yes</td>
<td>98(G)</td>
<td>Need more G size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soda lime powder</td>
<td>5.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thiopentone 0.5% injection</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td><strong>LOCAL ANAESTHETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bupivacaine 0.5% plain injection</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bupivacaine 0.5% heavy (spinal) injection</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug/combination</td>
<td>Route</td>
<td>Pre-operative Medication</td>
<td>Anaesthesia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------</td>
<td>--------------------------</td>
<td>--------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lignocaine 2% plain injection</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lignocaine 2% + adrenaline 1:80,000</td>
<td>Yes</td>
<td></td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lignocaine 10% pump spray</td>
<td>Anaesthetist</td>
<td></td>
<td>11.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylchloride spray</td>
<td>dentist</td>
<td>2alt spray to lignocaine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. PRE-OPERATIVE MEDICATION

<table>
<thead>
<tr>
<th>Drug/combination</th>
<th>Route</th>
<th>Pre-operative Medication</th>
<th>Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine 800mcg/ml injection</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diazepam 10mg/2ml injection</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Droperidol 10mg/2.5ml injection</td>
<td>Anaesthetist</td>
<td></td>
<td>3.38</td>
</tr>
<tr>
<td>Diazepam 5mg tablet</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fentanyl 100mcg/2ml injection</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midazolam 15mg/3ml injection</td>
<td>Anaesthetist</td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>Morphine 10mg/ml injection</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pethidine 50mg/ml injection</td>
<td>O&amp;G only</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Promethazine 50mg/2ml injection</td>
<td>0.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2.1 NON-OPIOIDS

<table>
<thead>
<tr>
<th>Drug/combination</th>
<th>Route</th>
<th>Pre-operative Medication</th>
<th>Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allopurinol 100mg tablet</td>
<td>yes</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Aspirin 300mg tablet</td>
<td>Yes</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Ibuprofen 400mg tablet</td>
<td>Yes</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Paracetamol 500mg tablet</td>
<td>Yes</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Paracetamol 500mg Suppos</td>
<td>ICU only</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Paracetamol 250mg Suppos</td>
<td>Paed, ICU use only</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Paracetamol 120mg/5ml elixir</td>
<td>yes</td>
<td></td>
<td>0.42</td>
</tr>
<tr>
<td>Probenecid 500mg tablet</td>
<td>0.1</td>
<td>Reduced usage</td>
<td></td>
</tr>
<tr>
<td>Diclofenac 25mg tablets</td>
<td>yes</td>
<td></td>
<td>donation</td>
</tr>
<tr>
<td>Colchicine 600mcg tablets</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2.2 OPIOID ANALGESICS

<table>
<thead>
<tr>
<th>Drug/combination</th>
<th>Route</th>
<th>Pre-operative Medication</th>
<th>Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine 30mg tablet</td>
<td>Yes</td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Fentanyl 100mcg/2ml injection</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morphine 10mg/ml injection</td>
<td>Yes</td>
<td></td>
<td>0.34</td>
</tr>
<tr>
<td>Pethidine 50mg/ml injection</td>
<td>O&amp;G only</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Morphine 10mg tablets SR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morphine 30mg tablets SR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3. ANTI-ALLERGICS & DRUGS USED IN ANAPHYLAXIS

<table>
<thead>
<tr>
<th>Drug/combination</th>
<th>Route</th>
<th>Pre-operative Medication</th>
<th>Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline 1mg/ml injection</td>
<td>Yes</td>
<td></td>
<td>0.43</td>
</tr>
<tr>
<td>Chlorpheniramine 4mg tablet</td>
<td>Yes</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Dexamethasone 4mg/ml injection</td>
<td>yes</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Dexamethasone 500mcg tablet</td>
<td></td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Hydrocortisone sodium succinate 100mg</td>
<td>yes</td>
<td></td>
<td>0.46</td>
</tr>
<tr>
<td>injection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promethazine 50mg/ml injection</td>
<td>Yes</td>
<td></td>
<td>0.26</td>
</tr>
<tr>
<td>Promethazine 10mg tablets</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 4 ANTIDOTES & OTHER SUBSTANCES USED IN POISONINGS

### 4.1 GENERAL

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charcoal and Sorbitol Soln</td>
<td>Yes</td>
<td>2-3 for OPD</td>
</tr>
</tbody>
</table>

### 4.2 SPECIFIC

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylcysteine 200mg/ml injection 10ml</td>
<td>Paracetamol OD only</td>
<td>6.8, 1 course only</td>
</tr>
<tr>
<td>Atropine 1mg/ml injection</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Naloxone 400mcg/ml injection</td>
<td></td>
<td>1.08</td>
</tr>
</tbody>
</table>

## 5 ANTIEPILEPTICS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine 200mg tablet</td>
<td>Indiv patients</td>
<td>0.02</td>
</tr>
<tr>
<td>Diazepam 10mg/2ml injection</td>
<td>Yes</td>
<td>0.15</td>
</tr>
<tr>
<td>Diazepam 5mg tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Phenobarbitone 200mg injection</td>
<td>Paed use</td>
<td>1.23</td>
</tr>
<tr>
<td>Phenytoin 250mg/5ml injection</td>
<td></td>
<td>2.88</td>
</tr>
<tr>
<td>Phenytoin 100mg tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Sodium Valproate 150mg tablet</td>
<td>Others ineffective</td>
<td>0.11</td>
</tr>
</tbody>
</table>

## 6 ANTI-INFECTIVE DRUGS

### 6.1.1 INTESTINAL ANTHELMINTICS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mebendazole 100mg tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Pyrantel 250mg tablets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6.1.2 ANTIFILARIALS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albendazole 400mg tablet</td>
<td>Yes - campaign</td>
<td>WHO Filariaasis</td>
</tr>
<tr>
<td>Diethylcarbamazine 50mg tablet</td>
<td>Yes - campaign</td>
<td>WHO Filiariaasis</td>
</tr>
</tbody>
</table>

### 6.2 ANTIBACTERIALS

#### 6.2.1 Penicillins

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxycillin 250mg tablet?capsules</td>
<td>Yes</td>
<td>0.02</td>
</tr>
<tr>
<td>Amoxycillin 500mg/Clavulanic acid 125mg tablet</td>
<td>Resistant cases only</td>
<td>0.24</td>
</tr>
<tr>
<td>Amoxycillin 125mg/5ml Susp</td>
<td>yes</td>
<td>0.56</td>
</tr>
<tr>
<td>Ampicillin 1g injection</td>
<td>yes</td>
<td>0.18</td>
</tr>
<tr>
<td>Benzathine penicillin 1.2 mega injection</td>
<td>yes</td>
<td>0.16</td>
</tr>
<tr>
<td>Benzyl penicillin 600mg injection</td>
<td>Yes</td>
<td>0.08</td>
</tr>
<tr>
<td>Fluc/Cloxacillin 500mg injection</td>
<td>yes</td>
<td>0.23</td>
</tr>
<tr>
<td>Cloxacillin 250mg tablet</td>
<td>Yes</td>
<td>0.02</td>
</tr>
<tr>
<td>Cloxacillin 500mg capsules</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Phenoxyxmethylpenicillin 250mg tablet</td>
<td>Yes</td>
<td>0.03</td>
</tr>
<tr>
<td>Procaine penicillin 4mega injection</td>
<td>Yes</td>
<td>0.25</td>
</tr>
</tbody>
</table>

#### 6.2.2 Other Antibacterials

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin 250mg/500mg tablet</td>
<td>STI for chlymydia</td>
<td>0.42</td>
</tr>
<tr>
<td>Medication</td>
<td>Availability</td>
<td>Prescription Details</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Ceftriaxone 1g injection</td>
<td>yes</td>
<td>For resistant organisms</td>
</tr>
<tr>
<td>Chloramphenicol 250mg capsule</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol 1g injection</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol 125mg/5ml suspension</td>
<td>yes</td>
<td>Keep as only caps</td>
</tr>
<tr>
<td>Ciprofloxacin 500mg tablet</td>
<td>yes</td>
<td>STI for gonorrhoea</td>
</tr>
<tr>
<td>Co-trimoxazole 480mg tablet</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Doxycycline 100mg tablet / capsule</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Erythromycin 250 tablet</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Gentamicin 80mg/2ml injection</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Metronidazole 5mg/ml IV solution 100ml</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Metronidazole 200mg tablet</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Tinidazole 500mg tablet</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Vancomycin 250mg injection</td>
<td>Restricted Item</td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.3 Antileprosy drugs

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Prescription Details</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clofazimine 50mg tablet</td>
<td>only combipacks</td>
<td>Free WHO combipacks only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dapsone 100mg tablet</td>
<td>only combipacks</td>
<td>Free WHO</td>
<td></td>
<td>Free from WHO</td>
</tr>
<tr>
<td>Rifampicin 150mg/300mg capsule</td>
<td>only combipacks</td>
<td>Free WHO - need PB?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.4 Anti-tuberculosis drugs

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Prescription Details</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethambutol 400mg tablet</td>
<td>Yes, indiv patients</td>
<td>TB</td>
<td>0.05</td>
<td>doctors order only</td>
</tr>
<tr>
<td>Isoniazid 100mg tablet</td>
<td>Yes, indiv patients</td>
<td></td>
<td>0.02</td>
<td>doctors order only</td>
</tr>
<tr>
<td>Pyrazinamide 4/500mg tablet</td>
<td>Yes, indiv patients</td>
<td>TB</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Rifampicin 150mg tablet / capsule</td>
<td>Yes, indiv patients</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Rifampicin 150mg/isoniazid 75mg tablet</td>
<td>Yes, indiv patients</td>
<td>TB</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Streptomycin 1g injection</td>
<td></td>
<td></td>
<td>0.56</td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.5 Antiviral Drugs

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Prescription Details</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aciclovir 200mg tablet</td>
<td></td>
<td>Severe herpes</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Aciclovir Eye Ointment</td>
<td></td>
<td>Herpes of eye</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>HIV Drugs - as per Global Fund</td>
<td></td>
<td>HIV/AIDS</td>
<td></td>
<td>Global Fund pays</td>
</tr>
</tbody>
</table>

### 6.3 ANTIFUNGAL DRUGS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Prescription Details</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clotrimazole 500mg Pessary</td>
<td>Yes</td>
<td></td>
<td>1.32</td>
<td>stat dose</td>
</tr>
<tr>
<td>fluconazole 50mg tablets</td>
<td></td>
<td></td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Griseofulvin 500mg tablet</td>
<td>yes</td>
<td></td>
<td>0.04</td>
<td>on doctors only</td>
</tr>
<tr>
<td>Nystatin oral suspension 100,000 units</td>
<td>yes</td>
<td></td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>6.4</td>
<td><strong>ANTIPROTOZOAL DRUGS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.1</td>
<td><strong>Antiamoebic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole 5mg/ml IV solution 100ml</td>
<td>yes</td>
<td>Where oral not possible</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Metronidazole 200mg tablet</td>
<td>Yes</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinidazole 500mg tablet</td>
<td>Yes</td>
<td>0.04 Stat dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole suppos 500mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.4.2</th>
<th><strong>Antimalarial Drugs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroquine 150mg base tablet</td>
<td>0.01</td>
</tr>
<tr>
<td>Doxycycline 100mg tab/cap</td>
<td>0.02</td>
</tr>
<tr>
<td>Fansidar® tablet</td>
<td>P.falciparum</td>
</tr>
<tr>
<td>Primaquine 15mg tablet</td>
<td>P.vivax eradication</td>
</tr>
<tr>
<td>Quinine 300mg/ml injection</td>
<td>Cerebral malaria</td>
</tr>
<tr>
<td>Quinine sulphate 300mg tablet</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th><strong>ANTI-MIGRAINE DRUGS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td><strong>FOR TREATMENT</strong></td>
</tr>
<tr>
<td>Aspirin 300mg tablet</td>
<td>Yes</td>
</tr>
<tr>
<td>Chlorpromazine 50mg injection</td>
<td>0.19 Low dose only</td>
</tr>
<tr>
<td>Metoclopramide 10mg injection</td>
<td>0.15</td>
</tr>
<tr>
<td>Paracetamol 500mg tablet</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.2</th>
<th><strong>FOR PROPHYLAXIS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Propranolol 10mg tablet</td>
<td>Thyroid storm</td>
</tr>
<tr>
<td>Propranolol Injection or similar</td>
<td>Thyroid storm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8</th>
<th><strong>ANTINEOPLASTICS &amp; IMMUNOSUPPRESSANTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td><strong>IMMUNOSUPPRESSIVE DRUGS</strong></td>
</tr>
<tr>
<td>Dexamethasone 500mcg tablet</td>
<td>0.07 not 2mg,4mg</td>
</tr>
<tr>
<td>Prednisolone 5mg tablet</td>
<td>0.01 Not prednisone</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.2</th>
<th><strong>ANTINEOPLASTIC DRUGS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclophosphamide injection</td>
<td>Indiv patients</td>
</tr>
<tr>
<td>5-Fluorouracil 500mg injection</td>
<td>Indiv patients</td>
</tr>
<tr>
<td>Methotrexate 50mg injection</td>
<td>Indiv patients</td>
</tr>
<tr>
<td>Methotrexate 2.5mg tablets</td>
<td>Indiv patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.3</th>
<th><strong>HORMONES AND ANTI_HORMONES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamoxifen 10/20mg tablet</td>
<td>Indiv.patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9</th>
<th><strong>ANTIPARKINSONIAN DRUGS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzhexol 2mg tablet</td>
<td>0.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10</th>
<th><strong>DRUGS AFFECTING THE BLOOD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1</td>
<td><strong>ANTI-ANAEMIA DRUGS</strong></td>
</tr>
<tr>
<td>Ferrous sulphate 200mg tablet</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Ferrous sulphate/gluconate syrup</strong></td>
<td><strong>Ferrous sulphate 200mg + folic acid 0.25mg tablet</strong></td>
</tr>
<tr>
<td><strong>Fe Dextran 5% Inj</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Folic acid 5mg tablet</strong></td>
<td>yes</td>
</tr>
<tr>
<td><strong>Hydroxocobalamin 1mg injection</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 10.2 DRUGS AFFECTING COAGULATION

| **Heparin sodium 5000iu/ml 5ml injection** | Yes | 1.53 |
| **Phytomenadione 1mg in 0.5ml injection** | Yes | 0.3 | 10mg deleted |
| **Warfarin 1mg tablet** | individual cases only | 0.04 | Keep same brand |
| **Warfarin 3mg tablet** | individual cases only | 0.06 | Delete 2mg |
| **Warfarin 5mg tablet** | individual cases only | 0.06 |

### 11 BLOOD PRODUCTS & PLASMA SUBSTITUTES

| **Polygeline IV solution 500ml** | (Haemacel/Gelofusine) | 5.93 |

### 12 CARDIOVASCULAR DRUGS

#### 12.1 ANTI-ANGINAL DRUGS

| **Atenolol 50mg tablet** | Individual cases only | 0.02 |
| **Glyceryl trinitrate 600mcg tablet** | Yes | 0.06 |
| **Isosorbide dinitrate 10mg tablet** | yes | 0.01 | doctors order |
| **Nifedipine 20mg SR tablet** | Yes | 0.01 | doctors order |
| **Propranolol 10mg tablet** | Individual cases only | 0.01 | change from 40mg |
| **Verapamil 40mg tablet** | Individual cases only | 0.05 |

#### 12.2 ANTI ARRHYTHMIC DRUGS

| **Atenolol 50mg tablet** | Individual cases only | 0.02 |
| **Lignocaine 2% injection 10ml** | Individual cases only | 0.42 |
| **Propranolol 10mg tablet** | Individual cases only | 0.01 |
| **Verapamil 2.5mg/ml injection** | Individual cases only | 2.7 |
| **Verapamil 40mg tablet** | Individual cases only | 0.05 |
| **Amiodarone 50mg/ml injection** | Individual cases only | small amount |

#### 12.3 ANTIHYPERTENSIVE DRUGS

<p>| <strong>Atenolol 50mg tablet</strong> | Individual cases only | 0.02 | on doctors order |
| <strong>Enalapril 5mg tablets</strong> | Individual cases only | 0.02 |
| <strong>Hydralazine 20mg/ml injection</strong> | Individual cases only | 7.16 | Tabs deleted |
| <strong>Hydrochlorothiazide 25mg tablet</strong> | Individual cases only | 0.01 | on doctors order |
| <strong>Methyldopa 250mg tablet</strong> | Individual cases only | 0.05 | on doctors order |
| <strong>Nifedipine 20mg ST tablet</strong> | Individual cases only | 0.01 |
| <strong>Prazosin 2mg tablet</strong> | Individual cases only | BPH |</p>
<table>
<thead>
<tr>
<th></th>
<th>treatment</th>
<th>12.4 DRUGS USED IN HEART FAILURE</th>
<th>12.5 DRUGS USED IN VASCULAR SHOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propranolol 10mg</td>
<td>Thyroid storm</td>
<td>on doctors order</td>
<td></td>
</tr>
<tr>
<td>tablet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.6 ANTITHROMBIC DRUGS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin 300mg</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tablet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Documented MI 82 Keep 1-2 only</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 DERMATOLOGICAL DRUGS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.1 ANTFUNGAL DRUGS (TOPICAL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound benzoic + salicylic acid oint (Whittfields)</td>
<td>Yes</td>
<td>1.1/50g</td>
<td></td>
</tr>
<tr>
<td>Salicylic acid 10% lotion</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miconazole cream 2%</td>
<td>Yes</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.2 ANTI-INFECTIVE DRUGS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neomycin + bacitracin + polymyxin ointment</td>
<td>Yes</td>
<td>0.63</td>
<td>Order 50g packs</td>
</tr>
<tr>
<td>Silver sulphadiazine 1% cream</td>
<td>Yes</td>
<td>0.67/50g</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine 1% Cream</td>
<td>Yes</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.3 ANTI-INFLAMMATORY &amp; ANTI-PRURITIC DRUGS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Betamethasone 0.1% cream</td>
<td></td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone 1% cream</td>
<td>Yes</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td>Zinc Oxide oint</td>
<td>Yes</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.5 SCABICIDES AND PEDICULOCIDES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzy1 benzoate 25% lotion</td>
<td>Yes</td>
<td>4.42/1L</td>
<td></td>
</tr>
<tr>
<td>Permethrin Lotion</td>
<td>Yes</td>
<td>Child, pregnant women</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.67/100ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.6 OTHER DERMATOLOGICAL PREPARATIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricating Jelly</td>
<td>yes</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 DIAGNOSTIC AGENTS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## OPHTHALMIC DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Strength</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescein ophthalmic strips</td>
<td>64/100</td>
<td></td>
</tr>
<tr>
<td>Tropicamide 1% Drops</td>
<td>2.1</td>
<td></td>
</tr>
</tbody>
</table>

### IMMUNOLOGICAL AGENTS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPD Human Tuberculin 100U/ml</td>
<td>44.84</td>
</tr>
</tbody>
</table>

#### 14.2 Radiocontrast media

<table>
<thead>
<tr>
<th>Drug</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium sulphate aqueous solution</td>
<td>consult radiographer</td>
</tr>
</tbody>
</table>

### OTHER AGENTS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECG Electrode Gel</td>
<td>3.34</td>
</tr>
<tr>
<td>Ultrasound Gel</td>
<td></td>
</tr>
</tbody>
</table>

## DISINFECTANTS & ANTISEPTICS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Strength</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium hypochlorite/Milton for solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine 1.5% + cetrimide 15% conc.</td>
<td>Yes</td>
<td>3.3/500ml</td>
</tr>
<tr>
<td>Chlorhexidine 1% cream</td>
<td>Yes</td>
<td>3.5/500g</td>
</tr>
<tr>
<td>Hydrogen peroxide 3% solution</td>
<td></td>
<td>1.27/100ml</td>
</tr>
<tr>
<td>Methylated spirits 70% SVM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Povidine iodine 10% aqueous solution</td>
<td>Yes</td>
<td>6.97/500ml</td>
</tr>
</tbody>
</table>

## DIURETICS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Strength</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetazolamide 250mg tablet</td>
<td>Glaucoma</td>
<td>0.04</td>
</tr>
<tr>
<td>Frusemide 20mg/2ml injection</td>
<td>yes</td>
<td>0.26</td>
</tr>
<tr>
<td>Frusemide 40mg tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Hydrochlorothiazide 25mg tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Mannitol 20% injection</td>
<td></td>
<td>3.25</td>
</tr>
<tr>
<td>Spironolactone 25mg tablet</td>
<td></td>
<td>0.04</td>
</tr>
</tbody>
</table>

## GASTROINTESTINAL DRUGS

### 17.1 ANTACIDS & OTHER ANTIULCER DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium trisilicate compound tablet</td>
<td>0.01</td>
</tr>
<tr>
<td>Omeprazole 20mg capsule</td>
<td>0.02</td>
</tr>
<tr>
<td>Ranitidine 50mg injection</td>
<td>ICU&amp; OI use only 0.38 doctors order only</td>
</tr>
<tr>
<td>Ranitidine 300mg tablets</td>
<td>yes</td>
</tr>
</tbody>
</table>

### 17.2 ANTIEMETIC DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoclopramide 10mg/2ml injection</td>
<td>0.09</td>
</tr>
<tr>
<td>Metoclopramide 10mg tablet</td>
<td>0.01</td>
</tr>
<tr>
<td>Prochlorperazine 12.5mg/ml injection</td>
<td>0.51</td>
</tr>
<tr>
<td>Promethazine 50mg injection</td>
<td>yes</td>
</tr>
<tr>
<td>Prochlorperazine 5mg tablets</td>
<td></td>
</tr>
<tr>
<td>Promethazine tablets 10mg</td>
<td></td>
</tr>
</tbody>
</table>

### 17.3 ANTIHAEMORRHOIDAL DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemorrhoidal ointment</td>
<td>1.23</td>
</tr>
</tbody>
</table>

### 17.5 ANTISPASMODIC DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscine N Butylbromide 20mg injection</td>
<td>0.16</td>
</tr>
</tbody>
</table>
Hyoscine N Butylbromide 10mg tablet  | yes | 0.02 |

17.6 LAXATIVE DRUGS
Bisacodyl 10mg suppository  |  | 0.1 |
Bisacodyl 5mg tablet  | yes | 0.01 |

Xray Prep Kits

17.7 DRUGS USED IN DIARRHOEA
Codeine phosphate 30mg tablet  | Yes | 0.07 |
Oral rehydration salts  | Yes | 0.11 |
Zinc sulphate 10mg tablet  | yes |

18 HORMONES, OTHER ENDOCRINE DRUGS & CONTRACEPTIVES
18.1 ADRENAL HORMONES & SYNTHETIC SUBSTITUTES
Dexamethasone 500mcg tablet  |  | 0.07 |
Hydrocortisone sodium succinate 100mg injection  |  | 0.46 |
Prednisolone 5mg, 20mg tablet  |  | 0.01 |

18.2 CONTRACEPTIVES
18.21 Hormonal contraceptives
Ethinylestradiol 30mcg + levonorgestrel 150mcg (Microgynon)  | Yes | UNFPA | Eugynon deleted |
Levonorgestrol 750mcg tablet *(Postinor)*  | yes | UNFPA | On doctors order |
Levonorgestrel 30mcg (Microlut)  | Yes | UNFPA | Provera 10mg del |
Medroxyprogesterone acetate 150mg/ml injection  | Yes | UNFPA | Progest Inj del |
Medroxyprogesterone acetate implant (norplant)  | yes | UNFPA | UNFPA donation |
Medroxyprogesterone tablets  | Yes |

18.22 Intrauterine Devices
Copper-containing IUD  |  | UNFPA |

18.23 Barrier Methods
Condoms with or without spermicide (nonoxicol)  | Yes | UNFPA |
Male & Female condoms  | Yes | UNFPA |

18.4 Insulins and other Antidiabetic Agents
Glibenclamide 5mg tabs  | Yes | 0.01 |
Glipizide 5mg tablet  | renal pts | 0.03 |
Insulin soluble 100IU/ml 10ml  | yes | 12.4 |
Insulin Isophane 100IU/ml 10ml  | Yes | 12.4 |
Metformin 500mg tablet  | Yes | 0.02 |

18.5 OVULATION INDUCERS
Clomiphene 50mg tablet  | O&G only |
18.6 PROGESTERONES
- Norethisterone 5mg tablet: yes, 0.02

18.7 THYROID HORM & ANTITHYROID DRUGS
- Carbimazole 5mg tablet: 0.02
- Thyroxine 100mcg tablet: 0.02

18.8 OTHER
- Finasteride 5mg tablet: Indiv pat only, 1.2, Very expensive

19 IMMUNOLOGICALS
19.1 SERA & IMMUNOGLOBULINS
- HBV immunoglobulin 400U/ml

19.2 For universal immunisation
- BCG Vaccine: Yes, Pub Health
- DPT Vaccine: Yes, Pub Health
- Hepatitis B Vaccine: Yes, Pub Health
- Measles-Rubella: Yes, Pub Health
- Polio (Sabin): Yes, Pub Health
- Tetanus Toxoid Adsorbed: Yes, Pub Health
- Pentavac(Hep B/Hib/HBV): yes, Pub Health

20 MUSCLE RELAXANTS(PERIPHERALLY ACT) & C’ESTERASE INHIBITORS
- Atracurium 25mg/2.5ml injection: 6.77, small supply only
- Neostigmine 2.5mg injection: 0.47
- Suxamethonium 100mg/2ml injection: 0.55, Pancur deleted
- Vecuronium 10mg injection: 5.56

21 OPHTHALMOLOGICAL & ENT PREPARATIONS
21.1 ANTI-INFECTIVE AGENTS
- Aciclovir Eye Ointment: Ocular herpes, 0.56
- Chloramphenicol 5% ear drops: Yes, 0.59
- Chloramphenicol 0.5% eye drops: Yes, 0.38
- Chloramphenicol 1% eye ointment: Yes, 0.3
- Gentamicin 0.3% eye drops: 0.58
- Tetracycline 1% eye ointment: Yes, 0.18
- Gentamicin ear drop
- Antifungal ear drops

21.2 ANTI-INFLAMMATORY AGENTS
- Dexamethasone 1mg/ml eye drops: 1.83
- Prednisolone eye drops

21.3 LOCAL ANAESTHETICS
- Amethocaine 0.5% eye drops: 2.27
### 21.4 MIOTICS & ANTIGLAUCOMA DRUGS

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetazolamide 250mg tablets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilocarpine 2% eye drops</td>
<td></td>
<td>Timolol - individ.pat</td>
</tr>
</tbody>
</table>

### 21.5 MYDRIATICS

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropicamide 1% eye drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenylephrine 10% Drops/Minims</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 22 OXYTOCICS & ANTIOXYTOCICS

#### 22.1 OXYTOCICS

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ergometrine 500mcg + oxytocin 5iu injection</td>
<td>Yes</td>
<td>1.84</td>
</tr>
<tr>
<td>Oxytocin 10iu injection</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Misoprostol 200mcg tablet</td>
<td></td>
<td>O&amp;G only 0.32</td>
</tr>
</tbody>
</table>

#### 22.2 ANTIOXYTOCICS

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nifedipine 20mg SR tablet</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Salbutamol 500mcg/ml injection</td>
<td></td>
<td>0.25</td>
</tr>
</tbody>
</table>

### 23 PSYCHOTHERAPEUTIC DRUGS

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amitriptylline 25mg tablets</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Chlorpromazine 25mg tablets</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Chlorpromazine 50mg injection</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Diazepam 5mg tablets</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Fluphenazine Depot 25mg/ml injection</td>
<td>Indiv patient</td>
<td>0.99</td>
</tr>
<tr>
<td>Haloperidol 5mg injection</td>
<td></td>
<td>0.33</td>
</tr>
<tr>
<td>Haloperidol tablets 500mcg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 24 DRUGS ACTING ON THE RESPIRATORY TRACT

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline 1mg/ml injection</td>
<td>Yes</td>
<td>0.43</td>
</tr>
<tr>
<td>Aminophylline 250mg/10ml injection</td>
<td></td>
<td>0.72 Del theophylline</td>
</tr>
<tr>
<td>Beclomethasone 50/100mcg Inhaler</td>
<td></td>
<td>4.42 Del Beconase</td>
</tr>
<tr>
<td>Salbutamol 100mcg Inhaler</td>
<td>Yes</td>
<td>2.16</td>
</tr>
<tr>
<td>Salbutamol 5mg/ml Resp.Soln 30ml</td>
<td></td>
<td>5.75</td>
</tr>
<tr>
<td>Salbutamol 500mcg/ml injection</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Salbutamol 4mg tablet</td>
<td></td>
<td>Delete over time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>encourage</td>
</tr>
</tbody>
</table>

### 25 SOLNS CORRECTING WATER, ELECTROLYTE & ACID BASE DISTURB

#### 25.1 ORAL

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Strength/Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral rehydration salts</td>
<td>Yes</td>
<td>0.11</td>
</tr>
<tr>
<td>Potassium chloride SR 600mg tablet</td>
<td></td>
<td>0.01 Limit supply</td>
</tr>
<tr>
<td>Sod.citratrurate sachets (Ural)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 25.2 PARENTERAL
### ESSENTIAL MEDICINES FOR CHILDREN 2010

#### 2010 TUVALU ESSENTIAL MEDICINE LIST FOR CHILDREN

<table>
<thead>
<tr>
<th>WHO</th>
<th>Drug name, strength and dosage form</th>
<th>Outer</th>
<th>Restrict use</th>
<th>Cost $A</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>ANAESTHETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td><strong>GENERAL ANAESTHETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ketamine injection 50mg (as HCL)/ml in 10ml</td>
<td></td>
<td>Anaesthetist use only</td>
<td></td>
<td>Anaesthetist use only</td>
</tr>
<tr>
<td></td>
<td>Nitrous oxide inhalation</td>
<td></td>
<td>Anaesthetist use only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxygen</td>
<td></td>
<td>yes</td>
<td></td>
<td>Anaesthetist use only</td>
</tr>
<tr>
<td></td>
<td>Thiopental injection 0.5g</td>
<td></td>
<td>Anaesthetist use only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fentanyl 100mcg/2ml injection</td>
<td></td>
<td>Anaesthetist use only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isophane/Halothane inhalation</td>
<td></td>
<td>Anaesthetist use only</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Calcium gluconate 100mg/ml**

<table>
<thead>
<tr>
<th>Compound solution of sodium lactate (Hartmanns) 1L</th>
<th>Yes</th>
<th>1.3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dextrose 10% injection 1L</strong></td>
<td>yes</td>
<td>O&amp;G/neonatal use</td>
</tr>
<tr>
<td>Dextrose 5% 1L</td>
<td>Yes</td>
<td>1.3</td>
</tr>
<tr>
<td>Dextrose 50% 50ml</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>Dextrose 3% in 1/3 NS 1L</td>
<td>yes</td>
<td>1.4</td>
</tr>
<tr>
<td>Gelofusine Plasma Expander 500ml</td>
<td></td>
<td>5.93</td>
</tr>
<tr>
<td>Magnesium Sulphate 50% injection</td>
<td></td>
<td>1.33</td>
</tr>
<tr>
<td>Mannitol 20% 500ml</td>
<td></td>
<td>3.25</td>
</tr>
<tr>
<td>Potassium chloride 1.5g/10ml</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Sodium bicarbonate 8.4% 10ml</td>
<td></td>
<td>0.86</td>
</tr>
<tr>
<td>Sodium chloride 0.9% 1L</td>
<td>Yes</td>
<td>1.3</td>
</tr>
<tr>
<td>Water for injection 10ml</td>
<td>Yes</td>
<td>0.07 Keep only 10ml</td>
</tr>
</tbody>
</table>

**26 VITAMINS & MINERALS**

- Hydroxocobalamin 1mg/ml injection (VitB12)
  Cost $A 0.45
- Multivitamin tablet
  Cost $A 0.01
- Pyridoxine 50mg tablet
  Cost $A 0.02
- Phytomenadione 1mg in 0.5ml injection (Vit K1)
  Cost $A 0.3
- Vitamin B1 inj

---

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### 1.2 LOCAL ANAESTHETICS

<table>
<thead>
<tr>
<th>Anaesthetic</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bupivacaine plain injection 0.5%</td>
<td></td>
</tr>
<tr>
<td>Lignocaine 1% plain injection</td>
<td></td>
</tr>
<tr>
<td>Lignocaine 2% + adrenaline 1:80,000 dental cartidege</td>
<td>yes</td>
</tr>
<tr>
<td>Lignocaine pump</td>
<td></td>
</tr>
<tr>
<td>Lignocaine gel</td>
<td>yes</td>
</tr>
</tbody>
</table>

*dentist advice use*

### 1.3 PRE-OPERATIVE MEDICATION

<table>
<thead>
<tr>
<th>Medication</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine 600mcg injection</td>
<td></td>
</tr>
<tr>
<td>Diazepam injection 5mg/2ml</td>
<td></td>
</tr>
<tr>
<td>Diazepam tablets 5mg</td>
<td></td>
</tr>
<tr>
<td>Morphine (SO2/HCL) Injection 10mg</td>
<td></td>
</tr>
<tr>
<td>Midazolam 15mg/2ml injection</td>
<td></td>
</tr>
<tr>
<td>Ketamine injection 50mg (as HCL)/ml in 10ml</td>
<td></td>
</tr>
<tr>
<td>Chloral hydrate 100mg/ml mixture</td>
<td></td>
</tr>
</tbody>
</table>

### 2 ANALGESICS, ANTIPYRETICS, NSAID’s, DRUGS TO TREAT GOUT

#### 2.1 NON-OPIOIDS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibuprofen tablets 200mg</td>
<td>Use &gt;3months</td>
</tr>
<tr>
<td>Paracetamol Oral liquid 120mg/5ml</td>
<td></td>
</tr>
<tr>
<td>Paracetamol Suppository 100mg</td>
<td></td>
</tr>
<tr>
<td>Paracetamol tablets 500mg</td>
<td>100mg if can source</td>
</tr>
<tr>
<td><strong>Aspirin tablets 100mg</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use for rheumatic fever, juvenile arthritis, kawasaki disease</td>
</tr>
</tbody>
</table>

#### 2.2 OPIOID ANALGESICS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine injection 10mg</td>
<td></td>
</tr>
<tr>
<td>Morphine Oral (HCL/SO4) liquid 10mg</td>
<td></td>
</tr>
<tr>
<td>Morphine 10mg tablets SR</td>
<td></td>
</tr>
</tbody>
</table>

### 3 ANTI-ALLERGICS & DRUGS USED IN ANAPHYLAXIS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpheniramine injection 10mg/ml</td>
<td>yes</td>
</tr>
<tr>
<td>Chlorpheniramine tablet 4mg</td>
<td>yes</td>
</tr>
<tr>
<td>Dexamethasone (HCL) injection 4mg/ml</td>
<td>yes</td>
</tr>
<tr>
<td>Adrenaline 1mg/ml</td>
<td>yes</td>
</tr>
<tr>
<td>Hydrocortisone 100mg/ml (sodium succinate)</td>
<td>yes</td>
</tr>
<tr>
<td>Prednisolone oral liquid 5mg/ml</td>
<td>yes</td>
</tr>
</tbody>
</table>

*on doctors order*
## ANTIDOTES & OTHER SUBSTANCES USED IN POISONINGS

### 4.1 GENERAL
- charcoal activated powder  
  *yes*

### 4.2 SPECIFIC
- Acetylcysteine inject 200mg/ml
- Atropine injection 1mg/ml  
  *yes*
- Calcium gluconate 100mg/ml
- **Phenobarbitone injection 200mg/ml**  
  *yes on doctors order*
- **Phenobarbitone 3mg/ml oral liquid**
- **Phenytoin injection 50mg/ml**  
  *yes on doctors order*
- **Phenytoin Oral liquid 25mg/ml**
- Valproic acid tablet (crushable) 100mg  
  *as sodium valproate*

## ANTICONVULSANTS/ANTIEPILEPTICS

- Carbamazepine oral liquid 100mg/5ml
- Carbamazepine (chewable) 100mg tablet
- **Diazepam injection 5mg/ml**  
  *yes on doctors order*
- **Phenobarbitone injection 200mg/ml**  
  *yes on doctors order*
- **Phenytoin injection 50mg/ml**  
  *yes on doctors order*
- **Phenytoin Oral liquid 25mg/ml**
- **Valproic acid tablet (crushable) 100mg**  
  *as sodium valproate*
- **Phenobarbitone 3mg/ml oral liquid**

## ANTI-INFECTIVE DRUGS

### 6.1.1 INTESTINAL ANTHELMINTICS
- Pyrantel Oral liquid 50mg/ml  
  *yes as embolate*
- **Mebendazole tablets 100mg**  
  *yes*

### 6.1.2 ANTIFILARIALS
- **Albendazole tablets 400mg**  
  *WHO Filarisis prog*
- **Diethylcarbamazepine tablet 50mg**  
  *WHO Filarisis prog*

### 6.2 ANTIBACTERIALS

#### 6.2.1 Beta lactam medicines
- **Amoxycillin oral liquid 125mg/5ml (powder for liq)**  
  *yes*
- Amoxycillin capsules 250mg  
  *yes*
- **Ampicillin injection 500mg**  
  *yes*
- **Benzathine benzylpenicillin inject.900mg (1.2mIU)**  
  *yes*
- Benzylpenicillin injection 600mg  
  *yes*
- **Cloxacillin oral liquid 125mg/5ml**  
  *yes*
- **Cloxacillin injection 500mg**  
  *yes*
- **Cloxacillin capsules 500mg**  
  *yes*
- **Phenoxytmethylpenicillin oral liq. 125mg/5ml**  
  *yes*
- **Procaine Benzylpenicillin inj. 1g (1mIU)**  
  *Not recom. As 1st line for neonatal sepsis*
### 6.2.2 Other Antibacterials

<table>
<thead>
<tr>
<th>Antibacterial</th>
<th>Yes/No</th>
<th>Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloramphenicol Oral liquid 150mg/5ml</td>
<td>Yes</td>
<td>as palmitate</td>
</tr>
<tr>
<td>Chloramphenicol capsules 250mg</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Doxycycline Oral liquid 25mg/ml</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Doxycycline capsules 100mg</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Erythromycin oral liquid 125mg/5ml</td>
<td>Yes</td>
<td>as stearate/ethyl succinate</td>
</tr>
<tr>
<td>Erythromycin tablets 250mg</td>
<td>Yes</td>
<td>as stearate/ethyl succinate</td>
</tr>
<tr>
<td>Gentamicin injection 40mg (as sulphate)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Metronidazole injection 500mg</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Metronidazole oral liquid 200mg/5ml</td>
<td>Yes</td>
<td>as benzoate</td>
</tr>
<tr>
<td>Sulfamethoxazole + trimethoprim Oral Liq. 240mg/5ml</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### 6.2.3 Antileprosy drugs

- Dapsone tablets 25mg
- Rifampicin tablets 150mg
- Clofazimine capsules 50mg

### 6.2.4 Anti-tuberculosis drugs

- Ethambutol tablet 100mg
- Isoniazid tablet (scored) 100mg tablet
- Pyrazinamide (dispersable) 150mg tablet
- Rifampicin tablet 150mg

### 6.2.5 Antiviral Drugs

- Abacavir (ABC) oral liquid 100mg/5ml (as sulphate)
- Didanosine (ddl) (dispersable) 100mg
- Lamivudine (3TC) oral liquid 50mg/5ml
- Stavudine (d4T) oral liquid 5mg/5ml
- Zidovudine (ZDV or AZT) oral liquid 50mg/ml
- Aciclovir tablet 200mg
- As per Global Fund

### 6.3 ANTIFUNGAL DRUGS

- Fluconazole 50mg tablet
- Griseofulvin tablet 125mg
- Nystatin Oral liquid 100,000IU/ml  Yes

### 6.4 ANTIPROTOZOAL DRUGS

#### 6.4.1 Antiamoebic

- Metronidazole injection 500mg  Yes
- Metronidazole oral liquid 200mg/5ml  Yes  as benzoate

#### 6.4.2 Antimalarial Drugs

- Chloroquine 50mg capsule
- Doxycycline capsule 100mg
### 7 Anti-migraine drugs

#### 7.1 For treatment

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primaquine tablet</td>
<td>7.5mg</td>
</tr>
<tr>
<td>Quinine HCL injection</td>
<td>300mg/ml</td>
</tr>
<tr>
<td>Ibuprofen tablet</td>
<td>400mg</td>
</tr>
<tr>
<td>Paracetamol 120mg/5ml Oral liquid</td>
<td></td>
</tr>
</tbody>
</table>

### 8 Antineoplastics & immunosuppressants

#### 8.1 Immunosuppressive drugs

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azathioprine injection</td>
<td>100mg</td>
</tr>
<tr>
<td>Ciclosporin capsule</td>
<td>25mg</td>
</tr>
</tbody>
</table>

#### 8.2 Antineoplastic drugs

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allopurinol tablet</td>
<td>100mg</td>
</tr>
<tr>
<td>Asparaginase injection 10 000 IU</td>
<td></td>
</tr>
<tr>
<td>Bleomycin injection 15mg</td>
<td></td>
</tr>
<tr>
<td>Methotrexate injection 50mg</td>
<td></td>
</tr>
</tbody>
</table>

#### 8.3 Hormones and anti-hormones

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone injection 4mg</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone injection 4mg</td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone injection 100mg</td>
<td></td>
</tr>
<tr>
<td>Prednisolone oral liquid 5mg/ml</td>
<td></td>
</tr>
</tbody>
</table>

### 9 Medicines used in palliative care

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amitriptyline tablet 10mg</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone injection 4mg</td>
<td></td>
</tr>
<tr>
<td>Diazepam injection 5mg/ml</td>
<td></td>
</tr>
<tr>
<td>Hyoscine hydrobromide injection 400mcg/ml</td>
<td></td>
</tr>
<tr>
<td>Midazolam injection 1mg/ml</td>
<td></td>
</tr>
<tr>
<td>Mophine tablet 10mg SR</td>
<td></td>
</tr>
<tr>
<td>Senna oral liquid 7.5mg/ml</td>
<td></td>
</tr>
</tbody>
</table>

### 10 Medicines affecting the blood

#### 10.1 Anti-anaemia drugs

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous sulphate oral liquid 25mg/ml</td>
<td>yes as sulphate</td>
</tr>
<tr>
<td>Folic acid tablet 5mg</td>
<td>yes</td>
</tr>
<tr>
<td>Hydroxycobalamin injection 1mg/ml</td>
<td></td>
</tr>
</tbody>
</table>

#### 10.2 Drugs affecting coagulation

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytomenadione injection 1mg/ml</td>
<td>yes</td>
</tr>
<tr>
<td>Heparin sodium injection 1000IU/ml</td>
<td></td>
</tr>
</tbody>
</table>

### 11 Cardiovascular drugs

#### 11.1 Requesting review whether or not these medicines

#### 11.2 Anti-arrhythmic drugs
<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin 250mg/ml injection</td>
<td></td>
</tr>
<tr>
<td>Lignocaine 2% injection</td>
<td></td>
</tr>
<tr>
<td>Propranolol 10mg tablet</td>
<td></td>
</tr>
</tbody>
</table>

### 11.3 ANTIHYPERTENSIVE DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enalapril tablet 5mg</td>
<td></td>
</tr>
</tbody>
</table>

### 11.4 DRUGS USED IN HEART FAILURE

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin injection 250mcg/ml</td>
<td></td>
</tr>
<tr>
<td>Digoxin tablets 250mcg</td>
<td></td>
</tr>
<tr>
<td>Frusemide oral liquid 20mg/5ml</td>
<td></td>
</tr>
<tr>
<td>Frusemide injection 10mg/ml</td>
<td></td>
</tr>
</tbody>
</table>

### 12 DERMATOLOGICAL DRUGS

#### 12.1 ANTIFUNGAL DRUGS (TOPICAL)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid + salicylic acid cream/ointment</td>
<td>yes</td>
</tr>
<tr>
<td>Miconazole cream 2%</td>
<td>yes</td>
</tr>
</tbody>
</table>

#### 12.2 ANTI-INFECTIVE DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neomycin sulphate + bacitracin</td>
<td>yes</td>
</tr>
<tr>
<td>Silver sulphadizine cream 1%</td>
<td>yes</td>
</tr>
</tbody>
</table>

#### 12.3 ANTI-INFLAMMATORY & ANTI-PRURITIC DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamethasone cream/ointment 0.1%</td>
<td>yes</td>
</tr>
<tr>
<td>Calamine lotion</td>
<td>yes</td>
</tr>
<tr>
<td>Hydrocortisone 1% cream/lotion</td>
<td>yes</td>
</tr>
</tbody>
</table>

#### 12.4 SCABICIDES AND PEDICULOCIDES

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin cream 5%</td>
<td>yes</td>
</tr>
</tbody>
</table>

### 13 DIAGNOSTIC AGENTS

#### 13.1 RADIOCONTRAST MEDIA

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium sulphate aqueuos solution</td>
<td>Doctor supervision</td>
</tr>
</tbody>
</table>

#### 13.2 IMMUNOLOGICAL AGENTS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPD Human Tuberculin 100</td>
<td></td>
</tr>
</tbody>
</table>

### 14 DISINFECTANTS & ANTISEPTICS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorhexidine solution 5%(digluconate)</td>
<td>yes</td>
</tr>
<tr>
<td>Ethanol solution 70%(denatured)</td>
<td></td>
</tr>
<tr>
<td>Povisone iodine aqueous 10%</td>
<td>yes</td>
</tr>
</tbody>
</table>

### 15 DIURETICS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frusemide injection 10mg/ml</td>
<td>yes</td>
</tr>
</tbody>
</table>

Doctor supervision on doctors order
<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frusemide oral liquid 20mg/5ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frusemide tablet 40mg</td>
<td>yes</td>
<td>on doctors order</td>
</tr>
</tbody>
</table>

**16 GASTROINTESTINAL DRUGS**

**16.1 ANTACIDS & OTHER ANTIULCER DRUGS**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium hydroxide oral liquid 320mg/5ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium hydrochloride oral liquid</td>
<td>eq. to 550mg MgO2/10ml</td>
<td></td>
</tr>
<tr>
<td>Ranitidine (as HCL) tablet 150mg</td>
<td></td>
<td>on doctors order</td>
</tr>
</tbody>
</table>

**16.2 ANTIEMETIC DRUGS**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoclopramide tablet 10mg</td>
<td>yes</td>
<td>doctors order</td>
</tr>
<tr>
<td>Metoclopramide oral liquid 5mg/5ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimenhydrinate oral liquid 2.5mg/ml</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**16.3 LAXATIVE DRUGS**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisacodyl suppository 10mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerine suppository</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

**16.4 DRUGS USED IN DIARRHOEA**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral rehydration salts</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Zinc sulphate tablet 10mg</td>
<td>In acute diarrhoea zinc sulphate should be used</td>
<td>as an adjunct to ORS</td>
</tr>
</tbody>
</table>

**17 HORMONES, OTHER ENDOCRINE DRUGS & CONTRACEPTIVES**

**17.1 ADRENAL HORMONES & SYNTHETIC SUBSTITUTES**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>prednisolone 5mg</td>
<td>yes</td>
<td>on doctors order</td>
</tr>
<tr>
<td>Hydrocortisone injection 100mg</td>
<td>yes</td>
<td>as sodium succinate</td>
</tr>
</tbody>
</table>

**17.2 Insulins and other Antidiabetic Agents**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin soluble 100IU/ml 10ml</td>
<td>yes</td>
<td>on doctors order</td>
</tr>
<tr>
<td>Insulin isophane 100IU/ml 10ml</td>
<td>yes</td>
<td>on doctors order</td>
</tr>
</tbody>
</table>

**17.3 THYROID HORM & ANTITHYROID DRUGS**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Formulation</th>
<th>Availability Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levothyroxine tablet 50mcg</td>
<td></td>
<td>small amount</td>
</tr>
</tbody>
</table>
18 IMMUNOLOGICALS

18.1 SERA & IMMUNOGLOBULINS

<table>
<thead>
<tr>
<th>Immunoglobin</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBV</td>
<td>400U/ml</td>
</tr>
</tbody>
</table>

18.2 For universal immunisation

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG Vaccine</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>DPT Vaccine</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>Hepatitis B Vaccine</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>Measles-Rubella</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>Polio (Sabin)</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>Tetanus Toxoid Adsorbed</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
<tr>
<td>Haemophilus influenzae type b vaccine</td>
<td>Yes</td>
<td>Pub Health</td>
</tr>
</tbody>
</table>

19 MUSCLE RELAXANTS (PERIPHERALLY ACT) & C'ESTERASE INHIBITORS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neostigmine injection 500mcg/ml</td>
<td>Anaesthetist advice</td>
<td></td>
</tr>
<tr>
<td>Suxamethonium injection 50mg</td>
<td>Anaesthetist advice</td>
<td></td>
</tr>
<tr>
<td>Vercuronium injection 10mg</td>
<td>Anaesthetist advice</td>
<td></td>
</tr>
</tbody>
</table>

20 OPHTHALMOLOGICAL & ENT PREPARATIONS

20.1 ANTI-INFECTIVE AGENTS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aciclovir ointment 3%w/w</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin solution eye drops 0.3% (sulphate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol eye drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol eye ointment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20.2 ANTI-INFLAMMATORY AGENTS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prednisolone solution eye drops 0.5% (sod.phos)</td>
<td>Specialist use</td>
<td></td>
</tr>
</tbody>
</table>

20.3 LOCAL ANAESTHETICS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amethocaine 0.5% eye drops</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21 PSYCHOTHERAPEUTIC DRUGS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpromazine injection 25mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorpromazine tablet 10mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haloperidol tablet 0.5mg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22 DRUGS ACTING ON THE RESPIRATORY TRACT

<table>
<thead>
<tr>
<th>Medication</th>
<th>Availability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline injection 1mg/ml</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Salbutamol injection 50mcg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salbutamol meter dose inhaler 100mcg/dose</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Salbutamol oral liquid 2mg/ml</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Salbutamol solution for use in nebulizer 5mg/ml</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Salbutamol tablet 5mg</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ipratropium meter dose inhaler 20mcg/dose</td>
<td>Yes</td>
<td>doctors advice</td>
</tr>
<tr>
<td>Ipratropium solution for nebulizer 250mcg/ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beclomethasone meter dose inhaler</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
### SOLNS CORRECTING WATER, ELECTROLYTE & ACID BASE DISTURB

#### 23.1 ORAL
- Oral rehydration salts: yes
- Potassium chloride

#### 23.2 PARENTERAL
- **Glucose 5% injectable solution**: yes
- **Glucose with sodium chloride inj. Solution 5%/0.9%**: yes
- **Potassium chloride solution 7.5%**: doctors advice
- **Sodium chloride inj. 0.9% solution**: yes
- **Water for injections 2ML**: yes
- **Dextrose 10% injectable solution**: yes

### VITAMINS & MINERALS
- Ascorbic acid tablets 50mg
- Cholcalciferol tablet 400IU
- Iodine capsule 200mg
- Pyridoxine (HCL) tablet 25mg
- Multivitamin syrup: yes
- Thiamine tablet 50mg

### EAR, NOSE AND THROAT CONDITION IN CHILDREN
- Acetic acid topical 2% in alcohol
- Wax Removal ear drops: yes
- Budesonide nasal spray 100mcg/spray: Specialist use
References

1. Tonga Standard Treatment Guidelines 2007
2. Fiji Standard Treatment Guidelines:
   - Respiratory
   - Cardiovascular
   - Antibiotics 2004
   - Managing diabetes mellitus
3. AMH 2010
4. WHO Model list for Essential Medicines unedited version 2009
5. WHO Model List for Essential Medicines for children unedited version 2009
Recommendations for
HIV Medicine and Sexual Health Care
in Pacific Small Island Countries and Territories

Second Edition
September 2008
The Oceania Society for Sexual Health and HIV Medicine (OSSHMM) expresses its thanks to Associate Professor Gary Rogers MB, BS, PhD, formerly of the HIV and STI Section, Public Health Programme, Secretariat of the Pacific Community (SPC). Professor Rogers authored the first edition and worked closely with the Board and members of the Society in the preparation of the Second Edition. The current edition includes revised STI (sexually transmitted infection) section and the addition of post exposure prophylaxis to non-occupational exposure, management of children with STIs and voluntary confidential counselling and testing (VCCT). OSSHMM endorses these recommendations, which are based on the small amount of operational research undertaken in the Pacific and on relevant international guidelines tailored to the circumstances facing clinicians and their patients in Pacific small island countries and territories.

The document is intended only to provide general information to health professionals and no liability is accepted by the Society and the Secretariat of the Pacific Community for the consequences of decisions made by professionals after consulting these recommendations. Health care workers should utilise professional judgement and due care in providing or recommending particular treatments to their patients or clients.

The development of the recommendations was supported by the Pacific HIV/AIDS Regional Project (PRHP) and SPC.

The Oceania Society for Sexual Health and HIV Medicine
September 2008
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Introduction

The first diagnosis of human immunodeficiency virus (HIV) infection in the Pacific Island region was made in 1984 in the Marshall Islands, but only recently have people living with HIV in most countries and territories in the region been able to benefit from effective treatment. In the developed countries of the Pacific Rim as well as in New Caledonia and French Polynesia, the introduction of combination antiretroviral therapy in the mid 1990s dramatically reduced the death rate from the complications of HIV infection and markedly improved the health of most people living with the virus.

In the last few years, financial assistance related to HIV treatment has been available from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and the Asia Development Bank (ADB), as has technical support from the Secretariat of the Pacific Community (SPC), the World Health Organization (WHO) and Hawai’i AIDS Education Training Center (HAETC). This assistance has enabled resource-constrained Pacific Island countries to start to provide antiretroviral therapy to their citizens who are living with HIV.

The effective and sustainable provision of HIV treatment is technically demanding. Nonetheless, Pacific Island HIV physicians and care teams are beginning to develop substantial experience in its use under the mentorship of technical advisers from SPC, WHO and HAETC.

Population surveys undertaken in several Pacific Island countries in 2004 and 2005 demonstrated that the prevalence of other sexually transmissible infections (STIs) such as genital Chlamydia trachomatis and gonorrhoea in the region are among the highest in the world. Further, many of these infections, particularly in women, are asymptomatic.1

In October 2006, ten HIV physicians from six Pacific Island countries met and decided to form a professional society of health workers engaged in the care of people living with HIV and people experiencing sexual health issues, including other STIs.

Since then, membership of the Oceania Society for Sexual Health and HIV Medicine (OSSHMM) has expanded to include health care workers from 11 Pacific Island countries and territories.

The society’s objectives include:

To ensure optimal care for all people living with HIV and other STIs and for people experiencing other sexual health issues

To provide expert advice on HIV, other STIs and sexual health to country and territory governments, relevant organisations and health care workers

In order to meet these objectives, this document has been prepared by collecting and distilling regionally developed guidelines and pertinent sections of relevant evidence-based international guidelines with full acknowledgement. Additionally, commentary on international guidelines is provided, based on the experience of OSSHMM members, to assist readers to apply the recommendations in the Pacific context. Where appropriate, the specific issues that apply on particular Pacific Islands or groups of islands are examined.
The first edition of these recommendations was issued in electronic form in July 2007. This second edition, available for the first time in print as well as electronic form, incorporates feedback from members and technical agencies as well as new information on HIV test counselling, post-exposure prophylaxis for non-occupational exposure, and the care of people with syphilis.

The combined population of the 21 Pacific small island countries and territories (namely American Samoa, Cook Islands, Federated States of Micronesia, Fiji Islands, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Pitcairn Islands, Samoa, Solomon Islands, Tokelau Islands, Tonga, Tuvalu, Vanuatu and Wallis and Futuna) is about three million people, which is less than half of the population of a small European country like Switzerland (population 7.5 million). Although each Pacific country or territory has its own unique character and culture, there are also many similarities among the islands in terms of their context and the issues they face. Further, common funding mechanisms are available to support the response to HIV and other STIs across many Pacific Island countries and territories.

For these reasons, OSSHHM believes that there is scope to change the existing approach to setting standards for HIV medicine and sexual health care, whereby each country or territory develops its own guidelines. Such an approach represents an unwarranted duplication of effort and leads to inconsistency in the quality of care that people living with HIV and people with sexual health problems receive across the region.

Accordingly, the society invites the governments and administrations of Pacific Island countries and territories to consider endorsing the evidence-based and Pacific-relevant recommendations contained in this document as national or territorial policy in relation to the practice of HIV medicine and sexual health care.

Because the science of sexual health and HIV medicine changes with extraordinary speed, it is necessary for clinical guidelines in these areas to be updated regularly. It is OSSHHM’s intention to update this collection of recommendations at least every two years and more often if there are substantial changes in the evidence over a shorter timeframe. Readers are referred to the society’s website (www.spc.int/hiv/ossshhm) where the most recent revision of the recommendations will always be available.
HIV test counselling

Background

HIV-related stigma and discrimination are not unique to the Pacific but their effect is particularly strong in the region. It is not uncommon to hear reports of banishment from villages and violence against people who are known, or just believed, to be HIV positive.

As well, problems with confidentiality in health care services have been well reported region-wide. This issue is heightened by the small, close-knit and interrelated nature of many communities.

If more people in the Pacific region who are concerned about having HIV infection or are vulnerable to it are to access HIV testing, they need more than the availability of testing services. Specifically, it is critical that they can trust that their sensitive personal information revealed in seeking an HIV test will not be shared with others.

Research shows that good counselling helps people to decide to be tested. People requesting or being offered testing for HIV should be taken through the HIV testing process by a health care worker with counselling skills. The input of someone with these skills will ensure that the patient or client can provide informed consent, if they decide to be tested. It will also minimise the potential for harm from misunderstanding, discrimination and stigma.

The content of this chapter is based on the publications of international organisations, including Family Health International, the United Nations Joint Program on AIDS (UNAIDS) and WHO, and on the operational guidelines of national AIDS organisations. They reflect international best practice in relation to HIV test counselling.

What is HIV test counselling?

There are many models for HIV test counselling. For the purposes of these recommendations, OSSHHM uses the following definition:

HIV test counselling is a confidential process that enables a person(s) to assess their relative risk of acquiring or transmitting HIV. The process also helps people to decide whether to be tested for HIV antibodies, manages their stress responses and provides support when they receive the test results and afterwards.

HIV test counselling serves two main purposes:

1. It helps prevent further transmission of HIV (and other STIs). Knowing their HIV status may encourage people who are infected to avoid transmitting the virus to others and can motivate people who are uninfected to remain so. HIV test counselling can prompt people to start to use or increase their use of condoms. It can also help to reduce sexually transmitted infections and increase use of safer injecting practices amongst injecting drug users.

---

1 OSSHHM is grateful to Alistair MacDonald, Counselling Training Officer in the HIV & STI Section at SPC, for his assistance with the development of this chapter on the basis of published guidelines.
2. It determines who requires care and treatment. A person must know that they have HIV before they can access HIV care services. These services include general clinical care and antiretroviral therapy, as well as interventions to prevent mother-to-child transmission of HIV.

Characteristics of HIV test counselling

It is vital that HIV testing and counselling respect basic human rights. International public health organisations recommend that providers:

- ensure an ethical counselling and testing process where the purpose of both the counselling and the test, and their benefits are explained to the person considering testing;
- guarantee the confidentiality of all medical information;
- make certain that testing and any associated counselling is voluntary and provides the person with the right to refuse; and
- address the implications of a positive test result, including its impact on the person’s life and the need for access to sustainable treatment and care.

HIV test counselling needs to be client-centred. This means that it must be aimed at achieving effective risk reduction for the client based on their specific needs, strengths and abilities. Counselling for behaviour change needs to be tailored to the person’s unique situation and their capacity to deal with stress and trauma.

HIV testing should not be mandatory. Testing without informed consent and confidentiality is a violation of fundamental human rights. In addition, there is no evidence that mandatory testing achieves public health goals.

Confidentiality

Testing information must only be reported to the person who was tested unless the person clearly says that they want to share information such as a test result with family, a partner or a close friend. Confidentiality is defined as keeping ‘private’ any information relating to someone. Maintaining a person’s privacy by restricting access to personal and confidential information, especially with respect to HIV test results and counselling records, demonstrates sensitivity and respect for their basic rights.

Box 1: Examples of breaches of confidentiality

- A health centre uses protective gear such as gloves only with people who are HIV positive. Health care staff should adopt the same standard precautions with all patients, irrespective of their HIV status.
- Telephone conversations, written counselling records, or medical files are not held privately under lock and key.
- A health care worker tells others, ‘Guess who came to the clinic for a test today.’ This is breaching the person’s right to privacy.
- A health care worker who meets a patient in the community greets and starts talking to them. Workers should wait for the patient to recognise and approach them rather than initiating contact.
People being counselled must also have explained, and be able to understand, the rare and limited circumstances when confidentiality or privacy may be broken by the person providing counselling or testing services (see footnote II under ‘Breaches of confidentiality’ below).

Breaches of confidentiality

Even if breaches of confidentiality are unintentional, the effect can be serious and immediate for the person in terms of stigma and discrimination. Outside of very limited circumstances, a deliberate breach of confidentiality is unethical and should lead to disciplinary action of the health care worker concerned. Breaches of confidentiality may deter others from accessing counselling and testing if the community comes to believe that a service cannot keep sensitive information private.

Principles for HIV test counselling

- Regardless of who initiates the process for counselling and testing, HIV testing should be voluntary.
- The person should have sufficient information, understanding and freedom of choice to be able to give informed consent to testing.
- Health care workers offering the HIV test counselling must ensure that the person understands that there is a real choice as to whether to test or not.
- Appropriate information, counselling and, where required, referral must be provided when the test result is available.
- People considering HIV testing should be encouraged to consider attending and being tested together with their regular sexual partner where appropriate.
- People receiving HIV test results should be encouraged to share the results with people who are close to them and who might be expected to be trustworthy and to provide emotional support.
- People whose test results are positive should receive counselling and referral to care, support and treatment. They should also be encouraged to disclose their results voluntarily to previous and current sexual partners who may themselves benefit from testing.
- People whose test results are negative should receive counselling to assist them to remain uninfected with HIV.

II Ethical or legal breaches of confidentiality: Under very limited circumstances, a health care worker or counsellor may be compelled either ethically or legally to breach the confidentiality of a person being counselled. Wherever possible, this breach of confidentiality must be made with the knowledge of that person and only when all other options have been considered or tried. The health care worker or counsellor has a duty to prepare the counselled person for such a breach. Generally confidentiality may only be breached by the counsellor when the person being counselled presents a danger either to themselves or another person(s). For example, a danger to another person might exist if a person communicates in counselling that they cannot disclose their HIV status to a specific sexual partner and that they will not use condoms to protect their partner. In this situation, ideally another health care worker would disclose the necessary information to the person’s partner. Another example is when a counsellor or health care worker has strong reason to believe, or the person being counselled indicates, that the counselled person has a clear plan to harm or kill themselves or others.

In other very rare circumstances, a court may compel a counsellor or health care worker to provide the medical and counselling records or other details of a
person who is being counselled, or who has previously been counselled. Public health and criminal law regarding HIV varies throughout the Pacific Island region, and so the legal limits to confidentiality may differ among countries and territories.
• In low prevalence environments (such as Pacific small island countries and territories), people whose test results are reactive but not yet confirmed should receive intensive counselling and support to enable them to manage in the difficult period when their HIV status is unclear.

HIV test results and counselling records should be treated confidentially. Only those health care workers with a direct role in the management of patients should have access to this information.

Requirements for HIV test counselling

In order to be effective and avoid the potential for harm, a number of essential elements need to be in place wherever HIV test counselling is offered.

Personne

Health care workers need training in counselling skills. Increasingly, HIV test counselling is performed by medical, nursing, midwifery or laboratory staff. This approach helps to improve access to testing and facilitates referral for prevention, treatment, care, counselling and support. All health care workers providing HIV test counselling need knowledge of, and skills in:

• providing general information about HIV and how it is transmitted;
• providing pre-test and post-test counselling;
• addressing difficult issues (such as managing suicidal tendencies, explaining the meaning of reactive but as yet unconfirmed results, fears about death and dying, safe disclosure of results to partners);
• HIV prevention and behaviour change; and
• referral mechanisms.

Delivering high-quality HIV test counselling also requires proper personnel management. Such management includes skilfully and regularly supervising staff, and identifying needs for further capacity development.

Infrastrutur

e

The minimal physical requirements for HIV test counselling include a consulting space that ensures privacy (that is, where others cannot see or hear the person providing the counselling or the person being counselled).

Quality assurance

Mechanisms should be established to ensure that ethical and technical standards are upheld for both counselling and testing services.
Linkages and referrals

Relationships should be established among HIV test counselling sites, health facilities and community organisations to enable delivery of comprehensive prevention, care, treatment
and support services. The existence of these relationships will also help ensure that everyone who is HIV tested (irrespective of the test result) has access to ongoing services, such as psycho-social support and legal assistance.

The stages of HIV test counselling

HIV test counselling is a process that takes place over a series of conversations between the person considering testing and the person providing the service. It will always involve at least two sessions: pre-test counselling and post-test counselling.

In some settings such as antenatal clinics, there is often a group HIV education session provided by clinic staff that precedes one-to-one pre-test counselling.

These sessions save time for health care workers by allowing larger numbers of women (and their partners) to be provided with generalised information on HIV at the same time and to decide if they wish to proceed with pre-test counselling. A group education session should never be considered as a substitute for pre-test counselling.

Sometimes additional follow-up sessions will be necessary after post-test counselling. Such sessions will be appropriate for people who test HIV positive and for some who test negative, especially if they need assistance to modify their risk behaviour.

Pre-test counselling

Pre-test counselling helps a person decide whether they want to have an HIV test and, if they decide to be tested, to prepare them for the result. The person providing the counselling needs to balance, on the one hand, providing information to the counselled person and jointly assessing risk with them and, on the other hand, responding to their emotional needs. This session explains the implications of knowing that you are or are not infected with HIV.

Pre-test counselling aims to:

- ensure that any decision to take the test is fully informed and voluntary;
- prepare the person for any type of result, whether negative, confirmed positive, or reactive but unconfirmed;
- provide risk reduction information and advice on strategies, irrespective of whether testing proceeds; and

Box 2: Risk assessment

In the pre-test session it is important that the health care worker or counsellor assesses the actual level of risk of the person, as opposed to the person's perception of their risk. For example, the person may believe that oral sex is very high risk for transmission of HIV when in fact it is low risk and there have been very few recorded cases of HIV transmission through this route.

In order to fulfil this task, a good rapport must be developed rapidly. Risk assessment requires the health care worker to ask explicit questions, sensitively, about the person's practices including:

- sexual practices, including any history of sex while travelling;
- alcohol or other drug use (particularly their relation to sexual activity and the use of injected drugs);
- occupational practices; and
- contaminated blood: through transfusion, organ transplant or other surgical procedures.
• provide options for the prevention of mother-to-child transmission of HIV where this is relevant.

Pre-test counselling checklist
1. Establish rapport by extending a warm welcome to the person considering testing.
2. Provide emotional support and explain about confidentiality (and its limits).
3. Explore the person's reasons for seeking a test and their understanding about HIV and its transmission.
5. Determine the person's marital or relationship status and their social supports.
6. Assist the person to assess their personal risk of HIV infection and to make a risk reduction plan, including safer sex practices. Provide condoms and ensure that the person knows how to use them, using a practical demonstration on a ‘penis substitute’, such as a banana, where required. This information should be provided to both males and females considering testing.
7. Explore what the person knows about the test and provide information about the testing procedure.
8. Explain clearly what is meant by ‘HIV positive’, ‘HIV negative’ and ‘indeterminate’ results – and the implications of each.
9. Where confirmatory testing is not available on-island, explain that a reactive initial HIV test may represent a true or false positive (see ‘HIV screening tests’ on page 13) and emphasise that only after confirmatory testing will a clear result be known.
10. Explain what is meant by the ‘window period’ (see ‘Window period’ page 16).
11. Explain when the results will be ready and how these will be delivered during a post-test counselling session to allow the results to be discussed. Never agree to deliver results over the phone.
12. Remind the person that the results are confidential and explain how their confidentiality is protected.
13. If relevant, inform the person of the cost of the test.
14. Allow the person to think through the issues, ask questions and get clarification.
15. Discuss with the person how they imagine they might react and how they might cope depending on the result. Discuss how others they know might react (partner, wife, husband, family, village community).
16. Explore risk of depression, suicide, homicide, and other violent or adverse outcomes.
17. Assist the person to come to their own decision about taking the test, restating that the process is entirely voluntary.
18. If the person decides to take the test, obtain signed written consent where required by law, or clearly document that you have obtained informed verbal consent.
19. If the person decides not to take the test, help to summarise their risk reduction plan, and tell them that they are welcome to come back to discuss anything further or to be tested at a later time.

20. Provide information about referral services appropriate for the person’s needs identified during the session (such as contraception, treatment for other STIs, help with responding to domestic violence, support for drug users and support for people who report having been raped).

21. Recommend that the person, if possible, plan for some ‘quiet time’ immediately after their post-test results appointment – such as taking the rest of the day off work or getting someone else to look after the children.

22. Discuss follow-up arrangement for post-test counselling.

Post-test counselling

The form of the post-test counselling session depends on what the test result is. The foundation of good post-test counselling is laid during the pre-test session. If the pre-test counselling is done well, the counsellor will already have a good relationship with the person who has been tested. People attending for HIV test results are likely to be anxious, and those receiving a positive HIV antibody result will usually be distressed. It is therefore desirable that the counsellor who provided pre-test counselling also provides post-test counselling.

Post-test counselling aims are to:

- communicate the test result promptly and clearly;
- assist the person to understand and cope with the HIV test results;
- provide the person with any further information they require;
- help the person make immediate and short-term plans;
- help the person decide what to do about disclosing their test results to partners and others;
- help the person to reduce their future risk of acquiring HIV or take action to prevent infection of others;
- help the person to access the immediate and ongoing medical, emotional and social care and support they need; and

Box 3: Preventing future risk-taking for people who test HIV negative

A primary aim of HIV test counselling is to assist people who are HIV negative to remain this way. However, some recent international studies suggest that testing negative for HIV may potentially foster a personal sense of invincibility and cause some people to increase rather than decrease their sexual risk-taking.

It is not uncommon for people who have had a ‘near miss’ or ‘lucky escape’ following risk-taking to misunderstand this outcome in a personal way. They begin to believe that they are ‘special’, are in some way ‘blessed’ or ‘protected against’ or even ‘immune to’ HIV infection.

It is therefore vital that in a post-test counselling session where the result is HIV negative, health care workers routinely discuss this phenomenon and explore the way that the person interprets the meaning of their own result. It may be useful to ask the HIV negative person to describe in their own words what they now understand about their future risk for HIV (or other STIs) and to discuss the behaviours required to remain HIV negative.

Depending on the result of this assessment, it may be helpful to refer or invite the person to return for further personalised primary prevention counselling.
• establish links with organisations serving people living with HIV, if the person wants this.

Post-test counselling checklist for when a result is HIV negative

1. Cross-check all results with the person’s file and blood samples.
2. Discuss the meaning of the result – including the need to repeat the test if the person may have been exposed to HIV in the 3 months before testing (see ‘Window period’ on page 16).
3. Discuss a personal risk reduction plan (see Box 3 on page 9) and information to prevent future infection. This discussion should cover safe sex practices and should build the person’s skills in using condoms and in negotiating their use.
4. Discuss follow-up plan options and resources for support, and check for other referral needs (see Box 3).
5. Address issues of ‘HIV-phobia’, hypochondriasis or anxiety disorder and arrange for referral if these are significant.

Post-test counselling checklist for when a result is not clear

(See ‘HIV screening tests’ on page 13)

1. Discuss the meaning of the result and explain the procedure that will be required to clarify the person’s true HIV status.
2. Help the person to cope with and adjust to the intervening period of uncertainty and anxiety.
3. Provide the person with any information they require.
4. Encourage the person to adopt safer sex practices or to abstain from sex until their HIV status is clarified.
5. Reassure the person that their records and results are confidential.

Box 4: Important things to do when delivering a positive HIV result

1. Invite the person to sit down and deliver the news of the result in a quiet, emotionally supportive and private environment.
2. Give a clear explanation of the result promptly: An HIV positive test result means that you have HIV infection.
3. Allow the person time to absorb the result.
4. Provide silence.
5. Check what the person understands by the result.
6. Gently enquire about the meaning of the result for the person:
   "I’m wondering what you are thinking or feeling right now."
7. Respond to any emotional reactions, such as anger, crying, silence.

Don’t

1. Blame the person for the result.
2. Make judgemental statements about their prior actions or negative comments about their reaction to the results.

Post-test counselling checklist for when a result is confirmed to be positive

1. Cross-check all results with the person’s file.
2. Be calm and be aware of non-verbal forms of communication when calling the person to the counselling room.
3. Briefly prepare the person for the result.
4. Be prompt and direct in providing the result (see Box 4 on page 10).
5. After providing the result, give the person the paper copy of the result to view/hold if possible.
6. Deal with the immediate emotional reactions and provide warm, emotional support.
7. Provide reassurance about the person's immediate safety.
8. Discuss health, reproductive and treatment issues or schedule another session to discuss these issues.
9. If the person does not have an AIDS-defining illness, remind the person of the difference between HIV and AIDS. Also inform them that people with HIV can remain healthy for a long time.
10. Discuss the personal, family and social implications of the result. Help the person to identify the main concerns at this stage (such as anxiety, depression, disclosure of test result to their main partner or family, and implications of their disclosure, such as the potential for discrimination, rejection or violence).
11. Make a short plan for follow-up counselling and medical referral.
12. Reiterate the person’s right to privacy and confidentiality with respect to medical information.
13. Help the person to strengthen their emotional resources.

Some common emotional responses to HIV-positive test results

- **Crying.** If the person starts to cry, it is important to let them do so. Give the person ‘room’ to cry, offer tissues and give them ‘permission’ to express their emotions by saying something like, ‘It is normal to cry in these circumstances’. After some time, comment on the process by saying something like, ‘This must be very difficult for you, would you like to talk about it?’ or ‘Would you like to tell me what thoughts are making you cry?’
- **Anger.** The person might start swearing or have outbursts of anger. If this occurs, do not panic but stay calm and give the person ‘room’ to express their feelings. Acknowledge that the feelings they are experiencing are normal and encourage the person to talk about what is making them angry.
- **No response.** This may be due to shock, denial, or a sense of doom or helplessness. Check that the person has ‘heard’ and understands the result. Be alert for suicidal or homicidal thoughts.
- **Denial.** This may be verbal or non-verbal. It is important to acknowledge that it can be difficult to accept information like a positive HIV result. Allow the person to talk about what they are thinking and feeling.

**Safety considerations for the person providing the test counselling**

Any stage of HIV test counselling can be stressful and the process may provoke strong emotions for the person being counselled, including anxiety, guilt or shame, panic, a sense
of hopelessness or doom, or anger. Also, for some people, the stress of HIV testing may worsen an underlying mental illness. In all of these circumstances the reaction to test counselling and the behaviour of the person testing may become ‘out of character’ and difficult to predict.

Many health care workers will be focused on providing a quiet, private and comfortable environment for the person undertaking the test counselling process. However, at all stages of testing it is good practice for the health care worker to have considered their safety as well.

The following are some simple tactics for increasing counsellor safety:

1. Plan the layout of the counselling room carefully. Always place the ‘counsellor’s chair’ closest to the door or exit, while at the same time not ‘cornering’ or blocking easy exit for the person being counselled.

2. Avoid allowing the person being counselled to stand or sit between the counsellor and the door during a session. At the start of the session, always guide them to their seat and invite them to sit there.

3. Avoid providing test results or undertaking other counselling when there is no one else in the building.

4. Have a service emergency plan in place to deal with violent or distraught people. Practise the emergency plan with colleagues.

5. Establish a relationship with local mental health services (where they exist) and the local police. Ensure that they understand that a rapid response may be required.
Diagnosing HIV infection

Being diagnosed with HIV infection is a very significant life event. Accordingly, it is important to take great care that the diagnosis is made reliably. However, technical constraints in some Pacific Island settings make it difficult to obtain definitive confirmation of the diagnosis of HIV infection quickly. These conditions can present particular difficulties for health care workers who are requesting the diagnosis and their patients.

HIV screening tests

Initial testing for HIV infection usually uses techniques that identify the presence of antibodies to HIV proteins in the blood (or occasionally other body fluids) of people being tested.

All pathological tests have to balance sensitivity (the ability to correctly identify a condition when it is present) against specificity (the ability to indicate that a condition is present only when it actually is, and not in a range of other circumstances that may cause a test to be reactive). Because of this balance, there are five possible outcomes when any screening test for HIV antibodies is undertaken:

1. True positive – the test is reactive (it indicates that HIV antibody is present) and the person from whom the specimen was taken is actually infected with HIV.
2. False positive – the test is reactive but the person from whom the specimen was taken is not actually infected with HIV.
3. Inconclusive – the test is unable to decide whether HIV antibody is present or not.
4. True negative – the test is non-reactive (it indicates that HIV antibody is not present) and the person from whom the specimen was taken is not actually infected with HIV.
5. False negative – the test is non-reactive but the person from whom the specimen was taken is actually infected with HIV.

Failing to identify that a person has HIV could have serious consequences. For this reason most pathological tests for HIV antibody are ‘calibrated’ so that they have a high sensitivity. This means that, provided that the test is properly conducted, that the test kit has not expired and that it has been correctly stored (and provided that the person being tested is not in the ‘window period’; see page 16), false negative results are very rare for HIV tests.
Reactive HIV screening tests and confirmatory testing

The ‘price’ for choosing a high sensitivity for HIV antibody tests is that they have a relatively low specificity. This means that reasonably often they will show false positive results (they will be reactive when the person does not actually have HIV). For example, if samples from 1000 people who do not have HIV are tested using a particular HIV test kit, on average, four of those samples will show reactivity even though the person from whom it was taken does not in fact have HIV (the test will be falsely positive).

This effect is particularly important in populations where the proportion of people who have HIV is quite low, as in most Pacific Islands at present. (See Box 5 on page 14).

For these reasons it is really important that when a screening HIV test is reactive or inconclusive, the sample is sent to a reference laboratory for confirmatory testing as soon as possible. Generally, the same sample used for initial testing should be sent to the reference laboratory, unless there is insufficient serum left for confirmatory testing.

Because of this complexity, OSSHHM recommends that a small team of people be nominated in each Pacific Island country or territory to oversee the follow-up of people who have reactive HIV screening tests. This team should include one laboratory scientist and one clinician (the identified leader of the core HIV care team – see ‘Core teams for HIV care’ on page 23 and Appendix 13) be nominated in each Pacific Island country or territory to oversee the follow-up of people who have reactive HIV screening tests.

All laboratory workers who undertake HIV testing should be instructed to telephone these key people whenever they find a reactive or inconclusive HIV screening test, before making any report about the test to the health care worker who requested it or to the person who was tested.

Counselling the person who has been tested when such a result is found can be challenging (see also ‘Post-counselling checklist for when a result is not clear’ on page 10). For practical purposes it is appropriate to say in most Pacific settings that:

Box 5: How likely is it that a reactive HIV screening test is a ‘real’ positive?

1. Assume that a particular HIV test has a false positive rate of 0.4 per cent (four out of 1000 people tested who do not have HIV will have a reactive result).
2. Consider a population where the proportion of people with HIV is really high, say 20 per cent.
   - Because a fifth of all people in this setting have HIV, it is much more likely that a person who chooses (at random) to have a test will actually have HIV than that the test will be falsely positive.
   + A reactive result in this population is much more likely to be a true positive than to be false.
3. Now consider a population (like the general community in many Pacific Islands) where the proportion of people who have HIV is much lower, say one in 10,000, or 0.01 per cent.
   - In this setting, because only one in 10,000 people really has HIV, it is much more likely that a false positive test will occur than that a person who chooses (randomly) to have a test will actually have HIV.
   - A reactive screening test result in this population is much more likely to be a false positive than a true positive.
4. In addition to the population prevalence of HIV, it is necessary to consider these factors:
   - If the person being tested is known to have had unprotected vaginal or anal sex with someone who has confirmed HIV then, relatively speaking, it becomes more likely that a reactive screening test will be a true positive rather than a false positive.
   - If the person being tested has clinical signs and symptoms that are suggestive of HIV infection then, relatively speaking, it becomes more likely that a reactive screening test will be a true positive.
There is some reaction on the screening test and we need to do further testing to work out what this means.

To help the person understand what is going on, it may be helpful to refer to information in the box ‘How likely is it that a reactive HIV screening test is a “real” positive?’ on Box 5 on page 14.

For a person who does not have suggestive symptoms and where it does not appear likely from the sexual history that they have had unprotected vaginal or anal sex with someone with HIV, you could say something like:

There is a chance that what we are seeing on the blood test means that you actually do have HIV but it is more than likely that you don’t. We need to arrange for further testing to make sure.

The person will obviously need considerable support to cope with the stress of this situation, as well as careful counselling to ensure that they understand the definitive result once confirmatory testing has been performed. The person should also be sensitively advised of the need to avoid unprotected vaginal or anal intercourse, blood donation and any other activity that could provide the opportunity for further HIV transmission until definitive confirmation of their HIV status is obtained. If the person has a regular sexual partner, it will be necessary to discuss the situation and uncertainty with the partner. The health care worker should offer the person who has been tested assistance in undertaking this discussion so that the partner can also fully understand the situation and recognise that the reactive test may well be a false positive.

Where it is more likely that the person’s screening test will turn out to be a true positive, give more circumspect advice. Such advice might be appropriate, for example, if the person came to testing because they are a contact of someone who has been diagnosed with HIV or where they have symptoms or clinical signs suggestive of HIV disease. In this situation, you could say something like:

Well, the screening test is positive, and this may well mean that you have HIV, but we won’t know for sure until we have done some extra testing.

Again it is clear that the person will need considerable support during the period of uncertainty and after the definitive result is known. It will also be necessary for the person in these circumstances to avoid activities that may result in further HIV transmission as described above.

There are often delays in obtaining confirmatory testing for reactive HIV screening results in many Pacific Island settings due to geographical and logistical issues. Sometimes it will be necessary to make urgent clinical decisions based only on a reactive screening test result. The most important example is where a woman has a reactive screening test in late pregnancy (see ‘Managing women who have a reactive HIV screening test during pregnancy’ on page 39). In this situation, clinical assessment and sexual history taking are very important because (as described in Box 5) they give important clues as to whether a reactive screening test is likely to be a false or a true positive.

Occasionally confirmatory testing at the reference laboratory will yield an ‘indeterminate’ result. In this case, a second sample must be drawn from the patient and sent to the
reference laboratory for analysis. The further period of uncertainty causes additional stress for the person who has been tested and for the health care worker. The principles already outlined should continue to be applied (including referring to the clinical assessment and sexual history for clues as to the likely final outcome) while there is ongoing uncertainty about whether the person actually has HIV.

In some cases, a reactive or inconclusive screening test is obtained from a unit of blood donated for transfusion or from a sample taken to determine someone’s suitability to donate blood or organs to another person. In these situations, the unit should be discarded and the person should be initially rejected as a donor until confirmatory testing and follow-up have been undertaken. A health care worker should contact the prospective donor, advise them confidentially and in person about the reactive result, and provide them with counselling and support as discussed in these recommendations.

Except in the case of women who test positive in late pregnancy (see ‘Managing women who have a reactive HIV screening test during pregnancy’ on page 39), it should almost never be necessary to initiate antiretroviral therapy before it is definitively confirmed that a person is actually infected with HIV.

‘Window period’

As has already been discussed, most HIV antibody tests are ‘calibrated’ to maximise sensitivity (at the cost of reduced specificity). For this reason, it is very rare for samples from a person with established HIV infection to test falsely negative, provided that the test has been conducted according to manufacturer’s instructions, that the test kit has not expired and that it has been stored under appropriate conditions.

The exception to this general statement is where people have only recently been infected with HIV. In this situation, the person’s body may not have developed detectable levels of antibody by the time the sample is taken.

If, for example, a person’s blood sample is drawn and tested for HIV antibodies two weeks after a sexual exposure at which they became infected with the virus, the sample would be likely to be non-reactive even though at the time the person is actually infected with HIV. This result is obtained because the new HIV infection is still becoming established in the person’s body and the immune system is in the process of developing an antibody response to it.

On average, HIV antibody tests become reactive about three to four weeks after the occasion when a person has been newly infected with HIV. Sometimes, for a range of reasons, this ‘window period’ is rather longer.

For practical purposes, a non-reactive HIV antibody test done on a sample taken 12 weeks or more after the last occasion on which the person might have been exposed to HIV can be regarded as definitive evidence that the person has not been infected.\textsuperscript{11}

\textsuperscript{11} The exception to this general advice is where antiretroviral medications have been given as ‘post-exposure prophylaxis’ for a particular incident (see ‘Managing potential exposures to blood-borne viruses including HIV in health care settings’ on page 51). The evidence shows that in these circumstances the window period can sometimes extend beyond 12 weeks, presumably because the antiretroviral drugs delay the time course over which infection is established in the body, even if they fail to prevent it. Where post-exposure prophylaxis medication has been given, the ‘window period’ should be extended.
If a test has been done for whatever reason on a sample drawn during this ‘window period’ and found to be non-reactive, it is important to repeat the test more than 12 weeks after the last exposure. If it is negative at this stage, the patient can be counselled that they have not acquired HIV from the exposure incidents concerned.

**Recommended testing algorithm for Pacific Island countries and territories**

A wide variety of protocols for HIV diagnosis have been in use in Pacific Island countries in the last few years. This variation has led to considerable confusion among laboratory workers and clinicians as well as inconsistent standards of care for people presenting for HIV testing. After consideration of the circumstances across a number of Pacific Island settings, OSSHHM, along with the Laboratory Network of the Pacific Public Health Surveillance Network (LabNet), now recommends a simplified ‘one screen’ algorithm as explained below.

**Which tests to use for screening and confirmation**

There are differences among Pacific Island countries and territories in the way that HIV testing is organised and in the level of sophistication of laboratory services available.

Accordingly, different testing techniques will be appropriate for screening and for confirmation in different circumstances. Whatever technologies are used, however, the central principle of the algorithm described in Figure 1 applies: only one screening test is utilised, and all reactive and repeatedly inconclusive samples are subjected to confirmatory testing in a reference laboratory.

For most Pacific Island countries and territories it is recommended that a single ‘rapid’ HIV antibody test is used for initial screening. In most settings, the Abbott Determine test kit is the most suitable for this purpose because it has very high sensitivity, is simple to use and can be performed on a single sample if necessary. In some laboratories, the larger number of tests performed each week makes the Serodia rapid HIV test a more appropriate choice.

OSSHHM recommends that all HIV testing in the small island countries and territories of the Pacific should be undertaken in recognised laboratories. Rapid tests are often used at the ‘point of care’ in other parts of the world where the prevalence of HIV is much higher. As discussed above, the very low prevalence of HIV in most Pacific small island countries and territories means that most reactive screening tests will turn out to be false positives. This probability, combined with the very high potential for avoidable social harm if a person’s ‘reactive’ status becomes known in a small island community before it is properly confirmed, raises serious concerns about the safety of ‘point of care’ testing in this region.

As discussed on page 13 (‘Reactive HIV screening tests and confirmatory testing’), OSSHHM recommends that all reactive HIV screening tests should be managed by a well-trained team in each country or territory. The society believes that undertaking HIV testing outside of recognised laboratories would reduce the likelihood that such a team would be
consulted before a reactive result is released to the person who has been tested and the requesting health care worker. Accordingly, OSSHMM recommends that point of care HIV testing is not undertaken in this region.

For most Pacific Island countries and territories, it is recommended that a single ‘rapid’ HIV antibody test is used, in a recognised laboratory, for initial screening. In a few well-developed Pacific laboratories with a high throughput of specimens, automated enzyme immuno-assay (ELISA) testing may be appropriate for initial screening.

Where rapid tests are used, it is important to note that only one type of test kit should be used for screening on any specimen. If the initial test is non-reactive, the specimen should be reported as negative. If it shows any degree of reactivity, the sample should be referred for confirmatory testing. It is not recommended to re-test reactive or inconclusive specimens with a different test kit (such as the Serodia, if the Determine was used for initial screening or vice versa).

Figure 1: General HIV testing algorithm for Pacific Island countries and territories
Which tests to use for confirmatory testing

The appropriate test for confirmatory testing varies between laboratories.

At Mataika House reference laboratory in Suva, reactive samples from Fiji and referred samples from Kiribati and Tuvalu are confirmed using a validated algorithm involving one rapid test and two ELISA tests. This approach may also be used soon in Palau.

At Institut Pasteur Nouvelle-Caledonie, reactive samples from New Caledonia and Vanuatu are confirmed using a combination of ELISA and Western Blot testing, as are samples from Samoa, Tonga and Solomon Islands at laboratories in Australia and New Zealand. Samples from American Samoa, the Federated States of Micronesia, Guam, Marshall Islands and Northern Mariana Islands that are reactive to an HIV screening test are referred to laboratories in Hawai‘i, where confirmation is undertaken using the Western Blot technique.

No international evidence-based guidelines have been published in the last decade to guide confirmatory testing for specimens that are reactive on screening tests for HIV antibody. No guidelines have ever been produced that specifically address issues in the Pacific Islands.

At present, OSSHHM recommends that confirmatory testing is undertaken according to the protocol in place in the reference laboratory to which specimens are sent, provided that at least one additional test of a different type from the screening test and with a specificity greater than 95 per cent is part of that protocol. In the longer term, OSSHHM recommends undertaking specific validation studies, utilising reactive, non-reactive and inconclusive samples from the Pacific Island region, to ensure that confirmation protocols are appropriate for the region’s populations.

Diagnosing HIV in the infants of mothers living with HIV

Diagnosing whether babies born to mothers with HIV have been infected with the virus during pregnancy, delivery or breastfeeding is more complicated than diagnosing HIV in adults and older children. It is more difficult because antibodies pass from mothers to their foetuses before birth. As a result, all babies of mothers with HIV will have antibodies to HIV present in their blood when they are born and for a period afterwards, even if they have not actually been infected with the virus themselves. Because HIV is usually diagnosed by
looking for the presence of HIV antibodies, samples from all babies of mothers with HIV will test ‘positive’ irrespective of whether the baby is actually infected with the virus.

Because babies who are infected with HIV may become seriously ill quickly, it is important to try to diagnose whether a baby has really been infected as early as possible.

Given that antibody testing is not reliable in young babies, tests that look for nucleic acid from HIV itself are utilised instead. Only babies who have actually been infected with HIV will have HIV nucleic acid in their blood. These tests are not available in most Pacific laboratories but referral of specimens to an overseas reference laboratory can usually be arranged.

OSSHHM recommends that babies of mothers with HIV have blood drawn and referred for nucleic acid testing six weeks after birth. The reason for this recommendation is that a high proportion of mother-to-child transmissions of HIV occur during labour and delivery. If transmission occurs at this time, it will take several weeks for the virus to reproduce in the baby’s body to an extent where viral nucleic acid can be detected in the blood, especially if mother and baby have received antiretroviral medications in order to reduce the chance of transmission. A negative test for HIV nucleic acid on the blood of a baby six weeks after birth indicates definitively that the child did not acquire HIV during labour or delivery.

Where a mother with HIV elects to breastfeed her baby, it should be recognised that HIV transmission can occur at any time until the baby is completely weaned. In these circumstances, it may be appropriate to re-test the baby’s blood for HIV nucleic acid six weeks after breastfeeding is stopped, or earlier if the baby shows clinical features suggestive of HIV infection.

All babies of mothers with HIV should be monitored closely for signs suggestive of HIV infection. Where specimen referral for nucleic acid testing is not possible, the baby should be assumed to be infected and managed accordingly (see ‘Caring for infants born to mothers with HIV’ on page 44). Blood should be drawn from the baby for HIV antibody testing when the baby is nine months old. If the test is non-reactive at that time, it can be concluded that the baby has not been infected.\textsuperscript{IV}

If the test is reactive or inconclusive, no definitive conclusion can be drawn and the test should be repeated every three months. A non-reactive test at any stage during this follow-up indicates that the baby is not HIV infected.\textsuperscript{V} If the antibody test is still reactive when the baby reaches 18 months of age, it may then be concluded that the baby is infected, as all maternally derived HIV antibody should have been lost from the circulation by this time. At this point, confirmatory testing should be undertaken on blood from the baby to verify the diagnosis.

\textsuperscript{IV} However, if the mother is breastfeeding, it is still possible that the baby has been recently infected and is in the window period or that infection will occur subsequently.

\textsuperscript{V} However, if the mother is breastfeeding, it is still possible that the baby has been recently infected and is in the window period or that infection will occur subsequently.
Box 7: Diagnosing HIV in the babies of mothers with HIV

- All infants born to mothers who have HIV will test positive for HIV antibodies at birth and for the first few months of life, whether they are infected or not, because of maternal antibodies passed across the placenta.

- A test for HIV nucleic acid done at a reference laboratory on a sample drawn from a baby at six weeks of age will reliably determine whether the baby was infected at or before birth.

- Babies born to mothers with HIV should be monitored closely and managed as if they are HIV infected until it is definitely known that they are not (see page 40).

- If nucleic acid testing is not available, an antibody test should be performed on the baby’s blood at nine months of age. If the test is negative, it can be assumed that the baby was not infected at birth.

- If the test is reactive at nine months, no conclusion can be drawn and the test should be repeated every three months until a negative result is obtained or the baby reaches 18 months of age.

- A reactive antibody test at 18 months of age indicates that the baby is HIV infected and confirmatory testing should be undertaken to verify the diagnosis.

- Where the babies of mothers with HIV are breastfed, infection can occur at any time until the baby is fully weaned. If the baby is not definitively known to be infected, a nucleic acid test six weeks after breastfeeding has ended will determine definitively whether the baby has been infected.
Organising care for people living with HIV

The impact of HIV infection is experienced across the full spectrum of the lives of people who are living with the virus, including the biological, psychological and social dimensions. Similarly, successful treatment for HIV infection requires a bio-psycho-social perspective because factors across all of these dimensions will bear on a person’s ability to adhere accurately to treatment and to stay engaged with the care team.

As well as providing support and encouragement to their patients and clients, health care workers should have an advocacy role in ensuring that appropriate services are made available for people with HIV in their communities.

Criteria for effective and sustainable antiretroviral therapy

Effective provision of combination antiretroviral therapy is an essential component of HIV care. Almost all people living with HIV will need to start on these medications during the course of their infection in order to avoid becoming ill and dying from opportunistic infections.

Once someone with HIV starts on antiretroviral therapy, current evidence indicates that they will need to take it continuously and very accurately for the rest of their lives. For many people, adhering to this regimen means maintaining medication supplies and the social conditions that enable accurate adherence for well in excess of 20 years.

In 2004 WHO convened a meeting of HIV coordinators from a number of Pacific Island countries. The participants agreed to nine criteria for effective and sustainable antiretroviral therapy provision. OSSHHM endorses these criteria (see below)\(^\text{VI}\) and believes that all Pacific Island countries and territories in which there are people living with HIV should strive to achieve them as soon as possible.

Many people with HIV need access to treatment urgently if they are to survive. Accordingly, OSSHHM believes that the nine criteria should not form a barrier to commencing treatment for people with HIV whose lives depend on it. Rather, they should be seen as ‘aspirational’ criteria that need to be achieved in parallel with initiating treatment programmes.

OSSHHM recommends that a country or territory that decides to initiate antiretroviral therapy develops and implements a timed, costed and funded plan, as a matter of urgency, to achieve the criteria within a short timeframe from the commencement of treatment.

The nine criteria for effective and sustainable antiretroviral therapy

1. There is a clear commitment to provide antiretroviral therapy in the country or territory from national or territorial decision-makers.
2. A clearly assigned central unit, with an identified leader, is responsible for oversight of medical care for people receiving antiretroviral therapy in the country or territory.
3. People living with HIV have been involved in development of care services.

\(^\text{VI}\) OSSHHM has slightly modified the original wording of the criteria to take account of subsequent developments in HIV care. It endorses the criteria as they appear in this document.
4. An ongoing supply of antiretroviral therapy has been secured and at least six months’ supply for the number of people to be treated is available in the country or territory.

5. A technically sound antiretroviral therapy protocol has been developed and is available. (Adoption of these OSSHMM recommendations would fulfil this criterion.)

6. A local partnership exists between public health services, clinical services and community organisations to ensure a continuum of care and support for people living with HIV, including support for adherence to treatment.

7. A core multidisciplinary HIV care team has been identified at each treatment site and has received appropriate training.

8. Diagnostic services are available to perform HIV antibody tests and essential routine tests to monitor for drug toxicity.

9. An adequate patient record system exists to ensure that the progress of people living with HIV being cared for by the core team can be effectively monitored.

‘Core teams’ for HIV care

The concept of a ‘core multidisciplinary HIV care team’ introduced in the nine criteria has been further developed from the experience of several Pacific Island countries and territories in setting up and operating core teams. This team needs to be able to provide comprehensive care for people living with HIV that takes account of the biological, psychological and social aspects of their health and provides ongoing support and follow-up to help them to adhere accurately to antiretroviral treatment over the long term.

OSSHMM recommends the following membership for an effective core team at any Pacific Island HIV treatment and care site:

1. an identified team leader – the primary HIV care doctor for the site;

2. a nurse coordinator for the team (often the ‘HIV coordinator’ of the country or territory, but the person needs to be able to be closely involved in the care of people living with HIV);

3. at least one additional doctor (a physician, primary health care, sexual health or public health doctor who can fill in for the primary doctor when the latter is off-island);\(^\text{vii}\)

4. an obstetrician;

5. a midwife;

6. a paediatrician;

7. a counsellor (if a qualified counsellor exists or is available – if not, the nurse coordinator takes on this role);

8. a pharmacist (who will take responsibility for antiretroviral stock management and, for countries accessing medications through the Regional Procurement Mechanism, communication with the regional pharmacist, as well as supporting patient adherence. At

\(^\text{vii}\) In settings where different doctors have responsibility for the outpatient and inpatient care of people living with HIV, it is essential that both an inpatient doctor and a public health or outpatient doctor are included in the core team.
some smaller island sites, the nurse coordinator takes on this role also if no pharmacist is available);

9. a laboratory officer (who can take responsibility for referral of confirmation and monitoring specimens to overseas laboratories and after further support perform low-cost CD4 counting in the country or territory); and

10. a person living with HIV.

Note: It is recognised that in countries and territories with smaller case loads, membership of the core HIV care team will not be the only, or even the primary, job of many of the team members. In these circumstances, the team would generally operate as a ‘virtual team’, whose members such as the obstetrician and paediatrician have received training and undertake to stay up to date with HIV care knowledge so that they can be called upon when required.

Some larger centres may nominate other health care workers to participate in the core team and provide skilled services to people living with HIV. These health care workers may include a dentist, a surgeon, a psychiatrist, a physiotherapist and/or a nutritionist.

**Process and content for initial training of core teams**

OSSHHM believes that one or more clinicians with extensive practical experience in HIV care should facilitate initial training of core HIV care teams. Further, such training should be undertaken in the Pacific Island country or territory where the team is to operate.

It is only through visiting the treatment site that training facilitators can gain an appreciation of the particular issues that will bear on effective HIV care in that setting. In-country training also allows all team members to participate and starts to build cooperation and cohesiveness within the team. Additionally the approach allows the facilitator to work with the team to identify and develop plans to overcome structural barriers that might impede the scale-up of HIV care services at the site.

A further advantage of in-country training is that it begins the development of an ongoing collegial relationship between members of the team and the training facilitator, who should provide ongoing remote mentorship for team members after the training. Finally, in-country training minimises the negative impact on service delivery that results from taking essential personnel out of their countries and territories for regional or international training events.

The HIV and STI Section in the Public Health Programme, SPC developed and refined basic content for the initial training of core HIV care teams on Pacific Islands. OSSHHM has assessed and endorses this content. (See Appendix 1 for details of the training content.)

**Mentorship and support of core teams**

The comprehensive care of people living with HIV is technically demanding. Moreover, the outcomes of care have been shown to be related to the level of experience of the health care workers providing it.

Many Pacific Island countries and territories are early in the development of their response to HIV and especially of treatment and care systems for people who are living with the virus.
Accordingly, as the newly formed care teams begin to care for people with HIV following the initial training, it is essential to provide them with intensive remote mentorship by experienced HIV clinicians.

OSSHHM recommends that, where possible, ongoing mentorship should be provided by the same experienced HIV clinician who has facilitated the initial in-country training sessions. In this way, an ongoing collegial relationship between the mentor and members of the core team can develop.

Health care workers in core HIV care teams should be encouraged to become active members of OSSHHM as a further source of collegial support and continuing education. As OSSHHM members they can also engage with issues and developments in relation to HIV medicine and sexual health care that are bearing on the Pacific region so that they can be effective advocates for the welfare of patients and clients in their country or territory and in their region.

As the network of OSSHHM members gains experience, knowledge and skill in HIV care, it is intended that members of the society will increasingly be able to provide support and mentorship for each other. Eventually, over a number of years, this growing capacity should remove the need for expert mentors from outside of the region.

Monitoring people with HIV not yet taking antiretroviral therapy

Once a core HIV care team has been established, it is recommended that efforts are made to re-contact all people who have already been diagnosed with HIV in the country or territory. The purpose of this contact is to monitor the health of these people and to assess them for antiretroviral therapy (see ‘When to start antiretroviral therapy’ on page 27).

OSSHHM recommends that where people do not yet need to start treatment, members of the team should review them every three months with a regular appointment, rather than waiting for them to present with clinical problems. At these regular clinic visits, the following activities should be undertaken:

- Enquire about any new symptoms, the person's energy level and their general state of physical and emotional well-being.
- Undertake a general clinical examination including, as a minimum:
  - skin and lymph nodes
  - recording weight
  - throat and mouth and chest
  - abdominal examination
  - examination of other systems guided by clinical history.
- Discuss psycho-social aspects of the person’s life, including any new sexual partners, with gentle and sensitive reinforcement of HIV prevention messages.
- Ensure that positive women with childbearing potential have access to and are utilising effective contraception unless they expressly wish to become pregnant.
• Undertake a dental and ophthalmic examination each year.
• Perform full blood count (every three months), and lipid profiles and liver function tests (every year).
• Undertake a CD4 count if available in-country or by international referral.

Use of antiretroviral therapy in adults and adolescents

To help clinicians to make sense of the complexity involved in antiretroviral therapy and provide the best advice to their patients, a number of expert bodies have produced guidelines for antiretroviral therapy. (Examples of guidelines come from WHO,6 the British HIV Association,7 the European AIDS Clinical Society,8 the French Ministère de la Santé et des Solidarités9 and the United States Department of Health and Human Services10.) Very high-level technical analysis of the available evidence is undertaken in the development of these guidelines. In addition, they are updated frequently to take account of the evolving body of science in this area.

Clearly, each of the available sets of guidelines is oriented towards the care of people living with HIV in the particular setting for which it was developed. The British, French and United States guidelines, for example, take account of the organisation and financing of health care in their respective countries and assume that clinicians utilising them will have access to drug choices and monitoring technologies that are the standard of care in those settings.

The WHO guidelines, on the other hand, are focused on ‘resource-limited settings’ and advocate a ‘public health approach’ to care provision. With this orientation, in place of individualised therapy that takes account of the circumstances of each person starting treatment, there are prescribed, standardised approaches that enable clinicians with limited experience to treat large numbers of people. Certainly, many Pacific small island countries and territories are ‘resource-limited’ but none has the very large numbers of people with HIV needing treatment for which this approach to HIV care was developed.

Nevertheless, the 2006 WHO guidelines, Antiretroviral therapy for HIV infection in adults and adolescents, are well researched and recommend rational combinations of drugs for initial and, where needed, second-line therapy.7 OSSHMM broadly endorses the document and recommends that health care workers consult it to gain an understanding of the science and reasoning that underpins the recommendations for antiretroviral therapy.

Utilising the approach developed in Australia, key elements of the 2006 WHO guidelines are distilled in this document along with commentary that takes account of other published guidelines and the experience of OSSHMM members. From this approach, these recommendations relevant for Pacific small island countries and territories have been produced.
When to start antiretroviral therapy

Evidence is now emerging to suggest that HIV causes significant, and probably irreparable damage to the immune systems of people who acquire it within weeks of first infection. At a clinical level, however, these effects are subtle, meaning that many people in the first few years of their HIV infection remain well and have few symptoms. Within a few months of infection, a near-equilibrium is usually achieved where immune cells are replaced almost as quickly as they are damaged and virus is destroyed by the body almost as quickly as it replicates.

Measurement of the number or proportion of lymphocytes in the person’s blood that carry the ‘CD4’ marker (known as the ‘CD4 count’ or simply ‘T cell count’) has proven to be a useful measure of the degree of immune damage that has occurred. It is also a powerful predictor of whether the person will develop a severe complication in the succeeding few months. Where it is available, this test provides an excellent tool to guide advice on when it is appropriate to commence antiretroviral therapy. CD4 counting is already used in many Pacific island countries and territories and the advent of low-cost technologies means that it will soon be available in all treatment centres in the region.

The WHO 2006 guidelines advocate that antiretroviral therapy should be recommended in relation to CD4 lymphocyte count according to the scheme in Table 1 below. In the context of the Pacific Islands, where fewer people are in need of antiretroviral therapy, OSSHHM recommends a slightly less conservative approach to the recommendation of antiretroviral therapy based on CD4 count, which is outlined in its commentary in Table 1.

It is recommended CD4 counting be undertaken when a person is first assessed after being diagnosed with HIV and then every three months after that. OSSHHM recommends that CD4 results be recorded on a graph in the patient’s medical record so that the approximate slope of their decline becomes apparent. In a person with HIV whose CD4 is between 200 and 350 cells per microlitre, a steep downward trajectory for the count should lead to earlier recommendation to initiate antiretroviral therapy.

Experience in other parts of the world has shown that while CD4 counting is very useful in informing decisions about when to recommend antiretroviral therapy, it is not essential. Where CD4 is not available, lives can be saved by initiating antiretroviral therapy on the basis of clinical assessment (clinical staging – see below).
Clinical staging

The WHO guidelines include a detailed, recently revised clinical staging system to which readers are referred\(^\text{12}\) (see Appendix 2 for a summary.)

Even when CD4 counting is available, the classification system is useful. OSSHJM recommends undertaking WHO clinical staging when people with HIV are first assessed and after significant new clinical events.

In the context of Pacific small island countries and territories, however, OSSHJM considers that it is not essential to rely on fine differentiation between clinical stages to decide when to recommend the initiation of antiretroviral therapy.

OSSHJM advocates more simply that, where CD4 testing is not yet available, all people with confirmed HIV who have significant HIV-related symptoms should be recommended to start on combination antiretroviral therapy as soon as they are emotionally and socially ‘ready’ to begin (see Box 8 on page 28).

**Box 8: Is the patient ‘ready’ for treatment?**

Accurate adherence to antiretroviral therapy is critical if antiretroviral drug resistance is to be avoided and the treatment is to be effective in the long term.

For this reason, it is essential that people living with HIV only start on antiretroviral therapy if they:

- understand why the treatment has been recommended
- understand the importance of accurate adherence and the reasons why it is critical
- are able to adhere accurately in terms of their social circumstances and the availability of support
- are committed to adhering accurately.

Before antiretroviral therapy is prescribed, the person should be carefully counselled and an assessment made of whether the patient is ‘ready’ to start in terms of these criteria.

It may take several clinical consultations, perhaps supplemented, where possible, by discussion with someone already taking antiretroviral therapy, before a person is emotionally and socially ‘ready’ to start.

Antiretroviral therapy should not be prescribed until the person with HIV and their clinician believe that the person is ‘ready’ to start, irrespective of the severity of their clinical disease and the urgency of their biological need for treatment.

What to start: which medications are recommended for first-line therapy?

The regimen chosen at the initiation of antiretroviral therapy represents the patient’s best chance of achieving prolonged suppression of HIV replication. It should be selected carefully given that it is intended that the patient will continue to take this combination for the rest of their life.

An ideal initial antiretroviral regimen would have the following characteristics:

- simple
- effective
- low pill burden
- minimal side effects
- short term
long term
affordable

Table 1: Treatment recommendations by CD4 lymphocyte count

<table>
<thead>
<tr>
<th>CD4 lymphocyte count (cells per microlitre)</th>
<th>WHO guidelines recommendation*</th>
<th>OSSHHM commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;200</td>
<td>Recommend that antiretroviral therapy be started, regardless of clinical stage.**</td>
<td>OSSHHM supports this recommendation.</td>
</tr>
<tr>
<td>200–350</td>
<td>Recommend that antiretroviral therapy be started if the patient: is in clinical stage 4 has tuberculosis has had severe bacterial infections is pregnant and is in clinical stage 3. Otherwise, begin to discuss antiretroviral therapy and recommend that it be commenced before the CD4 count falls below 200 cells per microlitre.</td>
<td>OSSHHM recommends that antiretroviral therapy should be recommended to all people with HIV in this cell count range who have significant symptoms related to their HIV. OSSHHM recommends that combination antiretroviral therapy should be offered to all women with HIV who are pregnant from the end of the first trimester (on page 40).</td>
</tr>
<tr>
<td>&gt;350</td>
<td>Do not recommend that antiretroviral therapy be started.</td>
<td>OSSHHM recommends that antiretroviral therapy should occasionally be recommended in people with CD4 counts &gt;350 based on individual assessment if, for example, the patient has significant symptoms that are likely to be HIV-related. OSSHHM recommends that combination antiretroviral therapy should be offered to all women with HIV who are pregnant (see above).</td>
</tr>
</tbody>
</table>

Source: This table is adapted from the table on page 26 of the WHO guidelines.7
Notes:
* The language of the recommendations has been altered slightly to emphasise the partnership relationship between HIV clinicians and their patients recommended by OSSHHM. See also the box ‘Is the patient “ready” for treatment?’ on page 32.
** See discussion under ‘Clinical staging’ on page 27.

The WHO guidelines recommend that starting regimens should include two nucleoside or nucleotide reverse transcriptase inhibitors (NRTIs) and a non-nucleoside reverse transcriptase inhibitor (NNRTI) ‘based on available evidence, clinical experience and programmatic feasibility for the wider introduction of ART in resource-limited settings’.7, p16

They go on to argue that

Regimens based on combination of two NRTIs plus one NNRTI are efficacious, are generally less expensive than other regimens, have generic formulations, are often
available as fixed dose combinations and do not require a cold chain. In addition, they preserve a potent new class (protease inhibitors) for second-line treatments. 7. p18

The WHO-recommended first-line regimens can be summarised as follows: VIII

<table>
<thead>
<tr>
<th>Either:</th>
<th>plus either:</th>
<th>plus either:</th>
</tr>
</thead>
<tbody>
<tr>
<td>zidovudine</td>
<td>lamivudine</td>
<td>efavirenz</td>
</tr>
<tr>
<td>or</td>
<td>tenofovir</td>
<td>or</td>
</tr>
<tr>
<td>or</td>
<td>stavudine</td>
<td>emtricitabine</td>
</tr>
<tr>
<td>or</td>
<td>abacavir</td>
<td>nevirapine</td>
</tr>
</tbody>
</table>

Zidovudine or tenofovir are the preferred drugs in the left-hand column; stavudine and abacavir are recommended as substitutes in the event of significant toxicity. Readers are referred to the WHO guidelines for detailed consideration of each drug on the list in terms of its advantages and disadvantages in first-line regimens. 7. pp20–21

For resource-constrained Pacific Island countries, OSSHMM recommends the following combination from the WHO list as the standard first-line regimen:

| zidovudine | plus | lamivudine | plus | efavirenz |

This regimen is available in generic formulations, including fixed dose and co-packaged combinations, and is relatively inexpensive. In addition, although it is associated with short-term side effects in some people (which can be managed and for which the patient can be properly prepared), it appears to be relatively non-toxic in the longer term.

The use of efavirenz is preferred over nevirapine, on balance, because of the higher risk of significant hypersensitivity reactions to nevirapine, particularly in patients with higher CD4 counts. The incidence of these reactions among Pacific Island populations is unknown, but they have certainly been observed during initial roll-out of antiretroviral therapy. Nevirapine is contraindicated in males with CD4 counts above 400 cells/microlitre and females with CD4 counts above 250 cells/microlitre because of a higher incidence of hypersensitivity. Until all Pacific Island countries and territories can obtain CD4 count testing, there is a significant risk that if nevirapine were used first line, patients with higher CD4 counts might be inadvertently started on the drug in inappropriate circumstances. The drug also requires reduced-dosage introduction, which adds complexity when the patient is trying to establish a new medication routine.

The major disadvantage of efavirenz is that it is contraindicated in the first trimester of pregnancy because of concern about possible teratogenic effects. Thus, where pregnancy is a possibility for women taking the drug, it is important that they use effective methods of contraception. As discussed under ‘Preventing HIV transmission from mother to child’ (pag

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VIII With drugs in each column listed in alphabetical order.
38), however, effective contraceptive methods are important for all women living with HIV unless they specifically wish to become pregnant.

OSHHMM recommends the use of efavirenz rather than nevirapine in the initial regimen.

Current guidelines for Europe⁹ and the United States¹¹ recommend the use of co-formulated abacavir/lamivudine or tenofovir/emtricitabine as the NRTI component of starting regimens, with zidovudine/lamivudine offered as an ‘alternative’. This recommendation is based on concerns about short- and long-term toxicities of zidovudine relative to abacavir or tenofovir. Thus for New Caledonia, French Polynesia, Wallis and Futuna, Guam and the Northern Mariana Islands, where abacavir or tenofovir are readily available and there may be less concern about their higher cost, they may be preferred to the regimen recommended for resource-constrained. Where abacavir is chosen as the starting regimen, it is important that patients are first tested for the presence of a particular HLA antigen (HLA*B5701) that is associated with hypersensitivity to the drug. The United States guidelines provide full information on the use of this test.¹¹

**How to start antiretroviral therapy**

Once a decision has been made to start antiretroviral therapy, the person needs to be carefully prepared. This preparation starts with the process described in Box 8 on page 28 to determine whether the person is emotionally and socially ‘ready’ to begin. This process may take several clinical consultations. Once emotional and social readiness has also been determined, it is essential to explain carefully to the person the dosing schedule for the drugs and the side effects that may be experienced.

Explaining how to take the medications is best done with the pill bottles in front of you, so that you can be sure the person knows which pills to take when. Once you have done this, it is advisable to ask the person to explain back to you how and when they will take the pills, so that you can check that they have understood and remembered your advice. It is also useful to provide written instructions and to include the person’s spouse or partner if they have one (with the patient’s express consent) so that the spouse or partner can help with reminding.

For the recommended starting regimen, it is suggested that this usually be taken as:

<table>
<thead>
<tr>
<th>Time</th>
<th>Medication</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.m.</td>
<td>zidovudine 300 mg plus lamivudine 150 mg with breakfast</td>
<td></td>
</tr>
<tr>
<td>p.m.</td>
<td>zidovudine 300 mg plus lamivudine 150 mg plus efavirenz 600 mg with dinner, about 12 hours after breakfast</td>
<td></td>
</tr>
</tbody>
</table>

It is critically important to explain the likely side effects so that the person knows what to expect and does not interrupt therapy out of concern if and when they experience any of those side effects. For the recommended regimen, the following explanations are particularly important:

There is a high chance that the person will experience some light-headedness, dizziness, drowsiness and/or insomnia or will generally feel strange (usually after the first few doses of efavirenz). These sensations are likely to improve after a few days.
There is a reasonable chance that the person will experience some nausea or headache or both (in relation to the zidovudine). The nausea will be minimised by always taking the tablets with food. If it occurs at other times in the day, a small snack will sometimes help. These symptoms, if they occur, can sometimes take several weeks to settle but will almost always be gone by six weeks from starting therapy.

There is some risk that the person will experience anaemia (which can be explained as a fall in the number of red cells in the blood) as a result of the zidovudine. This condition could make the person feel tired or could even have serious consequences. For this reason it is important that the person’s haemoglobin is well within normal range before initiating therapy, and that they return for follow-up tests when requested and report any new symptoms to the prescribing doctor.

There is a small chance that the person will develop an allergic reaction to one of the drugs, resulting in a skin rash or other symptoms. If this occurs, they should seek urgent help from the core HIV care team.

As part of this explanation, it should be emphasised that there is often a lot that can be done to manage side effects so the person should not ‘suffer in silence’. Instead, they should seek help from the core HIV care team earlier than planned if needed.

Zidovudine-related headache, for example, will usually respond to simple analgesics and, to manage nausea, an antinauseant given half an hour before the dose can be useful in the short term. If the person experiences severe and persistent central nervous system side effects from efavirenz, it can sometimes be useful to move the dose from dinner time to bed time temporarily, though this alternative regimen has the disadvantage of needing to remember three dosing points in the day rather than two. Efavirenz is absorbed more slowly when given away from food, which can sometimes reduce the severity of the side effects. For people who experience insomnia as a result of efavirenz, it can sometimes be helpful to move the dose to breakfast instead of dinner.

It is also important to warn people starting on antiretroviral therapy that they may experience a variety of symptoms in the first few weeks on therapy so that they may ‘feel worse before they feel better’ and that this is to be expected. For example, they may experience a renewed ‘flare’ of skin rashes that they have previously experienced. Explain that such an experience is a sign of the immune system recovering and responding to organisms in the skin that it has been unable to react to before (immune reconstitution syndrome). It is important for the person to realise that these effects are not adverse effects of the medication but encouraging signs of immune recovery. In addition, the person needs to appreciate that these experiences are likely to resolve spontaneously quite quickly, though specific treatment (such as steroid cream) can be provided if they are severe. Similarly, a person with anogenital or plantar warts should be warned that these could get worse in the short term as the immune system recovers and the body responds to wart virus already present in the skin.

Women of childbearing potential (and their partners, where appropriate) should be counselled on the importance of not becoming pregnant while taking the recommended first-line regimen. Appropriate contraception should also be provided (see also ‘Women with HIV who wish to become pregnant’ on page 36).
Blood should be taken just before a person starts antiretroviral therapy for measurement of haemoglobin, blood sugar and cholesterol and, where available, liver function tests. These results act as a baseline against which to compare tests undertaken during monitoring. Where viral load testing is available through referral to a reference laboratory, a sample should also be taken for this test just before treatment begins.

**Monitoring people taking antiretroviral therapy**

When a person starts on antiretroviral therapy, it is important that to give them information about who to contact if they need help urgently in the first few days of treatment. It is a good idea to telephone or have a team member visit them (with their consent) the following day to ensure that all has gone well with the first doses and provide reassurance about side effects if necessary.

The person should then be reviewed in the clinic at one week and two weeks from starting therapy. At these visits, enquire about any side effects that the person has experienced and take blood for haemoglobin testing.

It is also important to ask about adherence to therapy. However, ask in a way that embodies the spirit of partnership central to HIV care and that allows the patient to be honest without fearing disapproval.

**Rather than the accusing question:**

You haven’t missed any pills, have you?

**you might say something like:**

I know how hard it can be to take every one of the pills without missing any.

How have you been going with that?

A further review should be undertaken at one month from starting antiretroviral therapy. At this time, blood can be drawn for a repeat viral load test if it is available, as well as for haemoglobin measurement. It can be expected that by one month the viral load should have been reduced to less than a tenth of what it was before therapy (at least a ‘one-log’ reduction, e.g. from 100,000 to less than 10,000 copies per millilitre; or from 30,000 to less than 3000 copies per millilitre). If this reduction is not seen, it is important to enquire (carefully, as described above) about whether the person has adhered to therapy or whether the treatment has been interrupted for some reason. The patient will not always volunteer this information unless gentle enquiries are made on the basis of the viral load result.

The frequency of clinical review after the first month is at the discretion of the care team. Many Pacific Island care teams review their patients monthly to ensure that they remain in close contact, and they provide a month’s supply of medication at a time. For patients who live further from the centre, especially on outer islands, it is reasonable to review them only every three months, once the pattern of treatment adherence is firmly established. At each review the patient’s history is taken and examination conducted as described under ‘Monitoring people with HIV not yet taking antiretroviral therapy’ (page 25).
Haemoglobin should be measured every three months for the first year of therapy that includes zidovudine, or earlier than a scheduled measurement if the patient has symptoms or signs suggestive of anaemia.

Where it is available, the viral load should be measured every three months. By three months from the time of starting antiretroviral therapy, it is expected that the viral load should be below 400 copies of virus per millilitre and by six months it should be below the limit of detection of the test (which may be as low as 50 copies per millilitre). If these targets are not achieved, make further gentle enquiries about adherence and seek advice from a more experienced colleague through the OSSHHM network.

CD4 counting is also valuable during immune recovery. If it is available, it should be performed every three months until the count has been over 500 cells per microlitre for two consecutive tests. Thereafter it need only be performed once a year provided the viral load remains below the limit of detection.

Drug substitution for toxicity
Where a person on the recommended first-line regimen experiences severe, persistent clinical toxicity, it may be necessary to substitute one of the drugs in the regimen with an alternative (see Table 2). OSSHHM recommends seeking advice from more experienced practitioners, whenever practicable, through the OSSHHM network before making such a substitution.

More information on drug substitution for toxicity is available in the WHO guidelines. Decisions in these scenarios can be difficult and it is recommended that they be undertaken in full partnership with the patient and with advice from more experienced colleagues through the OSSHHM network.

Table 3 shows common side effects of antiretroviral therapy.

Table 2: Possible substitutes for drugs causing severe, persistent clinical toxicity

<table>
<thead>
<tr>
<th>Common toxicity</th>
<th>Drug causing it</th>
<th>Alternate substitute</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent anaemia (&lt;6.5 g/dl)</td>
<td>Zidovudine</td>
<td>Abacavir or tenofovir</td>
<td>Both of these alternate drugs are quite expensive and it is preferred to reserve them for a second-line regimen. Long-term use of stavudine is associated with high incidence of lipodystrophy. To avoid this outcome, it is sometimes recommended to substitute stavudine for a defined period (usually 12 months) and then substitute back to zidovudine (when the bone marrow may have recovered) with close monitoring of the haemoglobin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stavudine (40 mg twice daily unless the patient’s weight is below 60 kg, in which case 30 mg twice daily)</td>
<td></td>
</tr>
<tr>
<td>Central nervous system symptoms such as hallucinations or frank psychosis</td>
<td>Efavirenz</td>
<td>Nevirapine</td>
<td>Nevirapine should only be used if the patient’s CD4 count is low (below 400 for males or below 250 for females).</td>
</tr>
</tbody>
</table>
Table 3: Common side effects of antiretroviral therapy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Adverse events</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Abacavir    | • Hypersensitivity syndrome (fever, myalgia, malaise, nausea, vomiting, symptoms suggestive of upper respiratory tract infection, anorexia); symptoms progressively worsen with each subsequent dose; rash occurs in about half of cases  
• Rash  
• Headache, nausea, vomiting, diarrhoea | • Hypersensitivity reaction usually occurs in the first six weeks of treatment.  
• Hypersensitivity reaction may be more severe with once-daily abacavir dosing.  
• Risk of hypersensitivity is related to certain genetic factors, particularly HLA B 5701; consider screening for this before prescribing abacavir.  
• Counsel patients on signs of hypersensitivity syndrome.  
• In case of hypersensitivity syndrome, abacavir must be discontinued permanently. |
| Emtricitabine | • Headache, nausea, insomnia  
• Hyperpigmentation of palms and soles (occurs most frequently in dark-skinned people) | • Active against hepatitis B virus (not approved by the US Food and Drug Administration (FDA) for treatment of hepatitis B). In patients with HIV and hepatitis B co-infection, hepatitis may flare on discontinuation of emtricitabine.  
• Adjust dosage for renal insufficiency or failure. |
| Lamivudine  | • Headache, dry mouth | • Adverse effects are infrequent.  
• Active against hepatitis B virus. In patients with HIV and hepatitis B co-infection, hepatitis may flare on discontinuation of lamivudine.  
• Adjust dosage for renal insufficiency or failure. |
| Stavudine   | • Peripheral neuropathy  
• Pancreatitis  
• Dyslipidemia  
• Diarrhoea | • Of the NRTIs, stavudine appears to convey the greatest risk of lipodystrophy and other mitochondrial toxicity.  
• Risk of lactic acidosis and hepatic steatosis increases when combined with didanosine; this combination should be avoided when possible, especially during pregnancy.  
• Risk of peripheral neuropathy increases when combined with didanosine.  
• Consider dosage adjustment for peripheral neuropathy.  
• Adjust dosage for renal insufficiency or failure. |
| Tenofovir   | • Flatulence, nausea, diarrhoea, abdominal discomfort  
• Asthenia  
• Acute renal insufficiency, Fanconi syndrome  
• Chronic renal insufficiency | • Active against hepatitis B but not FDA approved for treatment of hepatitis B. In patients with HIV and hepatitis B co-infection, hepatitis may flare on discontinuation of tenofovir.  
• Gastrointestinal symptoms may be worse in lactose-intolerant patients; tenofovir is formulated with lactose.  
• There are case reports of renal insufficiency; association between tenofovir and renal insufficiency is not clear.  
• Adjust dosage for renal insufficiency or failure. |
| Zidovudine  | • Anaemia, neutropenia  
• Fatigue, malaise, headache  
• Nausea, vomiting  
• Myalgia, myopathy | • Twice-daily dosing is preferred over thrice-daily dosing.  
• Fatigue, nausea, headache and myalgia usually resolve two to four weeks after initiation. |
<table>
<thead>
<tr>
<th>Drug</th>
<th>Adverse events</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Hyperpigmentation of skin and nails</td>
<td>• Adjust dosage for renal insufficiency or failure.</td>
</tr>
<tr>
<td></td>
<td>• Non-nucleoside reverse transcriptase inhibitors</td>
<td></td>
</tr>
<tr>
<td>Efavirenz</td>
<td>• Elevations in liver function tests</td>
<td>• Central nervous system symptoms are common; severity usually decreases within two to four weeks.</td>
</tr>
<tr>
<td></td>
<td>• Abnormal dreams, drowsiness, dizziness, confusion</td>
<td>• It is teratogenic in animal studies; contraindicated during pregnancy and for use by women who may become pregnant.</td>
</tr>
<tr>
<td></td>
<td>• Hyperlipidemia</td>
<td></td>
</tr>
<tr>
<td>Nevirapine</td>
<td>• Elevations in liver function tests, hepatitis, liver failure</td>
<td>• Initial dose of 200 mg per day for first 14 days, then 200 mg twice daily, decreases frequency of rash.</td>
</tr>
<tr>
<td></td>
<td>• Most rash develops within first six weeks of therapy; rash is most common in women.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hepatotoxicity may be life threatening. It is more common at higher CD4 cell counts, in women and in patients with hepatitis B or C. Nevirapine should not be initiated for women with CD4 counts of &gt;250 cells/µL or men with CD4 counts of &gt;400 cells/µL, unless the benefit clearly outweighs the risk. Monitor liver tests closely for the first 16 weeks of treatment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Protease inhibitors</td>
<td></td>
</tr>
<tr>
<td>Lopinavir/ritonavir</td>
<td>• Diarrhoea, nausea, vomiting, Dyslipidemia, Elevations in liver function tests</td>
<td>• Available in tablets or oral solution. Tablets do not require refrigeration. Oral solution contains 42 per cent alcohol. Avoid combining oral solution with metronidazole or disulfiram. Alcohol in the oral solution may cause disulfiram-like reaction.</td>
</tr>
<tr>
<td></td>
<td>• Taste perversion</td>
<td></td>
</tr>
<tr>
<td>Ritonavir</td>
<td>• Nausea, vomiting, diarrhoea, abdominal pain, Elevations in liver function tests</td>
<td>• Capsules are stable at room temperature for up to 30 days. Avoid combining oral solution with metronidazole or disulfiram. Alcohol in the oral solution may cause disulfiram-like reaction. It has significant interactions with many other medications.</td>
</tr>
<tr>
<td></td>
<td>• Fatigue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Circumoral or peripheral numbness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Taste perversion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hyperuricaemia</td>
<td></td>
</tr>
</tbody>
</table>

Source: United States Department of Health and Human Services Panel on Antiretroviral Guidelines for Adults and Adolescents

Women with HIV who wish to become pregnant

Efavirenz is contraindicated in the first trimester of pregnancy because of an excess of birth defects, namely neural tube defects, observed in the babies of some women taking the drug. For this reason, it is vital to counsel women taking efavirenz about this concern and to provide them with appropriate and effective means of contraception. As discussed on pages 44–45 of the WHO guidelines,^7^ medroxyprogesterone acetate depot injection (Depo-Provera) is probably the most appropriate contraceptive choice for women on antiretroviral therapy.

Where a woman taking the standard regimen wishes to become pregnant, OSSHHM recommends temporarily substituting efavirenz with a protease inhibitor (preferably lopinavir/ritonavir 400 mg/100 mg twice daily with food) from the time that a decision to become pregnant is made.
Once the pregnancy reaches the end of the first trimester, efavirenz may be substituted back. For most women taking the recommended regimen who wish to become pregnant, nevirapine is not a suitable substitute because it is contraindicated in women with CD4 counts higher than 250 cells per microlitre. Because women in this scenario will usually have been on antiretroviral therapy for some time, they are very likely to have a CD4 count above this threshold.

Where a woman taking efavirenz is discovered to be pregnant, the dates of the pregnancy should be assessed rapidly, utilising ultrasonography if there is any doubt.

If the pregnancy is early in the first trimester then consider substituting lopinavir/ritonavir for efavirenz. If the pregnancy has passed or is about to pass the end of the first trimester, then drug substitution is not indicated as the period of concern will already have passed. In this last scenario, counsel the parents again about the risk of teratogenicity (this information should already have been provided when the therapy was initiated) and consider the options regarding the continuation of the pregnancy, where options are available under the laws of the country concerned.

**Antiretroviral therapy failure and second-line regimens**

The best chance to achieve durable and effective antiretroviral therapy is when treatment is first initiated. For this reason, the importance of careful assessment and preparation of the patient (see Box 8 on page 28) cannot be overemphasised.

The WHO guidelines provide detailed advice on how to identify antiretroviral therapy failure by clinical, immunological and virological means, as well as on how to manage this outcome.7 pp 34–43

It is expected that relatively few people will be treated for HIV in the small island countries and territories of the Pacific in the foreseeable future, and fewer still will experience antiretroviral therapy failure. For this reason, OSSHHM recommends undertaking individualised assessment, with advice from more experienced clinicians, whenever antiretroviral therapy failure is suspected in patients in the region. This assessment will involve the use of viral load tests conducted at reference laboratories, as well as careful and sensitive assessment of the patient’s prior adherence and the factors that have influenced it.

Similarly, OSSHHM recommends that where second-line regimens are required for people experiencing definite antiretroviral failure, these should be individualised on the basis of expert advice and, where possible, genotypic resistance testing conducted in a reference laboratory.

In general terms, second-line regimens are likely to include a ritonavir-booster protease inhibitor (most often lopinavir), with two carefully-selected nucleoside drugs.
Preventing HIV transmission from mother to child

In 2006 WHO published the guidelines Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants in resource-limited settings – Towards Universal Access. These guidelines build on earlier United Nations agency policy that recommends a four-pillared approach to the prevention of HIV infection in infants:

1. primary prevention of HIV infection in adults, especially women of childbearing potential;
2. prevention of unintended pregnancy in women living with HIV;
3. prevention of HIV transmission from mothers living with HIV to their infants; and
4. development of effective systems for the care, treatment and support of mothers living with HIV, their children and families.

A regional consultation on the prevention of mother-to-child transmission in the Pacific was conducted by the United Nations Children’s Fund (UNICEF) in Suva in April 2007. It identified a fifth area of focus (which could also be considered a particularly important aspect of the first pillar):

5. prevention of HIV infection in women who are already pregnant.

The promotion and ready availability of counselling and HIV testing (with fully informed consent) for women who are pregnant is an important overarching strategy because, without it, pillars 3 and 4 cannot be implemented. The counselling associated with antenatal testing also provides an opportunity to address pillar 5, especially if regular male partners of antenatal women (where they have them) are invited to undergo HIV testing at the same time.

OSSHHM endorses this enhanced comprehensive approach to the prevention of HIV infection in infants. These efforts should include a particular focus on the gendered aspects of Pacific social structures that increase the risk to women and the increased vulnerability to HIV acquisition associated with the extreme rates of other sexually transmissible infections (see ‘Managing sexually transmitted infections’ on page 62).

The prevention of unintended pregnancy in women with HIV has already been underlined in these recommendations in relation to the potential teratogenicity of the recommended first-line antiretroviral regimen for the region (see ‘Women with HIV who wish to become pregnant’ on page 36). OSSHHM emphasises that all people living with HIV should be engaged with regular clinical follow-up and that this follow-up should include provision of appropriate and effective contraceptive measures for positive women of childbearing potential who do not expressly wish to become pregnant.

Counselling and testing for HIV and other STIs among pregnant women and their male partners

WHO’s recently published Guidance on provider-initiated HIV testing and counselling does not definitively recommend that HIV testing be routinely offered to women who are pregnant in communities with low HIV prevalence or concentrated epidemics. OSSHHM recommends that all women who are pregnant should be routinely counselled on HIV and offered an HIV antibody test with fully informed consent. The test should be offered as early
as possible in pregnancy. Ideally the regular male partners of pregnant women should also be provided with counselling and offered testing at the same time. Women with identified high risk of HIV transmission at booking should be re-tested for HIV serology around 36 weeks of gestation.

Additionally, very high rates of other sexually transmissible infections were documented among antenatal women in Second Generation Surveillance studies undertaken in six Pacific Island countries in 2004. For this reason, OSSHHM recommends also offering serological testing for syphilis and hepatitis B, and nucleic acid testing for gonorrhoea and chlamydia to pregnant women (and, where possible, their regular male partners) as a routine part of antenatal care (see also ‘Managing sexually transmitted infections’ on page 62). Where other sexually transmitted infections are diagnosed, they should be appropriately treated.

Managing women who have a reactive HIV screening test during pregnancy

It is important to emphasise that some women who have a reactive screening test for HIV during pregnancy may not, in fact, have HIV but may be showing false positive on the screening test.

Thus it is critical to manage reactive screening test results very carefully. The aim must be both to minimise the potential trauma to the woman and her family and to still ensure that optimal precautions are taken to minimise the risk of HIV transmission to the infant if the woman is really HIV infected (see ‘Diagnosing HIV infection’ on page 13 and, especially, ‘Reactive HIV screening tests and confirmatory testing’ on page 14).

All reactive screening test results should be discussed with the leader (or acting leader) of the core HIV care team in the country, territory or health area immediately (before any result is given to the requesting clinician or the person tested). Due consideration should be given to confidentiality in this discussion. The current leaders of core HIV care teams are listed in Appendix 13.

OSSHHM recommends that laboratories immediately send the original specimen for confirmatory testing in a reference laboratory. This result should be available within a week, provided the optimal means of transport and reference laboratory protocols are utilised. The OSSHHM network and regional laboratory support officers should be utilised to overcome any barriers operating against the transporting of the specimen on the next scheduled flight and its urgent testing at the reference laboratory.

The action to be taken while awaiting confirmation depends on the dates of the pregnancy. These dates must be accurately and urgently established, utilising ultrasonography if there is any doubt.

If the pregnancy is at less than 30 weeks of gestation, it is reasonable to wait for confirmation before taking any urgent action beyond ensuring the usual good antenatal care for the mother. The mother should be counselled about the reactive specimen and the confirmation process according to the algorithm on page 148.

If the pregnancy is at more than 30 weeks of gestation, then the mother should be carefully counselled according to the recommendations on page 14. Additionally, she should be told
that, because of the potential risk to the baby if the result turns out to be correct, it is strongly advised that action be taken in case the result is true.

If the woman accepts this proposal, then antiretroviral therapy should be initiated and action taken as if the woman were definitely known to have HIV, following the approach described below. If the confirmatory testing is unequivocally negative, then the antiretroviral therapy can be discontinued once this result is known. OSSHHM emphasises the importance of utilising support from more experience clinicians through the OSSHHM network before a judgement is made that a confirmatory test is unequivocally negative. If there is any doubt, the antiretroviral therapy should be continued and a second specimen tested.

**Antiretroviral therapy for the mother**

All of the international guidelines reviewed recommend full combination antiretroviral therapy for women who are pregnant and require antiretroviral therapy at the time of assessment for the maintenance of their own health. The guidelines differ, however, on the best option for women with early HIV disease who are pregnant but may not require antiretroviral therapy for several years in relation to their own health.

The British HIV Association guidelines recommend that women in this situation

May be treated with a short-term antiretroviral therapy (START) commencing in the 2nd trimester with standard (‘highly active’ antiretroviral therapy) regimens with the intention to achieve undetectable viral loads of <50 copies per ml prior to delivery.\(^8\)

This approach recognises that it may be appropriate to discontinue this treatment after delivery (or after breastfeeding, if it is undertaken).

The United States guidelines recommend that:

Standard combination antiretroviral regimens for treatment of HIV-1 infection should be discussed and should be offered to all pregnant women with HIV-1 infection regardless of viral load;

and state specifically that:

When initiation of antiretroviral therapy is considered optional on the basis of current guidelines for treatment of nonpregnant persons, infected pregnant women should be counselled regarding the benefits of standard combination therapy for foetal protection and should be offered such therapy.\(^11\)

In its guidelines Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants in resource-limited settings – Towards Universal Access, WHO recommends the general use of less intensive prophylactic regimens, rather than combination antiretroviral therapy, for pregnant women with HIV who do not yet require treatment for their own health.\(^12\)

OSSHHM recognises that the most significant risk factor for mother-to-child transmission antenatally, perinatally and during breastfeeding (if it is undertaken) is the HIV viral load of the mother. There is no doubt that the most effective way to reduce maternal viral load is with full antiretroviral therapy.
The risk of developing antiretroviral resistance during the 12 weeks of zidovudine monotherapy associated with prophylactic regimens appears to be low in women with low viral loads (hence the references to 1000 copies per millilitre in the United States guidelines and 10,000 copies per millilitre in the British guidelines). Most Pacific small island settings do not yet have ready access to viral load testing, however, and so will be unable to ensure (without a prolonged delay) that the prophylactic approach is not being used in women for whom this risk is substantial.

Further, apart from the concern about the use of efavirenz in the first trimester of pregnancy already considered, there is no evidence at present – despite the use of the recommended antiretroviral drugs in a large number of pregnancies – to indicate that these drugs are harmful to the foetus or neonate.

OSSHHM advocates discussing with pregnant women with HIV in Pacific Island countries and territories the full range of options for the use of antiretroviral drugs to prevent mother-to-child transmission, including the advantages and disadvantages of each approach. However, on the balance of the evidence, OSSHHM believes that all women with HIV who are pregnant should be recommended to begin standard antiretroviral therapy as soon as possible after the end of the first trimester of pregnancy (see ‘What to start: which medications are recommended for first-line therapy?’ on page 28).

Women who are already taking antiretroviral therapy when they become pregnant should continue it. However, if the pregnancy is discovered early in the first trimester, consider substituting efavirenz as discussed under ‘Women with HIV who wish to become pregnant’ (page 364).

Women commencing antiretroviral therapy because they are pregnant require the same preparation and assessment as everyone starting treatment (see the Box 8 on page 27). It is important, however, that the woman and her core HIV care team consider the welfare of the foetus as well as the mother in reaching a conclusion about whether antiretroviral therapy should be commenced.

If a woman elects to undertake exclusive breastfeeding rather than exclusive substitute feeding (see ‘Infant feeding choices’ on page 43), OSSHHM recommends that standard antiretroviral therapy is continued at least until all breastfeeding has stopped.

If a woman has commenced antiretroviral therapy solely because she was pregnant and her antepartum clinical status indicates that she may not require antiretroviral therapy for her own health for several years, consider stopping antiretroviral therapy after the risk of mother-to-child transmission has passed. If stopping it is anticipated, this step should be discussed with the woman and planned before antiretroviral therapy begins.

If antiretroviral therapy is stopped after delivery or at the end of breastfeeding, measures should be taken to avoid a period of effective monotherapy caused by stopping drugs with different half-lives at the same time. Seek expert advice through the OSSHHM network so that the latest evidence can be considered with regard to stopping the regimen safely. At the time of writing, the best option is probably to:
Substitute lopinavir/ritonavir (400 mg/100 mg twice daily with food) for the efavirenz for a period of one month, and then discontinue the zidovudine, lamivudine and lopinavir/ritonavir simultaneously.

If the woman is early in her HIV infection and has decided not to breastfeed her infant, and it is known, or it is reasonable to assume, that her viral load is low, consider utilising the prophylactic regimen recommended in the WHO guidelines Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants in resource-limited settings – Towards Universal Access. Namely:

| 300 mg zidovudine twice daily starting at 28 weeks or as soon as possible thereafter and continued until seven days postpartum |
| 150 mg lamivudine at the onset of labour and every 12 hours thereafter for seven days |
| 200 mg nevirapine as a single dose at the onset of labour.¹² |

If combination antiretroviral therapy (or zidovudine as part of the prophylactic regimen described above) was instituted for at least a month prior to elective caesarean section or the onset of labour, then additional intrapartum antiretroviral drugs are not indicated.

For women who are diagnosed HIV positive late in pregnancy, or are known to be HIV positive but present late in pregnancy, standard antiretroviral therapy should be instituted as soon as possible. Additionally, a single dose of 200 mg nevirapine should be given orally at the onset of labour or (with a sip of water only) two hours before elective caesarean section is commenced.

For women who have a reactive HIV screening test during labour, or women who are known to be HIV positive but present in labour with no prior antenatal care or antiretroviral therapy, the following regimen should be given (orally) as soon as possible:

| 600 mg zidovudine (2 x 300 mg) |
| 150 mg lamivudine |
| 200 mg nevirapine (if nevirapine is not available, 600 mg efavirenz can be used) |

followed by:

| 300 mg of zidovudine and 150 mg lamivudine 12 hours later and then continued twice daily |
| 600 mg efavirenz 24 hours after the initial doses and continued once daily. |

Mode of delivery

The current WHO guidelines make little reference to the mode of delivery but they build on earlier advice that recommended elective caesarean section for in settings where it can be conducted safely.¹⁴ Similarly, the United States¹¹ and British⁸ guidelines generally recommend elective caesarean section at 38 weeks of gestation and OSSHHM endorses this recommendation.
The capacity of Pacific small Island countries and territories to provide elective caesarean section services with a low complication rate is thought to vary. OSSHHM recommends that, in discussing delivery options with pregnant women with HIV, clinical judgement is exercised to determine whether the additional benefit gained from elective caesarean section is outweighed by the potential risks of the procedure in a particular setting.

The evidence suggests that the benefit of caesarean section in reducing mother-to-child transmission is only seen if the procedure is undertaken electively. If labour begins prior to a planned elective caesarean section, and especially if the membranes have ruptured, it is recommended that the woman have a normal vaginal delivery. There is, however, a clear association between prolonged rupture of membranes and mother-to-child transmission. Thus it is important in this situation that the labour is carefully monitored using partography to ensure that it is progressing well. In the case of prolonged or obstructed labour, OSSHHM recommends undertaking emergency caesarean section earlier rather than later.

Although the evidence is lacking, common sense dictates that routine episiotomy, the use of scalp electrodes and foetal blood sampling should be avoided during vaginal delivery of women with HIV. Similarly, instrumental delivery should be avoided where possible in favour of emergency caesarean section.

### Antiretroviral prophylaxis for the infant

In common with the WHO and other guidelines,\(^7,8,11\) OSSHHM recommends the administration of prophylactic antiretroviral drugs to newborn infants. The aim of this treatment is to prevent any viruses that may have been acquired during birth from leading to established HIV infection in the infant.

Where the mother has received at least a month of antiretroviral therapy prior to the birth, the following regimen is recommended for the baby:

- 2 mg/kg nevirapine oral suspension immediately postpartum (single dose),
- and
- 4 mg/kg zidovudine twice daily for seven days.

Where the mother has not received antiretroviral therapy for at least a month antepartum, it is recommended that the zidovudine is continued for four weeks instead of just seven days.

### Infant feeding choices

Both the United States\(^11\) and British\(^8\) guidelines recommend that women with HIV avoid breastfeeding because of the well-recognised risk of post-natal mother-to-child transmission of HIV by this means. There is, however, considerable evidence to suggest that infants who are substitute-fed in resource-poor countries are at significantly increased risk of mortality (secondary to malnutrition and water-borne infections) compared with their breastfed peers.\(^15\)

Given that the goal of interventions to prevent mother–to-child transmission of HIV is HIV-free infant survival, the advantages and disadvantages of breast versus substitute feeding
need to be carefully considered in providing advice to mothers with HIV in the Pacific Island region.

Current WHO guidance on this issue recommends that:

When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breastfeeding by HIV-infected women is recommended.¹²

There is accumulating evidence to suggest that exclusive breastfeeding (giving only breastmilk with exclusion of all other fluids and solids) is associated with a substantially lower risk of transmission than mixed feeding. For this reason, the WHO guidance suggests that:

Exclusive breastfeeding is recommended for HIV-infected women for the first 6 months of life unless replacement feeding is acceptable, feasible, affordable, sustainable and safe for them and their infants before that time.¹²

The final choice about infant feeding is, of course, up to the parents of the child. Clinicians will need to exercise professional judgement about the extent to which substitute feeding would be ‘acceptable, feasible, affordable, sustainable and safe’ in the particular circumstances when making recommendations in this area.

OSSHHM strongly recommends counselling parents about the increased transmission risks associated with mixed feeding. Further, it recommends providing them with support, encouragement and material assistance to maintain either exclusive formula feeding or exclusive breastfeeding according to the parents’ circumstances and choice.

Other possible options in relation to infant feeding for mothers with HIV include:

- exclusive ‘wet nursing’ by another woman who is known not to have HIV and who is able to practise abstinence or 100 per cent condom use; and
- home pasteurisation of breastmilk.

There is not yet strong evidence to support either of these practices. However, information about their use may be obtained from colleagues through the OSSHHM network.

Caring for infants born to mothers with HIV

Establishing definitively whether an infant has acquired HIV from their mother is complex (see ‘Diagnosing HIV in the infants of mothers living with HIV’ on page 19). Even if they have not acquired HIV themselves, babies born to mothers living with HIV are at risk of adverse outcomes for a number of other reasons:

- If they are substitute-fed, they will be at increased risk of gastroenteritis, respiratory infections and other adverse outcomes because they are deprived of the recognised health benefits of breastfeeding;
- If the mother is ill, she may have difficulty caring for the infant appropriately;
- The family may be economically vulnerable due to illness or death of adult relatives.
It is important that health care teams closely monitor these babies. They should give particular attention to feeding, growth, the development of diarrhoea and other conditions such as respiratory infections and otitis media. OSSHHM recommends that infants born to mothers with HIV receive specific prophylaxis for Pneumocystis pneumonia as follows, from the age of six weeks until it is definitively established that they have not been HIV infected (see ‘Diagnosing HIV in the infants of mothers living with HIV’ on page19):

<table>
<thead>
<tr>
<th>150 mg/m² trimethoprim daily</th>
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<tbody>
<tr>
<td>and</td>
</tr>
<tr>
<td>750 mg/m² sulphamethoxazole daily, given as co-trimoxazole oral solution.</td>
</tr>
</tbody>
</table>

Any intercurrent illnesses should be treated vigorously. In this regard, the family should be counselled on the importance of seeking medical help early in the case of diarrhoea or other significant symptoms in the infant.

Occasionally it will be appropriate to consider the initiation of combination antiretroviral therapy in infants who are failing to thrive and who exhibit signs suggestive of HIV infection even when the diagnosis has not yet been definitively established.

**Antiretroviral therapy in infants**

Where antiretroviral therapy is indicated for infants, it is essential to initiate them on three antiretroviral drugs simultaneously to avoid the development of viral drug resistance. The following regimen is generally recommended, but OSSHHM strongly recommends that practitioners seek advice from more experienced colleagues through the OSSHHM network before initiating antiretroviral therapy in infants:

<table>
<thead>
<tr>
<th>4 mg/kg zidovudine twice daily</th>
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</thead>
<tbody>
<tr>
<td>4 mg/kg lamivudine twice daily</td>
</tr>
<tr>
<td>4 mg/kg nevirapine once daily for the first 14 days followed by 7 mg/kg twice daily thereafter.</td>
</tr>
</tbody>
</table>
Managing potential exposures to blood-borne viruses including HIV in health care settings\textsuperscript{IX}

Health care workers can experience incidents during the course of their employment that involve contact with blood or body substances. Such exposures may put the person at risk of acquiring a blood-borne infection.

Adherence to standard infection control practices is the first line of protection for health care workers against occupational exposure to HIV and other blood-borne viruses such as hepatitis B virus (HBV) and hepatitis C virus (HCV).

These concerns are pertinent to all people who may be in a health care setting. These include clinical staff and students, non-clinical staff (administrators, housekeeping staff, laundry staff and maintenance workers), laboratory staff, volunteers, private contractors, consultants and visitors.

Prevention of occupational exposures

Prevention of exposure through safer practices, barrier precautions and other methods is the most effective strategy to reduce the risk of infection with HIV and other blood-borne pathogens in health care settings.

There are three significant priorities in prevention:

1. All health care workers need to be trained, and be able to demonstrate competency, in the implementation of standard precautions;\textsuperscript{X}

2. All staff need to be provided with the necessary materials and protective equipment;

3. Operational protocols and systems at health care facilities should be designed and refined to minimise the risk of occupational exposure.

OSSHHM recommends defining these priorities and articulating them in infection control policies and guidelines for every health care facility.

Health care workers should also be knowledgeable about the risks of acquiring HIV and HBV sexually. They should have ready access to condoms, as well as confidential HIV and STI counselling, testing and treatment counselling services.

Practices to reduce the incidence of occupational exposures include:

- not recapping needles;
- not disconnecting needles from syringes after use;
- always transporting sharp objects in a kidney dish or puncture proof container;
- always placing used sharps in puncture proof containers for proper disposal (preferably by incineration);

\textsuperscript{IX} This section is based on guidelines developed for workers involved in the first round of Second Generation Surveillance studies in the Pacific Island region, supported by the Global Fund.

\textsuperscript{X} Standard precautions were formerly known as ‘Universal Precautions’.
• ensuring sharps containers are readily available in the immediate vicinity of where sharp instruments are used; and
• not placing sharps containers on the floor or low surfaces where they may be accessed by young children.

Systems for management of occupational exposures

OSSHHM recommends that health care employers ensure that:

• an efficient local system is established for reporting and managing potential exposures of health care workers to blood and body substances;
• confidentiality of injured health care workers is maintained;
• expert advice is available to all health care workers 24 hours a day and processes are in place to facilitate rapid assessment, which is essential to ensure timely administration of specific prophylaxis if appropriate; and
• all occupational exposures are fully documented to ensure that procedures can be reviewed and strengthened.

Risks of transmission associated with particular occupational exposures

Occupational exposures include:

• percutaneous injuries or cuts with used instruments (such as solid or hollow bore needles or scalpel blades) involving blood or other body substances;
• contamination of fresh cuts or abrasions with blood or other body substances; and
• contamination of the eyes or other mucous surface with blood or other body substances.

From the pooled data from several studies of health care workers exposed to HIV in the workplace, it appears that the risk of HIV transmission after percutaneous exposure to HIV-infected blood is approximately 0.3 per cent.16

The following exposure characteristics are associated with relatively higher levels of risk:

• a deep injury;
• visible blood on the ‘sharp’ device causing the injury;
• injury by a needle that has previously been used in the patient’s vein or artery; and
• the patient has a high viral load.11

The risk of transmission from a ‘sharp’ object contaminated with other infected body fluids or tissues is believed to be lower than for exposure to infected blood.

11 High viral loads are most likely to be present in people who are in the acute (recently infected) or late phases of HIV infection. Viral loads over about 30,000 copies per millilitre are generally considered ‘high’ for this purpose.
After a mucous membrane (eye, nose or mouth) exposure to HIV-infected blood, the risk is approximately 0.09 per cent.\textsuperscript{10}

For a person unvaccinated against HBV, the risk after percutaneous exposure is 23 to 37 per cent if the ‘source’ person is hepatitis B ‘e’ antigen (HBeAg) negative, and 37 to 62 per cent if the ‘source’ is HBeAg positive. Infection with hepatitis B is possible following mucous membrane exposure but has not been quantified.\textsuperscript{17}

The risk for HCV infection after percutaneous exposure to infected blood is approximately 1.8 per cent. Infection with HCV following mucous membrane exposure has not been quantified but is thought to be rare.\textsuperscript{11}

Managing occupational exposure – immediate steps

First aid

- After percutaneous exposure, wash injuries and cuts immediately and very thoroughly with soap and water, and then cover the wound with a dressing. If running water is not available, clean the site with an alcohol-based hand rub solution. Do not use any strong solutions, such as bleach or iodine, as these may irritate the wound and make the injury worse.
- Wash splashes to unbroken, intact skin immediately. If running water is not available, clean the site with an alcohol-based hand rub solution.
- Where there are splashes to the mouth or nose, spit or blow out the fluid immediately and then rinse the site thoroughly with water or saline and spit/blow out the fluid again. Repeat this process several times. Do not use soap or disinfectant in the mouth or nose.
- Irrigate splashes to the eyes with clean water, saline or sterile irrigation fluid. If wearing contact lenses, leave them in place while irrigating, then remove after the eye is clean and cleanse the lenses in the normal manner. Do not use soap or disinfectant in the eye.

Reporting

Immediately after applying first aid (as above), the health care worker should report the exposure to their supervisor or manager.

The supervisor should arrange immediate medical assessment of the health care worker and of the patient who is the ‘source’ of the exposure, if this is known.

Complete an exposure report, which should contain the following information:

- the name of the staff member involved;
- the area where the incident occurred, such as the ward, operating room or emergency room;
- a description of the incident;
- the name of the ‘source’ person whose blood or body substances were involved in the incident (if known); and
if the source of the blood is unknown, this must also be documented.

Send a copy of the exposure report to the institutional infection control professional. The exposed health care worker’s supervisor should be made aware of any risks or lapses in standard precaution procedures in a confidential, sensitive and non-judgemental way.

Medical assessment after occupational exposures

A medical risk assessment involves taking and recording the history and details of the occupational exposure to assess the risk of the exposed person acquiring HIV, HBV and HCV from the ‘source’ person. A trained professional should make this assessment immediately after first aid is attended, regardless of what time of day the occupational exposure occurs. Information to be examined during the assessment includes:

- date, time and location of the exposure;
- duty being performed at time of the exposure;
- how the exposure occurred;
- protective clothing, such as gloves, being worn at the time of the incident;
- nature of exposure such as percutaneous, mucous membrane, non-intact skin;
- type and volume of blood or other body fluids involved;
- duration of contact with blood or other body fluids;
- if the exposure was a sharps injury: the type of implement involved, whether it was visibly contaminated with blood, the depth of injury and whether bleeding occurred;
- if the exposure was a needle stick injury: the gauge of needle, size of syringe, purpose for which needle was used;
- if the exposure involved non-intact skin: the condition of skin;
- HIV, HBV and HCV status of the ‘source’ person (if known); and
- HBV immunity and vaccination history of the exposed person.

The exposure and the ‘source’ patient

- The exposure should be evaluated for its potential to transmit a blood-borne pathogen based on body substance and severity of exposure. Source identification and testing are only necessary if the results will change the clinical management of the exposed worker.
- If the exposure is assessed as having no or low risk of HIV transmission, then medication for post-exposure prophylaxis against HIV is not indicated. This applies regardless of whether the source person is known to be HIV positive or not. In low-risk exposures, testing of the source is not necessary.
- When testing of a ‘source’ patient of unknown status is appropriate, it should only occur with the person’s informed consent.
- The ‘source’ person should receive appropriate pre-test counselling and a plan for referral for care, treatment and support.
• Confidentiality must be maintained throughout the process.

**The exposed health care worker**

Medical assessment constitutes an emergency for the exposed health care worker. Assessment should include baseline tests on a venous blood specimen from the health care worker, with fully informed consent, to ascertain whether the exposed person was already infected with a blood-borne pathogen from previous exposure before the incident:

• Baseline testing should occur as soon as possible following exposure (after first aid has been completed), and certainly within 72 hours.
• Pre-test counselling for HIV should occur before any blood is taken for testing (see below).
• Baseline tests are usually HIV antibody, hepatitis B surface antigen (HBsAg) and surface antibody (HBsAb), as well as hepatitis C antibody where this test is available.
• The health care worker’s tetanus immunisation status should be considered.
• Follow-up re-testing for HIV, HBV and HCV (where available) should occur at six weeks, three months and six months.

Clinical evaluation and baseline testing of the exposed health care worker should proceed only after pre-test counselling and with informed consent. Pre-test counselling should always include:

• giving a realistic assurance of privacy and confidentiality;
• reviewing and, if necessary, further explaining HIV, HBV and HCV infection and their consequences;
• explaining testing, possible results and confirmatory testing;
• assessing risk related to past and current sexual and other behaviours, as well as any previous occupational exposures;
• assessing risk related to the occupational exposure in question;
• explaining the low transmission risk for HIV associated with occupational exposure;
• assessing anxiety level and coping mechanisms;
• obtaining informed consent for testing;
• obtaining informed consent for a pregnancy test (if indicated);
• planning for precautions while awaiting test results (and while taking post-exposure prophylaxis medication, if indicated), including consideration of safer sexual practices or abstinence, cessation of breastfeeding if lactating and any required modification of occupational duties (this would only be necessary for health care workers whose work includes exposure-prone procedures – that is, procedures that involve the use of sharp instruments in confined spaces such as the mouth, vagina, or the chest or abdominal cavities);
• providing information about the potential adverse effects of antiretroviral medications;
• addressing any other risks identified by sexual and behavioural history;
• arranging support while awaiting results, and while taking post-exposure prophylaxis medication (if indicated); and
• reviewing the sequence of events that preceded the exposure, and providing exposure risk reduction education in a sensitive and non-judgemental way.

Post-exposure prophylaxis for occupational exposure
Post-exposure prophylaxis (PEP) is treatment to reduce the likelihood of HIV, HBV and tetanus infection in health care workers after possible occupational exposure. There is no PEP available for HCV.

Post-exposure prophylaxis for HIV
There are no prospective trials to prove the effectiveness of PEP for HIV in humans. Our understanding of the pathogenesis of HIV infection suggests that antiretroviral drugs should further reduce the already low rate of infection following occupational exposure, provided treatment is initiated early enough. A retrospective case-control study suggested that the use of zidovudine is associated with a reduction in risk of approximately 80 per cent.18 Clinical trials of the use of antiretroviral drugs for prevention of mother-to-child transmission of HIV consistently demonstrate good efficacy following perinatal exposure, even in babies who do not receive treatment until after birth. Although these results are encouraging, protection of newborns is not absolute and the relevance of this situation to occupational exposure cannot be guaranteed.

PEP is certainly not 100 per cent effective. There have been several documented cases of HIV infection despite the use of PEP in this setting.

Where PEP is indicated, it should be offered immediately without waiting for the results of HIV testing from the ‘source’ of the exposure. PEP for HIV should be provided using a combination of two antiretroviral drugs as soon as possible after exposure to a ‘source’ person with confirmed HIV (or where it is medically likely that the ‘source’ person is infected with HIV). When the injury involves an increased risk of infection (an injury caused by a large-bore hollow needle, associated with a deep puncture, or caused by a device visibly contaminated with blood or a device that has been in a patient’s artery or vein), the regimen should be expanded to include a third antiretroviral drug.

Table 4 and Figure 2 below summarise current indications for HIV PEP.

Following occupational exposure in a health care worker that meets the criteria in Table 4, antiretroviral drugs for PEP may be provided according to the regimens prescribed in Table 5.

PEP should start as soon as possible after the injury or exposure, no later than 72 hours and, if possible, within 4 hours of exposure. In general, it is not recommended to start PEP when the exposure happened more than 72 hours ago.

Nevirapine should not be used for PEP because of a very substantial risk of skin and liver toxicity in people with normal immune function.
Routine use of three drugs is not recommended for all exposed people. The disadvantages of adding a third drug are that it increases the probability that adverse events will occur, further complicates antiretroviral drug adherence and reduces the chance that the full four-week course of PEP will be completed.

If prophylaxis is commenced and the ‘source’ person is subsequently determined to be HIV negative, antiretroviral drugs should be discontinued.

**Post-exposure prophylaxis for hepatitis B**

Childhood vaccination against HBV is included in the expanded programme of immunisation in Pacific Island countries and territories. OSSHHM recommends that health care institutions institute a programme to offer immunisation for HBV to all health care workers.

Laboratories in some Pacific Island countries and territories are unable to offer testing for HBV. Table 6 below summarises the recommended actions to protect health care workers against HBV after occupational exposure, where testing and hepatitis B immunoglobulin (HB Ig) are available.

Table 4: Indications for prophylaxis against HIV infection after percutaneous injury or mucosal exposure, according to infection status of the ‘source’ person

<table>
<thead>
<tr>
<th>Risk posed by exposure*</th>
<th>Infection status of the ‘source’ person**</th>
<th>Unknown status</th>
<th>Unknown ‘source’ person</th>
<th>HIV negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>HIV positive, class 1</td>
<td>Expanded (three-drug) PEP is recommended.</td>
<td>Generally PEP is not warranted but basic two-drug PEP can be considered if the ‘source’ person has risk factors for blood-borne virus infections.†</td>
<td>Generally prophylaxis is not warranted but basic two-drug prophylaxis can be considered in settings where it is likely that the ‘source’ may have had a blood-borne virus.</td>
</tr>
<tr>
<td></td>
<td>HIV positive, class 2</td>
<td>Expanded (three-drug) PEP is recommended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher</td>
<td>Expanded (three-drug) PEP is recommended.</td>
<td>Expanded (three-drug) PEP is recommended.</td>
<td>Generally PEP is not warranted but basic two-drug PEP can be considered if the ‘source’ person has risk factors for blood-borne virus infections.†</td>
<td>Generally prophylaxis is not warranted but basic two-drug prophylaxis can be considered in settings where it is likely that the ‘source’ may have had a blood-borne virus.</td>
</tr>
</tbody>
</table>

Notes:
* Injuries caused by solid needles and superficial injuries pose a lower risk of infection; those involving a large-bore hollow needle, a deep puncture, a device visibly contaminated with blood, or a needle used in a patient’s artery or vein pose a higher risk of infection. PEP with antiretroviral drugs is not indicated for contact between intact skin and blood or other body fluids contaminated by HIV.
** Class 1 HIV positive status is defined by asymptomatic HIV infection or, if known, a viral load <30,000 copies per ml; Class 2 HIV positive status is defined by symptomatic HIV infection, acute seroconversion illness, or a viral load >30,000 copies per ml.
† If the ‘source’ person has risk factors for HIV infection, prophylaxis is optional and should be based on an individualised decision made jointly by the exposed health care worker and the treating doctor.
Table 5: Antiretroviral regimens for post-exposure prophylaxis

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Doses</th>
<th>Principal adverse effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>zidovudine plus lamivudine</td>
<td>One 300 mg tablet twice daily for four weeks One 150 mg tablet twice daily for four weeks</td>
<td>Anaemia, neutropenia, nausea, headache, insomnia, muscle pain, weakness Abdominal pain, nausea, diarrhoea, rash, pancreatitis (all very rare)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Expanded PEP (for higher-risk exposure)</strong> Basic two-drug regimen plus</td>
</tr>
<tr>
<td>efavirenz</td>
<td>One 600 mg tablet at bed time for four weeks</td>
<td>Rash (including Stevens-Johnson syndrome), insomnia, somnolence, dizziness, trouble concentrating, abnormal dreaming; potentially teratogenic in 1st trimester of pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Expanded PEP (for higher-risk exposure in health care workers in the first trimester of pregnancy)</strong> Basic two-drug regimen plus</td>
</tr>
<tr>
<td>lopinavir/ritonavir</td>
<td>400 mg/100 mg twice daily for four weeks</td>
<td>Diarrhoea, nausea, abdominal pain, weakness, rash</td>
</tr>
</tbody>
</table>


Post-exposure prophylaxis for tetanus

Although exposure from discarded needles found in public places such as beaches are thought to pose a very low risk of blood-borne virus transmission, tetanus prophylaxis should be considered in these circumstances. Where the exposure constitutes a tetanus-prone injury, recommended prophylaxis depends on the exposed person’s past history of tetanus immunisation:

If it is less than five years since immunisation, then no tetanus immunoglobulin or tetanus toxoid is necessary.

If it is 5 to 10 years since immunisation, a tetanus toxoid or adult diphtheria immunisation and tetanus combined booster is recommended.

If it is longer than 10 years since immunisation, both tetanus immunoglobulin and tetanus toxoid or adult diphtheria and tetanus immunisation (in different limbs) are recommended.
Post-exposure prophylaxis for hepatitis C

Few Pacific small island countries and territories can currently test for hepatitis C and there is no HCV prophylaxis to offer at this time. Immunoglobulin is ineffective for HCV. Potential PEP agents such as ribavirin and interferon are not currently recommended because they are potentially very toxic and unlikely to be available.

Clinical follow-up and counselling

In addition to HIV antibody testing at the time of the injury, exposed health care workers should be offered repeat testing at six weeks, three months and six months after exposure.

Health care workers who take PEP should use condoms (or abstain from sex) until serology is negative at six months post-exposure. Female health care workers who are lactating may consider stopping breastfeeding. Health care workers whose work includes exposure-prone procedures (those involving the use of sharp instruments in confined spaces such as the mouth, vagina, and the chest or abdominal cavities) should consider with their clinician whether they need to modify their practice until seronegativity is confirmed at six months following the exposure.
Table 6: Post-exposure prophylaxis for hepatitis B (where serological testing, HBlg and HBV vaccine are available)

<table>
<thead>
<tr>
<th>Health care worker</th>
<th>'Source' patient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HBsAg positive</td>
</tr>
<tr>
<td>Unvaccinated</td>
<td>HBlg x 1 dose</td>
</tr>
<tr>
<td></td>
<td>plus HBlg x 1 dose plus Hepatitis B vaccine x 3 doses</td>
</tr>
<tr>
<td>Serological 'responder' (HBsAb &gt;10 mIU/ml)</td>
<td>No treatment</td>
</tr>
<tr>
<td>Serological 'non-responder' (HBsAb &lt;10 mIU/ml)</td>
<td>HBlg x 1 dose</td>
</tr>
<tr>
<td></td>
<td>plus Hepatitis B vaccine x 3 doses</td>
</tr>
<tr>
<td>Antibody status unknown</td>
<td>Test health care worker for anti-HBs if available</td>
</tr>
<tr>
<td></td>
<td>If anti-HBs &gt;10 mIU/ml: No treatment</td>
</tr>
<tr>
<td></td>
<td>If anti-HBs &lt;10 mIU/ml: HBlg x 1 dose plus</td>
</tr>
<tr>
<td></td>
<td>Hepatitis B vaccine x 3 doses</td>
</tr>
<tr>
<td></td>
<td>If anti-HBs &gt;10 mIU/ml: No treatment</td>
</tr>
<tr>
<td></td>
<td>If anti-HBs &lt;10 mIU/ml: Hepatitis B vaccine x 3 doses</td>
</tr>
</tbody>
</table>


If the health care worker is infected with HIV, they will usually develop an acute retroviral syndrome two to six weeks after exposure. This syndrome is an illness that resembles glandular fever with fevers, sweats, malaise, lethargy, anorexia, nausea, myalgia, arthralgia, headache, sore throat, diarrhoea, lymphadenopathy and rash.

Occupational exposure to HIV is a frightening experience. Some psychological morbidity (anxiety, depression, insomnia) and even post-traumatic stress disorder are relatively common among health care workers following such an exposure. Early and frequent follow-up appointments for counselling and clinical review are essential.

Should the health care worker become HIV positive, clinical management should follow these recommendations and ongoing counselling and support will be essential.

Special considerations
Where the 'source' person is already taking antiretroviral therapy (especially a second-line or other drug combination), the possibility of HIV drug resistance should be considered. In this
situation, and in all other complex circumstances, treating clinicians should seek advice from more experienced colleagues through the OSSHHM network as soon as possible.

Post-exposure prophylaxis for non-occupational exposure

OSSHHM recommends appropriate use of post-exposure prophylaxis following non-occupational exposure (PEP-NOE) to HIV as a potential method of preventing HIV infection.

The recommendations in this section are based on a comprehensive review of the literature pertaining to PEP-NOE.

The recommendations for PEP-NOE may not be appropriate for use in all clinical situations. Decisions to follow these recommendations must be based on the professional judgement of the service provider and with consideration of individual client circumstances and wishes. It should be acknowledged that use of any antiretroviral agent in this setting is an unlicensed indication.

Background

Studies indicate that once HIV crosses a mucosal barrier, it may take up to 48 to 72 hours before HIV can be detected within regional lymph nodes and up to five days before HIV can be detected in blood.\(^{20,21,22}\)

Risks of HIV transmission

\[
\text{Risk of HIV transmission} = \text{Risk that source is HIV positive} \times \text{Risk of exposure}
\]

(including co-factors such as sexually transmissible infections, high viral load and bleeding)

The risk of HIV transmission is dependent on the exposure characteristics, the infectivity of the source and host susceptibility. The risk of HIV transmission may be increased by:

- a high plasma viral load in the source (transmission may still be possible with low or undetectable viral loads),\(^{23,24,25,26}\)
- breaches in the mucosal barrier such as abrasions and genital ulcer disease, following sexual assault or intercourse.\(^{27,28,29}\)

Table 7: The risk of HIV transmission following an exposure from a source known to be HIV positive

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>Estimated risk of HIV transmission per exposure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood transfusion (one unit)</td>
<td>90–100 (^{30})</td>
</tr>
<tr>
<td>Receptor of anal intercourse</td>
<td>0.1–3.0 (^{31,32})</td>
</tr>
<tr>
<td>Receptor of vaginal intercourse</td>
<td>0.1–0.2 (^{32,37})</td>
</tr>
<tr>
<td>Penetrator of vaginal intercourse</td>
<td>0.03–0.09 (^{33})</td>
</tr>
<tr>
<td>Penetrator of anal intercourse</td>
<td>0.06 (^{36})</td>
</tr>
<tr>
<td>Receptor of oral sex (fellatio)</td>
<td>0–0.04 (^{38})</td>
</tr>
</tbody>
</table>
### Calculating the risk of HIV transmission

Table 8 gives examples of estimates of an individual’s risk of contracting HIV through a source who is known to be HIV positive and through a source of unknown status, according to type of exposure.

**Table 8: Calculating the risk of HIV transmission**

<table>
<thead>
<tr>
<th>Population group and type of exposure</th>
<th>Risk of HIV transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Source unknown for HIV</td>
</tr>
<tr>
<td>Unprotected receptor for anal intercourse</td>
<td>15% x 3% = 0.45%</td>
</tr>
<tr>
<td></td>
<td>1 in 222</td>
</tr>
<tr>
<td>Unprotected receptor for vaginal intercourse</td>
<td>0.1% x 0.09% = 0.00009%</td>
</tr>
<tr>
<td></td>
<td>1 in 100,000</td>
</tr>
<tr>
<td>Intravenous drug user sharing injecting equipment</td>
<td>4.7% x 0.67% = 0.031%</td>
</tr>
<tr>
<td></td>
<td>1 in 3226</td>
</tr>
</tbody>
</table>

*Note: Risk is calculated using data from Table 4 according to the formula: Risk of HIV transmission = Risk that source is HIV positive x Risk of exposure.*


### Evidence to support post-exposure prophylaxis

From a retrospective case-control study among health care workers occupationally exposed to HIV infection, it was demonstrated that a 28-day PEP course of zidovudine is protective.\(^24\)

However, in some instances PEP has failed to prevent HIV infection following occupational exposure.\(^44\) In a Brazilian study, none of the individuals who received PEP within 72 hours following sexual assault seroconverted, but seroconversion did occur in 2.7 per cent of individuals who took PEP after the 72-hour window.\(^45\) This result shows that PEP may be less effective or ineffective if initiated after 72 hours of the exposure. In the sexual exposure setting, ‘failures’ of PEP-NOE have been attributed to late initiation, poor adherence, and repeated exposure to HIV.\(^46\)

### Possible risks of PEP-NOE

Some side effects of PEP-NOE have been associated with metabolic abnormalities, lipid abnormalities, insulin resistance and diabetes mellitus in addition to gastro-intestinal side effects. Nevirapine causes significant liver toxicity and should not be used in individuals with CD4 count.\(^47,48\) The frequency, severity, duration and reversibility of side effects and potential for as yet unknown long-term complications must be weighed up against the potential benefit of PEP-NOE.
Potential behavioural/psychological implications of offering PEP-NOE

The availability of PEP-NOE may make individuals complacent to primary prevention strategies and consequently may result in more frequent high-risk behaviour. Some studies show that the availability of PEP-NOE increases risk behaviour especially among the younger and less educated gay men, while other studies show no increase in risk behaviour. If the possible exposure to HIV causes a state of acute anxiety, the provision of PEP-NOE may help alleviate such anxiety.

A risk–benefit analysis should be undertaken for every individual presenting following an exposure. The decision to initiate PEP-NOE should be made on a case-by-case basis.

Recommendations for prescribing PEP-NOE

OSSHHM recommends that PEP-NOE should be regarded as a last option where conventional, proven methods of HIV prevention have failed. PEP-NOE should be considered only if an individual presents within 72 hours of exposure.

The following tables provide more specific recommendations based on the HIV status and area of origin of the source. Table 9 first provides PEP recommendations in cases where the source is known to be HIV positive.

Table 9: Consideration of PEP-NOE with potential exposure risk if source is known to be HIV positive

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recepter of anal sex</td>
<td>PEP-NOE recommended</td>
</tr>
<tr>
<td>Inserter of anal sex</td>
<td>PEP-NOE recommended</td>
</tr>
<tr>
<td>Receptor of vaginal sex</td>
<td>PEP-NOE recommended</td>
</tr>
<tr>
<td>Inserter of vaginal sex</td>
<td>PEP-NOE recommended</td>
</tr>
<tr>
<td>Fellatio with ejaculation (receptor)</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Splash of semen into eye</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Fellatio without ejaculation (receptor)</td>
<td>PEP-NOE not recommended</td>
</tr>
<tr>
<td>Cunnilingus (receptor)</td>
<td>PEP-NOE not recommended</td>
</tr>
</tbody>
</table>


If the source is not known to be HIV positive, then try – where possible – to establish the HIV status of the source individual using voluntary confidential counselling and testing (VCCT) principles as soon as possible. Tables 10 and 11 list the PEP-NOE recommendations where the HIV status of the source is unknown. These recommendations vary depending on whether the source is from a group with HIV prevalence (Table 10) or is not from such a group (Table 11).

High prevalence groups to which the recommendations in Table 10 apply are those where there is a significant likelihood of the source individual being HIV positive, such as men who have sex with men, sex workers and people from areas of high HIV prevalence (particularly sub-Saharan Africa). HIV transmission is likely to increase following aggravated sexual intercourse (anal or vaginal), such as that experienced during sexual assault, hence PEP-NOE may be recommended readily in such situation
Table 10: Consideration of PEP-NOE with potential exposure risk if source is of unknown HIV status but from group with high HIV prevalence

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptor of anal sex</td>
<td>PEP-NOE recommended</td>
</tr>
<tr>
<td>Inserter of anal sex</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Receptor of vaginal sex</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Inserter of vaginal sex</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Fellatio with ejaculation (receptor)</td>
<td>PEP-NOE considered</td>
</tr>
</tbody>
</table>


Table 11: Consideration of PEP-NOE with potential exposure risk if source is unknown and not from a group with high HIV prevalence

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptor of anal sex</td>
<td>PEP-NOE considered</td>
</tr>
<tr>
<td>Inserter of anal sex</td>
<td>PEP-NOE not recommended</td>
</tr>
<tr>
<td>Receptor of vaginal sex</td>
<td>PEP-NOE not recommended</td>
</tr>
<tr>
<td>Inserter of vaginal sex</td>
<td>PEP-NOE not recommended</td>
</tr>
<tr>
<td>Fellatio with ejaculation (receptor)</td>
<td>PEP-NOE not recommended</td>
</tr>
</tbody>
</table>


Recommendations for drug regimens to be used

Zidovudine (AZT) is the only drug to date that has been studied in regard to PEP and for which there is evidence of reduction of risk of HIV transmission following occupational exposure. It is for this reason that zidovudine is included in all first choice PEP regimens, unless there is evidence that the source virus is resistant to this drug.\(^ {51,52} \) Nevirapine is not recommended due to hepatotoxicity.\(^ {47,48} \) Expert advice should be sought where and when necessary.

Recommended combinations

\[ 2\text{NRTI} + \text{PI (boosted PI)} \]

Given that, for optimal efficacy, PEP-NOE should be commenced as soon as possible after exposure,\(^ {50} \) 24-hour access should be available including during weekends and public holidays. As with PEP following occupational exposure, local policies and pathways must be established to enable this level of accessibility. OSSHMM recommends that, in each Pacific small island country or territory, one or more PEP officers are identified for the provision of PEP. Each officer must be experienced in the management of antiretroviral therapy and have expertise in HIV testing and transmission.

It is recommended that individuals presenting for PEP-NOE are referred to the PEP officer and seen by them as early as possible – whether or not PEP-NOE is offered or accepted. PEP-NOE should not be withheld until such expertise is available.
Table 12: Antiretroviral regimens for post-exposure prophylaxis for non-occupational exposure

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEP-NOE for lower-risk exposure</td>
</tr>
<tr>
<td>Zidovudine plus</td>
<td>One 300 mg tablet twice daily for four weeks</td>
</tr>
<tr>
<td>Lamivudine</td>
<td>One 150 mg tablet twice daily for four weeks</td>
</tr>
<tr>
<td></td>
<td>PEP-NOE for higher-risk exposure – Basic 2-drug regimen plus</td>
</tr>
<tr>
<td>Efavirenz or</td>
<td>One 600 mg tablet at bed time for four weeks</td>
</tr>
<tr>
<td>Nelfinavir</td>
<td>1250 mg bd</td>
</tr>
</tbody>
</table>


Assessment and initial management of the individual presenting for PEP-NOE

When an individual presents for PEP-NOE, an appropriate risk assessment should be performed. At presentation, and prior to administration of PEP-NOE, the following issues must be discussed with the individual:

- the rationale for PEP-NOE;
- the potential risks and side effects of PEP following sexual exposure to HIV (PEPSE); and
- the arrangement for early follow-up with a PEP officer.

Keep documentation to demonstrate that the above issues have been discussed. It is mandatory that individuals for whom PEP-NOE is considered have an HIV VCCT screening test (with rapid result) prior to or shortly after initiating therapy. If this test detected any previously undiagnosed HIV infection, this finding would significantly alter the management.

Those presenting for PEP-NOE must be seen by the PEP officer at the earliest opportunity, who will then address the following issues:

- pre-test counselling;
- the need for compliance with the four-week course of PEP-NOE if the baseline result is negative, with discussion including the side effects of the drugs and the support available in the clinic and in the community to help adherence;
- the need to have a follow-up HIV test at three and six months;
- the need for safer sex for the following three months; and
- coping strategies.
Follow-up arrangements for individuals presenting for PEPSE

Regular follow-up, ideally on a weekly basis at first, is necessary for individuals receiving PEP-NOE to monitor compliance and possible adverse effects of the medications. This approach is designed to improve adherence to the treatment regimen and allow prompt management of any concerns or complications.

All individuals who receive PEP (and those who decline but have had significant risk of exposure to HIV) should be re-tested for HIV antibodies at three and six months.

All individuals presenting for PEP-NOE should be offered comprehensive screening for other STIs at an appropriate time, in accordance with the guidelines on screening for STIs.

Hepatitis B vaccination (and immunoglobulin) should also be considered to PEP-NOE.

The opportunity should be taken for appropriate behaviour modification and risk-reduction counselling with individuals presenting for PEP-NOE.

Management of individuals who repeatedly present for PEPSE or with ongoing risk behaviour

Repeat users of PEP-NOE warrant attention. Consider repeat courses of PEP-NOE according to the risk of HIV acquisition at the time of presentation, particularly if the circumstances suggest this to be appropriate (commercial sex workers, serodiscordant couples, inability to control the preventative behaviour of their partners). Individuals who present more than once a year for PEP-NOE, who do not otherwise have prevailing circumstances for doing so, should be referred for counselling. PEP-NOE should be considered if the current risk circumstances clearly indicate a need for this.
Managing sexually transmitted infections

Sexually transmitted infections (STIs) are very common in Pacific small island countries and territories.

The recommendations in this section emphasise identifying the STI syndromes and the causative agents, and providing appropriate treatment. They also bring into the focus the relevant components such as selecting the best antimicrobials available for treatment, patient education and counselling including VCCT, condom promotion and other safer sexual practices, and identification and management of sex partner(s) to enhance the STI management.

This second edition of OSSHHM recommendations is an evolving document. It needs to be reviewed from time to time to maintain its relevance and applicability to situations in the Pacific Island region.

Key components in managing sexually transmitted infections

Essential components for the management of STIs in its totality include:

- comprehensive case management (as below);
- safer sexual behavioural issues like abstinence, delaying initiation of penetrative sex, having one sexual partner only or decreasing number of sex partners, and consistent use of condoms;
- condom promotion – outlets, distribution, supply, social marketing;
- integration of STI management and care (including treatment based on syndromes or laboratory-based/specific clinical manifestation) into primary health care, reproductive health facilities, private clinics and others; and
- promotion of health-seeking behaviours. It is observed and documented that most people in Pacific small island countries and territories do not normally seek health care services until very late in the disease process. Some will try traditional medicine first until the condition worsens and only then will present to a health facility. It should be noted that STIs are caused by organisms that have specific antimicrobial treatments, and no herbal medicine can efficiently treat STIs.

Comprehensive case management of STIs

Comprehensive case management provides the key factors for management of STIs. It starts with the index patient’s presenting complaint, then involves identifying the syndromes or infection, deciding on the best antimicrobial regimen for treatment, providing education and counselling, contact tracing and management of the partner(s).

Management of any STI requires health workers to be professional, respectful of patients and non-judgemental. Clinical examination must take place in appropriate surroundings where privacy can be ensured and confidentiality guaranteed. Health care workers must overcome their own sensitivities and be able to address the issues associated with sexuality and STIs in an open and constructive manner.
Identification of the syndrome or infection

When a client approaches a health provider, it is a big step with implications for both parties. The index client has a problem and has some confidence in the service or specific health provider to assist with solving it. For their part, the health provider should feel privileged that this person is putting confidence and trust in them to provide that service, and must not breach that trust.

Health providers must ensure that the following components are in place for appropriate care in the management of STI clients:

- user-friendly environment ensuring privacy and a ‘one-stop shop’ for the client;
- history taking including an appropriate sexual history;
- physical examination, including detailed genital examination and review of systems;
- syndromic or laboratory-based diagnosis of presenting complaint;
- investigation of other asymptomatic STIs if suspected;
- effective curative or palliative therapy;
- patient education and counselling – issues include: importance of notifying and treating partner, risk reduction and prevention of further transmission, HIV risk perception, assessment and VCCT screening;
- contact tracing and partner notification; and
- follow-up if relevant or referral if indicated.

The syndrome management\textsuperscript{57} refers to the identification of disease syndromes through history taking and physical examination of the client, rather than resorting to laboratory services (especially in the initial encounter). After this identification, the antimicrobial treatment is offered. It is also through the information from the index client that the sex partner(s) is identified, evaluated and treated accordingly.

The aetiological method of identifying the infection involves taking a specimen (swab, urine or blood) from the index client and sending it to the laboratory for analysis. Culture and sensitivity assist with identifying not only the causative organisms but also what may be the best option for antimicrobial. This method needs expertise and the availability of technology, and is time consuming. However, where available, these tests are necessary where syndromic management fails, in order to achieve correct diagnosis, notification and appropriate treatment.

Selection of antimicrobial for optimal treatment of STIs

In considering the best option for antimicrobials to treat an STI, take account of the following components:

- Efficacy of antimicrobials. Efficacy of any antimicrobial must be aimed at a cure rate of above 95 per cent\textsuperscript{52} of those infected with bacterial STI. Antimicrobial regimen with lower cure rates should only be used as a last resort and with great caution.
• As the therapeutic efficacy changes over time, the local epidemiology of resistant STI organisms is important, and likewise efficacy data from one country may not be transferable to another country or territory.

• Availability of effective drugs at first contact point. Effective and safe antimicrobials should be available at the first contact points of STI care. The choice should also consider compliance and practitioners’ awareness and capacity to manage cases at that level.

Client education, counselling and behaviour modification

Behavioural assessment during sexual history taking from the index client is essential to provide leads to issues that need to be addressed during the education session. The following issues should be included in client education:

• the nature of infection, including the importance of completing the course of treatment and of attending the follow-up visits or referral;
• harm reduction issues in relation to possibility of drug use, where appropriate; and
• informing and educating index client and partner(s) on ways of minimising or lowering their risks of contracting and transmitting HIV and other STIs, including through safer sexual practices such as abstinence, having one faithful sexual partner, and consistent condom use. It is also important that the patient knows how to apply the condom (either female or male) and how to correctly discard it after being used (see Appendix 12a and Appendix 12b).

In any form, the health worker must not enforce their beliefs on the client. Instead the health worker must make the client aware of their own risky behaviour in terms of STIs and contracting HIV and give the client options to choose what best applies to them.

Voluntary confidential counselling and testing for HIV and testing for other STIs

Testing should be targeted in particular to:

• STI clients (investigation for their current symptoms and also screening for other STIs);
• people who have been newly diagnosed with HIV;
• antenatal women, where detection and treatment would benefit the neonate; and
• anyone who volunteers to be screened for STIs and HIV.

VCCT is covered in detail in under ‘HIV test counselling’ (page 3).

Some essential tests

Comprehensive screening tests for STIs should ideally include:

• blood for all consenting males and females:
- syphilis: RPR or VDRL titre and treponemal test
- hepatitis B: hepatitis B surface antigen (no need if the client is known to have a chronic infection)
- HIV: HIV antibody following proper VCCT
  - for asymptomatic males and females:
    - first void urine for chlamydia and gonorrhoea testing (note: not all Pacific small island countries and territories can test for chlamydia)
    - pap smear (note: swabs must be taken before pap smear)
    - throat swabs (if indicated) if history of oral sex
    - rectal swabs for men who have sex with men
  - for symptomatic males:
    - external urethral swab for microscopy, culture and sensitivity if discharge noted
    - first void urine for chlamydia (where testing is available)
  - for symptomatic females:
    - endocervical swab for microscopy, culture and sensitivity if cervical discharge is noted
    - high vaginal swab microscopy, culture and sensitivity
    - first void urine for chlamydia (where testing is available)
    - pap smear (note: swabs must be taken before pap smear).

Contact tracing and management of sexual partners
An STI client strongly indicates that the same infection exists in someone else in the community. It therefore becomes imperative that the health provider identifies this additional person (or people) and treat them accordingly. Contact tracing and management of sex partner(s) is an essential component of STI management. It should be done in a way that keeps information confidential (despite the difficulty of such a task in the small communities of the Pacific Island region).

Contacting the sex partner(s) of an index client is often challenging. The index clients need appropriate counselling, and the process of identifying and notifying sex partner(s) should be voluntary and non-coercive. The main aim of this process is to identify the sex partner(s), and to ensure that they are referred for evaluation and treated appropriately, regardless of whether they are symptomatic or not.

Contact tracing and sex partner(s) notification can be carried out either by client referral or health provider referral or in combination. In client referral, the index client is encouraged to notify the sex partner(s) of their possible infection. With health provider referral, a health care worker notifies the sex partner(s), after the index client has accurately identified the partner(s).
In extreme scenarios the sex partner(s) may have been identified but is refusing to cooperate even after everyone available in the local network (e.g. health inspectors, village health workers and others) has attempted to secure their cooperation. In such cases, the health provider may exercise the relevant clause within the Public Health Act or other law in connection with deliberately infecting others with a communicable disease. It needs to be noted the Public Health Acts in most Pacific small island countries and territories only cover STIs other than HIV. Because this law does not govern HIV, HIV contact tracing is exempted from it.

Management of sex partner(s) depends on the diagnosis of the index client’s STI, either using the syndrome approach or through laboratory diagnosis.

The following are some of the suggested strategies for the treatment of partners:

- Offer immediate epidemiological treatment, based solely on the index client’s diagnosis. No laboratory investigation is done on the sex partner(s).
- Offer immediate epidemiological treatment but obtain specimens from the partner(s) for subsequent confirmation from the laboratory. (Offer screening tests as well.)
- Delay treatment until the result of the specimen that was sent to the laboratory is available. It must be noted that there is a risk of loss of follow-up.

The strategy selection may depend on:

- the assessed risk of infection;
- the severity of the disease;
- the availability of effective diagnostic tests;
- the availability of a reasonable follow-up service in the area;
- the likelihood of the patient’s compliance with the follow-up visit (includes consideration of the client’s working schedule, distance from health facility, and commitments);
- the availability of effective treatment; and
- the high chance of spread of infection if the epidemiological treatment is not offered in a timely manner.

Note: It is recommended that the treatment regimen prescribed for the index client is the same as that prescribed for the identified sex partner(s). (The exception is in pregnant partner(s) where some drugs are contraindicated.)
Treatment based on STI-associated syndromes

Most health care facilities in Pacific small island countries and territories lack the equipment and trained personnel required for etiological diagnosis of STIs. WHO has developed and promoted guidelines on a syndrome-based approach using simplified tools (flowcharts or algorithms) for health workers managing STI patients. The basis of this approach is to identify groups of symptoms and easily recognised signs (syndromes), and to provide treatment to deal with the majority of organisms, or the most serious among them, that are responsible for producing that syndrome.

Table 13 outlines the syndromes associated with STIs, the potential causative organisms and conditions for which treatment should be provided and/or considered. For ease of reference, it also includes the corresponding numbers for the flowcharts, which are reproduced in Appendices 3 to 11 of this publication.

In most cases the sexual partner(s) of the index client should also be examined for STIs and promptly treated for the same condition(s) as the index client. The exception is where a client with vaginal discharge is thought not to be at risk of, or suffering from, cervical infection: her partner(s) may not need to be treated, at least not initially.

It must be noted that some reproductive tract symptoms are not necessarily caused by a sexually transmitted organism. For example, vaginal discharge can be caused by an overgrowth of endogenous vaginal bacteria causing bacterial vaginosis.

Table 14 outlines possible explanations, partner treatment requirements and appropriate counselling messages for each of the syndromes associated with STIs.

Syndrome 1: Urethral discharge in men (Appendices 3 and 4)

Male patients complaining of urethral discharge and/or dysuria should be examined for evidence of discharge. If none is seen, the urethra should be gently massaged from the ventral part of the penis towards the urethral opening or meatus (“milking”). It is sometimes difficult to confirm the presence of discharge, especially if the man has recently urinated.

The major pathogens causing urethral discharge are Neisseria gonorrhoeae (N. gonorrhoeae) and Chlamydia trachomatis (C. trachomatis). In syndromic management, treatment of a patient with urethral discharge should adequately cover these two organisms. Where reliable laboratory facilities are available, a urethral swab can be taken for distinction between the two organisms and specific treatment.
### Table 13: Syndromes, potential causative organisms/conditions, and flowcharts*

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Most common organism responsible in Pacific Island region</th>
<th>Other organisms (conditions) for which treatment should be considered**</th>
<th>Appendix number</th>
</tr>
</thead>
</table>
| Urethral discharge (in men)     | - Neisseria gonorrhoeae  
- Chlamydia trachomatis | - Trichomona vaginalis (persistent or recurrent cases) | 3, 4            |
| Vaginal discharge               | - Bacterial vaginosis  
- Trichomonas vaginalis | - Neisseria gonorrhoeae  
- Chlamydia trachomatis  
- Candida albicans | 5, 6            |
| Lower abdominal pain (in females)| - Neisseria gonorrhoeae  
- Chlamydia trachomatis  
- Anaerobic bacteria | | 7              |
| Neonatal conjunctivitis         | - Neisseria gonorrhoeae  
- Chlamydia trachomatis | | 8              |
| Scrotal swelling                | - Neisseria gonorrhoeae  
- Chlamydia trachomatis | | 9              |
| Genital ulcers                  | - Treponema pallidum (syphilis) | - Herpes simplex virus 2  
- Haemophilus ducreyi (chancroid)  
- Klebsiella granulomatis (granuloma inguinale/donovanosis)  
- Chlamydia trachomatis serovars L1-3 (lymphogranuloma venereum) | 10             |
| Inguinal bubo                    | - Chlamydia trachomatis serovars L1–3 (lymphogranuloma venereum)  
- Haemophilus ducreyi (chancroid) | | 7              |

**Notes:**
*OSSHHM has slightly modified the original numbering of the flowcharts to group causative agents in sequence. Nevertheless, the flowchart contents remain in original form. (See Appendices 3 to 11.)

**Consideration of other organisms/conditions should be based on local epidemiology and/or an individuals’ symptoms or signs as described in the flowcharts.
Table 14: Possible explanations, partner treatment requirements, and counselling messages for selected syndromes

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Possible explanations</th>
<th>Partner treatment requirements</th>
<th>Counselling message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urethral discharge (men)</td>
<td>STI very likely</td>
<td>Treat partners for same conditions (female partners as for cervical infection)</td>
<td>STI prevention counselling</td>
</tr>
<tr>
<td>Genital ulcer</td>
<td>STI very likely</td>
<td>Treat partners for same conditions</td>
<td>STI prevention counselling</td>
</tr>
<tr>
<td>Inguinal bubo</td>
<td>STI very likely</td>
<td>Treat partners for same conditions</td>
<td>STI prevention counselling</td>
</tr>
<tr>
<td>Scrotal swelling</td>
<td>STI very likely if urethral discharge present Other causes possible</td>
<td>Treat partners for same organisms (female partners as for cervical infection) If no urethral discharge: partner treatment a precaution to reduce complications</td>
<td>STI prevention counselling</td>
</tr>
<tr>
<td>Lower abdominal pain (women)</td>
<td>Pelvic inflammatory disease, often STI. But other genitourinary or gastrointestinal causes possible</td>
<td>Treat male partners as for urethral discharge</td>
<td>Partner treatment a precaution to reduce complications</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>Endogenous (non-STI) infection most likely cause of vaginitis</td>
<td>No partner treatment unless relapse (then give treatment for trichomoniasis)</td>
<td>Usually not sexually transmitted</td>
</tr>
<tr>
<td></td>
<td>If cervical infection judged present or likely, presume STI</td>
<td>Treat male partners as for urethral discharge</td>
<td>STI prevention counselling</td>
</tr>
<tr>
<td>Neonatal conjunctivitis</td>
<td>Often caused by STI, but other causes possible</td>
<td>Treat mother for cervical infection, and her partner(s) as for urethral discharge</td>
<td>Partner treatment a precaution to reduce complications</td>
</tr>
</tbody>
</table>

Recommended syndromic treatment for urethral discharge comprises:

- therapy for uncomplicated gonorrhoea;
  plus

- therapy for chlamydia.
Note:

- Patients should take single-dose treatments under observation at the clinic, where feasible.
- Where multiple-dose treatments are used, emphasise the importance of completing the whole course (even if symptoms resolve earlier).
- All sexual partners in the last three months should be treated for the same conditions. If the last sexual contact was more than three months previously, the last partner should be treated.
- To prevent re-infection, the patient should avoid sexual intercourse or should use condoms with his past partner(s) until both he and the partner(s) have completed treatment.
- To prevent infection of new partners, the patient should avoid intercourse or use condoms until he has completed treatment and is asymptomatic.
- The patient should be advised to return if symptoms persist seven days after start of therapy. If he does return after seven days, at this point he should be referred to an STI specialist. If there is no STI specialist, OSSHMM recommends using the OSSHMM network for assistance.

Table 15: Treatment options for uncomplicated gonorrhoea and chlamydia

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice:</th>
<th>Effective substitute</th>
<th>Other regimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Ciprofloxacin 500 mg orally as a single dose</td>
<td>Cefixime 400 mg orally as a single dose or Ceftriaxone 125 mg by intramuscular injection</td>
<td>Amoxicillin 2.5 g plus Amoxicillin/Clavulanic acid 500 mg/125 mg plus Probenecid 1 g orally all as single supervised dose</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1 g orally as single dose</td>
<td>Doxycycline 100 mg orally twice a day for 7 days</td>
<td>Tetracycline 500 mg orally 4 times a day for 7 days or Erythromycin 500 mg orally 4 times a day for 7 days</td>
</tr>
</tbody>
</table>

Persistent or recurrent urethral discharge

Persistent or recurrent symptoms of urethritis may result from drug resistance, poor compliance or re-infection. In some cases there may be infection with Trichomonas vaginalis (T. vaginalis). If the recurrent urethral discharge is due to poor compliance or re-infection, then the same therapy for N. gonorrhoeae and C. trachomatis must be repeated. If drug resistance is suspected, then a substitute therapy should be given. If T. vaginalis is suspected, then therapy for T. vaginalis must be given. The Pacific has an overall rate of 11 per cent T. vaginalis in women attending antenatal clinics. 53, 54, 55, and 56
Table 16: Treatment options for recurrent or persistent urethral discharge, covering Trichomonas vaginalis

<table>
<thead>
<tr>
<th>Treatment options for Trichomonas vaginalis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metronidazole 2 g orally as a single dose, or</td>
</tr>
<tr>
<td>Tinidazole 500 mg orally twice a day for 5 days</td>
</tr>
<tr>
<td>Alternatives</td>
</tr>
<tr>
<td>Metronidazole 400 mg or 500 mg orally twice a day for 7 days</td>
</tr>
</tbody>
</table>

Note:
- Patients should take single-dose treatments under observation at the clinic, where feasible.
- When multiple-dose treatments are used, emphasise the importance of completing the whole course (even if symptoms resolve earlier).
- All sexual partners in the last three months should be treated for the same conditions. If the last sexual contact was more than three months previously, the last partner should be treated.
- To prevent re-infection, the patient should avoid sexual intercourse or use condoms with his past partner(s) until both he and the partner(s) have completed treatment.
- To prevent infection of new partners, the patient should avoid intercourse or use condoms until he has completed treatment and is asymptomatic.
- The patient should be advised to return if symptoms persist seven days after start of therapy. If he does return after seven days, at this point he should be referred to an STI specialist through OSSHHM network.

Syndrome 2: Vaginal discharge (Appendices 5 and 6)

A spontaneous complaint of abnormal vaginal discharge (abnormal in terms of quantity, colour or odour) most commonly indicates an infection in either the vagina or the cervix. A vaginal infection (vaginitis) due to bacterial vaginosis (multiple organisms) or yeast infection (Candida albicans) is not an STI, while trichomoniasis (Trichomonas vaginalis) usually is. Mucopurulent cervicitis due to gonorrhoea or chlamydia is sexually transmitted and may rarely cause vaginal discharge.

All females presenting with abnormal vaginal discharge should receive treatment for bacterial vaginosis and trichomoniasis. Additional treatment for yeast infection is indicated when clinically apparent (white, curd-like discharge, redness of the vulva and vagina, and itching). Given that vaginitis is usually not due to sexually transmitted organisms, treatment of partners is not recommended (at least not initially; it may become necessary if symptoms recur or do not resolve).

The clinical detection of cervical infection is difficult because a large proportion of women with gonococcal or chlamydial cervical infection are asymptomatic. When there are facilities and staff expertise to carry out bimanual pelvic and speculum examinations, the cervix can be viewed directly and cervicitis diagnosed if mucopus or erosions are seen, or friability observed. In such cases, treatment covering gonorrhoea and chlamydia should be added to the treatment for bacterial vaginosis and trichomoniasis (with or without treatment of yeast.
infection). Appendix 5 outlines the approach to a patient with vaginal discharge where bimanual and speculum examination is available (with or without microscopy facilities).

In the absence of these findings and/or facilities, an attempt can still be made to identify those with an increased likelihood of being infected with N. gonorrhoeae and/or C. trachomatis. Knowledge of the local prevalence of gonococcal and/or chlamydia in females presenting with vaginal discharge is important. Treatment for cervical infection should be added to the treatment for vaginitis if risk is high. Appendix 5 outlines the approach to a patient with vaginal discharge where neither bimanual and speculum examination nor microscopy services are available.

Where resources permit, the use of laboratory tests to screen women with vaginal discharge should be considered. Such screening could be applied generally to all women with discharge, or selectively to those with discharge and a positive risk assessment.

Recommended syndrome treatment for vaginal infection comprises:

- therapy for T. vaginalis;
  
  plus

- therapy for bacterial vaginosis;
  
  and, where indicated,

- therapy for C. albicans.

Recommended syndrome treatment for cervical infection comprises:

- syndromic treatment for vaginal infection as above;
  
  plus

- therapy for uncomplicated gonorrhoea;
  
  plus

- therapy for Chlamydia.

Note:

- Some improvement in vaginitis is usually seen within a few days; symptoms should be gone within one week. Advise patients to return if symptoms persist.

- If treatment failure is suspected, re-examine and consider treating for yeast infection or cervical infection if either of these was not treated at the first visit.

- With the initial treatment for vaginal infection, treatment of partner(s) is not required. However, current partner(s) should be treated for T. vaginalis if the patient’s symptoms persist or recur, or if the partner is symptomatic. (The patient should be re-treated at the same time.)

- Patients with recurrent bacterial vaginosis should be advised to avoid douching and vaginal drying agents.
- Pregnancy, diabetes or HIV may be factors in repeat yeast infections; antibiotics and sometimes oral contraceptive use may also be factors.
- When treating for cervical infection, treat all partners from the last three months (or most the recent partner if last contact was more than three months previously).

Table 17: Treatment options for vaginitis (to cover bacterial vaginosis, trichomoniasis and yeast if indicated) and cervicitis (to cover vaginitis and uncomplicated gonorrhoea and chlamydia)

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice</th>
<th>Effective substitute(s)</th>
<th>If woman is pregnant or breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial vaginosis</td>
<td>Metronidazole* 2 g orally in a single dose or Metronidazole* 400 or 500 mg orally twice a day for 7 days</td>
<td>Clindamycin cream 2%, one full applicator (5 g) intravaginally at bed time for 7 days or Clindamycin 300 mg orally twice a day for 7 days</td>
<td>Preferably after first trimester Metronidazole* 200 or 250 mg orally 3 times a day for 7 days or Metronidazole* gel 0.75%, one full applicator (5 g) intra-vaginally twice a day for 5 days or Clindamycin 300 mg orally twice a day for 7 days</td>
</tr>
<tr>
<td>Trichomonas</td>
<td></td>
<td>Tinidazole* 2 g orally in a single dose or Tinidazole* 500 mg orally twice a day for 5 days</td>
<td></td>
</tr>
<tr>
<td>Candida albicans (yeast)</td>
<td>Miconazole 200 mg vaginal suppository, one a day for 3 days or Clotrimazole** 100 mg vaginal tablet, two tablets a day for 3 days or Fluconazole 150 mg oral tablet, in a single dose</td>
<td>Nystatin 100,000 units vaginal tablet, one a day for 14 days</td>
<td>Miconazole 200 mg vaginal suppository, one a day for 3 days or Clotrimazole** 100 mg vaginal tablet, two tablets a day for 3 days or Nystatin 100,000 unit vaginal tablet, one a day for 14 days</td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>Ciprofloxacin 500 mg orally as a single dose</td>
<td>Cefixime 400 mg orally as a single dose or Ceftriaxone 125 mg by intramuscular injection</td>
<td>Amoxicillin 2.5 g plus Amoxicillin/Clavulanic acid 500 mg/125 mg plus Probenecid 1 g orally all as a single supervised dose</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1 g orally as single dose</td>
<td>Doxycycline† 100 mg orally twice a day for 7 days</td>
<td>Tetracycline 500 mg orally 4 times a day for 7 days or Erythromycin 500 mg orally 4 times a day for 7 days</td>
</tr>
</tbody>
</table>

Notes:
*Patients taking metronidazole or tinidazole should be cautioned to avoid alcohol. Use of metronidazole is not recommended in the first trimester of pregnancy.
**Single-dose clotrimazole (500 mg), available in some places, is also effective for yeast infection (C. albicans).
†Doxycycline, tetracycline and ciprofloxacin should be avoided in pregnancy and when breastfeeding.
Syndrome 3: Lower abdominal pain  
(Appendix 7)

All sexually active females presenting with lower abdominal pain should be carefully evaluated for pelvic inflammatory disease (PID). Carry out a routine bimanual and abdominal examination on all females with a presumptive STI because some females with PID may be asymptomatic. Symptoms suggestive of PID include abdominal pain, deep dyspareunia, vaginal discharge, menometrorrhagia, dysuria, fever, and occasionally nausea and vomiting.

PID becomes highly probable when one or more of the above symptoms is seen in a female with adnexal tenderness, evidence of lower genital tract infection, and cervical motion tenderness. In general, health workers should err on the side of over-diagnosing and treating suspected cases.

A medical officer should see all females with lower abdominal pain (i.e. refer to the medical officer if there is no doctor available at the level where they are first seen). Other causes of lower abdominal pain should be considered, such as acute appendicitis, urinary tract infection, and ectopic pregnancy.

Hospitalisation of patients with acute PID should be seriously considered when:

- the diagnosis is uncertain;
- surgical emergencies such as appendicitis and ectopic pregnancy cannot be excluded;
- a pelvic abscess is suspected;
- the patient is severely ill such that management on an outpatient basis would be difficult;
- the patient is pregnant;
- the patient is unable to follow or tolerate an outpatient regimen; or
- the patient has failed to respond to outpatient therapy.

Outpatients with PID should be followed up no later than 72 hours after starting treatment (24 hours for females with fever) and admitted to hospital if their condition has not improved. Patients should show substantial clinical improvement (absence of fever, reduction in abdominal tenderness, and reduction in uterine, adnexal and cervical motion tenderness) within three days of starting treatment. Patients who do not improve within this period may require hospitalisation.

If PID should occur with an intrauterine contraceptive device (IUD) in place, treat the PID using appropriate antibiotics first. There is no evidence that removal of the IUD provides any additional benefit. Thus, if the patient wishes to continue using it, the IUD need not be removed. If she does not want to keep the IUD, removal of the IUD is recommended after antimicrobial therapy has been commenced. When the IUD is removed, contraceptive counselling is necessary.

Etiological agents causing PID include N. gonorrhoeae, C. trachomatis and anaerobic bacteria (Bacteroides spp. and Gram-positive cocci). Facultative Gram-negative rods and Mycoplasma hominis have also been implicated. As it is impossible to differentiate between these clinically, and because a precise microbiological diagnosis is difficult, the treatment regimen must be effective against this broad range of pathogens. The regimens recommended below are based on this principle.
Table 18a shows the outpatient treatment options, which include single-dose therapy for gonorrhoea. If the appropriate option cannot be provided at the level where the patient is first seen, she must be admitted or referred (see Table 18b for inpatient treatment options).

Table 18a: Outpatient treatment options for pelvic inflammatory disease

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice: choose one from each box (= three drugs)</th>
<th>Effective substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Ceftriaxone 250 mg by intramuscular injection or Ciprofloxacin 500 mg orally as a single dose</td>
<td>Amoxicillin 2.5 g plus Amoxicillin/clavulanic acid 500 mg/125 mg plus Probenecid 1 g orally (all as a single supervised dose) or Cefixime 400 mg orally as a single dose</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1 g orally as a single dose or Doxycycline* 100 mg orally twice a day for 14 days</td>
<td>Erythromycin 500 mg orally 4 times a day for 7 days or Tetracycline* 500 mg orally 4 times a day for 14 days</td>
</tr>
<tr>
<td>Anaerobes</td>
<td>Metronidazole** 400–500 mg orally, twice a day for 14 days</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
*Contraindicated for pregnant or breastfeeding women.
**Patients taking metronidazole should be cautioned to avoid alcohol. Metronidazole should also be avoided during the first trimester of pregnancy.

Syndrome 4: Neonatal conjunctivitis
(Appendix 8)

Ophthalmia neonatorum (neonatal conjunctivitis), most commonly caused by N. gonorrhoeae and C. trachomatis can lead to blindness if treatment is delayed. Other common causes are Staphylococcus aureus, Streptococcus pneumoniae, Haemophilus spp. and Pseudomonas spp. Redness and swelling of the eyelids or ‘sticky eyes’, or mucopurulent discharge from the eye(s) are most common symptoms noted in neonates.

As the clinical manifestations and possible complications of gonococcal and chlamydial infections are similar, in settings where it is impossible to differentiate between the two infections, treatment should be provided to cover both. This treatment would include single-dose therapy for gonorrhoea and multiple-dose therapy for chlamydia, following one of the treatment options outlined in Table 19 below.
Table 18b: Inpatient treatment options of pelvic inflammatory disease

<table>
<thead>
<tr>
<th>STI</th>
<th>Option 1 Choose one from each box (= three drugs), and follow with oral outpatient therapy below.</th>
<th>Option 2 Give both drugs and follow with oral outpatient therapy below.</th>
<th>Option 3 Commonly available. Give all three drugs plus oral outpatient therapy below.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Ceftriaxone 250 mg by intramuscular injection, once a day</td>
<td>Gentamicin 1.5 mg/kg of body weight by intravenous injection every 8 hours plus Clindamycin 900 mg by intravenous injection every 8 hours</td>
<td>Ampicillin 2 g by intravenous or intramuscular injection, then 1 g every 6 hours plus Gentamicin 80 mg by intramuscular injection every 8 hours plus Metronidazole 500 mg or 100 ml by intravenous infusion every 8 hours</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Doxycycline * 100 mg orally or by intravenous injection, twice a day or Tetracycline † 500 mg orally 4 times a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaerobes</td>
<td>Metronidazole 400–500 mg orally or by intravenous injection, twice a day or Chloramphenicol ‡ 500 mg orally or by intravenous injection, 4 times a day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For all three options, therapy should be continued until at least two days after the patient has improved and should then be followed by one of the following oral treatments for a total of 14 days: Doxycycline † 100 mg orally twice a day or tetracycline ‡ 500 mg orally four times a day.

Notes:
* Intravenous doxycycline is painful and has no advantage over the oral route if the patient is able to take medicine by mouth.
† Contraindicated for pregnant or breastfeeding women. PID is uncommon in pregnancy.
‡ Tetracycline is contraindicated in children under 8 years of age.

Table 19: Treatment of neonatal conjunctivitis covering gonorrhoea and chlamydia

<table>
<thead>
<tr>
<th>Drug options for gonorrhoea</th>
<th>Drug options for chlamydia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone 50 mg/kg by intramuscular injection as a single dose, to maximum 125 mg</td>
<td>Erythromycin syrup, 50 mg/kg per day orally, in 4 divided doses, for 14 days</td>
</tr>
</tbody>
</table>

Alternatives

<table>
<thead>
<tr>
<th>Drug options for gonorrhoea</th>
<th>Drug options for chlamydia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanamycin 25 mg/kg by intramuscular injection as a single dose, to maximum 75 mg</td>
<td>Trimethoprim 40 mg with Sulfamethoxazole 200 mg orally, twice daily for 14 days</td>
</tr>
<tr>
<td>Spectinomycin 25 mg/kg by intramuscular injection as a single dose, to maximum 75 mg</td>
<td></td>
</tr>
</tbody>
</table>

Note: Ideally a paediatrician should see all neonatal cases. However, in the absence of a paediatrician, the health care worker must counsel the mother on treatment compliance before discharging the neonate.
Syndrome 5: Scrotal swelling
(Appendix 9)

An acute onset of unilateral testicular pain and scrotal swelling in men under the age of 35 years is often due to epididymitis caused by sexually transmitted organisms. Some erythema and oedema of the overlying skin in the scrotum may also be noted. When the epididymitis is accompanied by urethral discharge, it should be presumed to be of sexually transmitted origin, commonly gonococcal and/or chlamydial in nature. The adjacent testis may also get inflamed (orchitis), giving rise to epididymo-orchitis. If not effectively treated, STI-related epididymitis may lead to infertility.57

In men older than 35 years, where there may have been no risk of a sexually transmitted infection, Escherichia coli, Klebsiella spp. or Pseudomonas aeruginosa. A tuberculous orchitis may give rise to epididymitis, often secondary to lesions elsewhere, especially in the lungs or bones. In brucellosis, usually caused by Brucella melitensis or Brucella abortus, an orchitis is usually clinically more evident than an epididymitis.

In pre-pubertal children the usual aetiology is coliform, Pseudomonas infection or mumps virus. Mumps epididymo-orchitis is usually noted within a week of parotid enlargement.

Trauma, testicular torsion and tumour should also be considered as important causes of testicular pain. Sudden onset of scrotal pain most frequently is due to testicular torsion which is a surgical emergency that needs urgent referral.

Recommended syndrome treatment for scrotal swelling consists of:

- therapy for uncomplicated gonorrhoea;
  
  plus

- therapy for Chlamydia.

Note:

- When the scrotal swelling is presumed to be of sexual origin – that is, when it is accompanied by urethral discharge – all sexual partners in the preceding three months (or the most recent partner if last sexual contact was more than three months previously) should be treated for the same conditions. Female partners should be treated as for cervical infection (see Table 18a).

- Where sexual origin cannot be presumed – for example, when there is no history or evidence of urethral discharge – treatment may be offered for sexual partners as a precaution to reduce complications.

- Advise patients to return if symptoms persist seven days after the start of therapy.
Table 20: Treatment of scrotal swelling, and covering uncomplicated gonorrhoea and chlamydia

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice</th>
<th>Effective substitute</th>
<th>Other regimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Ciprofloxacin 500 mg orally as a single dose</td>
<td>Cefixime 400 mg orally as a single dose or Ceftriaxone 125 mg by intramuscular injection</td>
<td>Amoxicillin 2.5 g plus Amoxicillin/Clavulanic acid 500 mg/125 mg plus Probenecid 1 g orally all as a single dose</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>Azithromycin 1 g orally as single dose</td>
<td>Doxycycline 100 mg orally twice a day for 7 days</td>
<td>Tetracycline 500 mg orally 4 times a day for 7 days or Erythromycin 500 mg orally 4 times a day for 7 days</td>
</tr>
</tbody>
</table>

Syndrome 6: Genital ulcers (Appendix 10)

Genital ulcers and HIV infection

Syphilitic chancre, genital herpes and chancroid are the most common genital ulcer disease. Genital ulcer disease increases the risk of transmitting and contracting HIV by up to nine times.57 Herpetic ulcers (and ulcerative STIs in general) in HIV-infected patients may be atypical and persist for a long time.

Laboratory-assisted differential diagnosis of genital ulcer disease (GUD) may often be misleading initially. For example, in areas where there is high prevalence of syphilis, a person may have a reactive serological test from a previous infection, even when the cause of the present ulcer may be non-syphilitic. Conversely, a negative syphilis test does not necessarily exclude chancre of primary syphilis as seroreactivity may take two to three weeks to show.

If examination confirms the presence of genital ulcers, treatment appropriate to local causes should be given.

Available data indicate that syphilis is a significant problem in the Pacific Island region.58–65 Lack of local data on seroprevalence of HSV-2 infection in many countries and territories often makes it difficult to add treatment for herpes to routine protocol for management of genital ulcer disease. Rates of chancroid in the Pacific are also difficult to ascertain. Haemophilus ducreyi, which causes painful chancroid, is still endemic in some developing parts of the world, particularly where HIV is prevalent.66 Granuloma inguinale (donovanosis), caused by Klebsiella granulomatis, is another disease for which it is difficult to find Pacific data.67–70 Even less information is available for Lymphogranuloma venereum (LGV) caused by Chlamydia trachomatis serovars L1 to L3.
Recommended syndrome treatment of genital ulcer disease is to:

- treat for syphilis;
- provide genital herpes management;
- where applicable, treat for chancroid, granuloma inguinale (donovanosis) and/or lymphogranuloma venereum (LGV);
- advise on basic care of the ulcer (keep clean and dry);
- aspirate any fluctuant glands (avoid surgical incision ) to prevent spontaneous rupture;
- educate and counsel on compliance with treatment and risk reduction;
- promote and provide condoms;
- offer HIV serological testing where appropriate facilities and counselling are available;
- advise the patient to return in seven days if the lesion is not fully healed and sooner if the clinical condition becomes worse; and
- assist with partner treatment (all sexual partners in the preceding three months, or last sexual partner if last contact was more than three months earlier).

**Syndrome 7: Inguinal bubo (Appendix 11)**

Inguinal and femoral buboes are localised inguinal lymph node enlargements, which are painful and may be fluctuant. LGV and chancroid are common causes of inguinal buboes. Non-sexually transmitted local and systemic infections (e.g. infections of the lower limb or tuberculous lymphadenopathy) can also cause swelling of inguinal lymph nodes.

Appendix 11 outlines the approach to the patient with a bubo or buboes and Table 22 summarises recommended antibiotics.

Recommended syndrome treatment consists of:

- therapy for chancroid;
  
  and

- therapy for Lymphogranuloma venereum (LGV)
Table 21: Treatment options for genital ulcer disease

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice</th>
<th>Effective substitutes</th>
<th>If patient is pregnant, breastfeeding or under 16 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syphilis (primary)</td>
<td>Benzathine penicillin 2.4 million units by single intramuscular injection</td>
<td>Doxycycline* 100 mg orally twice a day for 14 days or Tetracycline* 500 mg orally 4 times a day for 14 days</td>
<td>Benzathine penicillin 2.4 million units by single intramuscular injection or Erythromycin** 500 mg orally 4 times a day for 15 days</td>
</tr>
</tbody>
</table>

Additional therapy for HSV-2 where common (>30%)

<table>
<thead>
<tr>
<th>Genital herpes</th>
<th>Primary infection Acyclovir* 400 mg orally 3 times a day for 7 days</th>
<th>Primary infection Famiclovir* 250 mg orally 3 times a day for 7 days or Valaciclovir* 1 g twice a day for 7 days</th>
<th>Use acyclovir only when benefit outweighs risk (see Annex 4). Dosage is the same as for primary infection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent infection: Acyclovir* 400 mg orally 3 times a day for 5 days</td>
<td>Recurrent infection: Famiclovir* 125 mg orally 3 times a day for 5 days or Valaciclovir* 500 mg twice a day for 5 days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In areas where chancroid, granuloma inguinale or Lymphogranuloma venereum are important causes of genital ulcers, the following treatments can be added.

<table>
<thead>
<tr>
<th>Chancroid</th>
<th>Ciprofloxacin 500 mg orally twice a day for 3 days or Azithromycin 1 g orally as a single dose or Erythromycin** 500 mg orally 4 times a day for 7 days</th>
<th>Ceftriaxone 250 mg as a single intramuscular injection</th>
<th>Erythromycin** 500 mg orally 4 times a day for 7 days or Azithromycin 1 g orally as a single dose or Ceftriaxone 250 mg as a single intramuscular injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granuloma inguinale (donovanosis) (treatment should be continued until all lesions have completely epithelialised)</td>
<td>Azithromycin 1 g orally as a single dose followed by 500 mg once a day or Doxycycline* 100 mg orally twice a day</td>
<td>Erythromycin 500 mg orally 4 times a day or Tetracycline* 500 mg orally 4 times a day or Trimethoprim (80 mg)/Sulfamethoxazole (400 mg), 2 tablets orally twice a day</td>
<td>Azithromycin 1 g orally as a single dose or Erythromycin** 500 mg orally 4 times a day</td>
</tr>
<tr>
<td>Lymphogranuloma venereum (LGV)</td>
<td>Doxycycline* 100 mg orally twice a day for 14 days or Erythromycin** 500 mg orally 4 times a day for 14 days</td>
<td>Tetracycline* 500 mg orally 4 times a day for 14 days</td>
<td>Erythromycin** 500 mg orally 4 times a day for 14 days</td>
</tr>
</tbody>
</table>

Notes:
* Contraindicated for pregnant or breastfeeding women.
** Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity; only erythromycin base or erythromycin ethylsuccinate should be used.
Note:

- Treatment for LGV generally takes 14 days to complete, but some cases may require longer treatment.
- Improvement is usually seen within one week; it may take a few weeks for complete healing.
- Patients should be counselled on the need to complete the course of antibiotics even if symptoms improve earlier.
- Follow-up visits every one to two days may be needed to drain the bubo or buboes. Fluctuant lymph nodes should be aspirated (through healthy skin) to prevent spontaneous rupture. Incision and drainage or excision of nodes may delay healing, and should not be attempted.
- Where there is doubt and/or treatment failure, referral for diagnostic biopsy is advisable.
- All sexual partners in the last three months (or the most recent partner if last sexual contact was more than three months previously) should be treated for the same conditions – that is, chancroid and LGV – even if they are asymptomatic.
- To prevent re-infection, the patient should avoid sexual intercourse or use condoms with past partner(s) until both the patient and the partner have completed treatment.
- To prevent infection of new partners, the patient should avoid intercourse or use condoms until the initial treatment is completed.

**Table 22: Inguinal bubo treatment to cover chancroid and LGV**

<table>
<thead>
<tr>
<th>STI</th>
<th>First choice Choose one from each box (= two drugs)</th>
<th>Effective substitutes</th>
<th>If patient is pregnant, breastfeeding or under 16 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chancroid</td>
<td>Ciprofloxacin* 500 mg orally twice a day for 3 days or Erythromycin** 500 mg orally 4 times a day for 7 days</td>
<td>Azithromycin, 1 g orally as a single dose or Ceftriaxone 250 mg as a single intramuscular injection</td>
<td>Erythromycin** 500 mg orally four times a day for 14 days (covers both chancroid and LGV)</td>
</tr>
<tr>
<td>LGV</td>
<td>Doxycycline* 100 mg orally twice a day for 14 days</td>
<td>Tetracycline* 500 mg orally 4 times a day for 14 days</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- * Contraindicated for pregnant or breastfeeding women.
- ** Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity; only erythromycin base or erythromycin ethylsuccinate should be used.
Treatment of specific sexually transmitted infections

This section outlines the symptoms and the treatment considerations for a range of specific STIs. Treatment of a specific STI should be based on laboratory confirmation and/or specific clinical presentations.

Gonococcal infection

Gonorrhoea is the most common symptomatic uncomplicated anogenital infection that is dealt with in STI clinics and other health care settings in the Pacific Island region.\(^{56}\)

Transmission

Neisseria gonorrhoeae is basically transmitted through sexual contact. It can also be passed from mother’s genital tract to the newborn during vaginal delivery causing ophthalmia neonatorum or systemic neonatal infection. Transmission through blood can cause disseminated gonococcal infection especially in the younger age group.

Diagnosis

Clinical features

In males, it may present as:

- asymptomatic infection (in some males);
- urethral discharge and dysuria;
- upper respiratory tract infection;
- rectal infection, which may cause anal discharge or perianal pain;
- acute epididymo-orchitis (more common in men aged over 35 years);
- fever, petechial or pustular skin lesions, asymmetrical arthralgia, septic arthritis, and tenosynovitis in disseminated infection; and
- very rarely, meningitis or endocarditis.

In females, it may present as:

- asymptomatic infection (more common than for males);
- mucopurulent endocervical discharge, contact bleeding (cervicitis);
- altered vaginal discharge;
- acute lower abdominal pain and tenderness; and
- disseminated infection (as in males).

In newborns, it presents as:

- purulent conjunctivitis.
Laboratory diagnosis

- N. gonorrhoeae is a gram-negative intracellular, aerobic diplococcus that can be identified from genital, rectal, pharyngeal or ocular secretion of infected individuals.

- Methods involve gram staining/methylene blue stain and microscopy by visualising the diplococci in leucocytes.

- Culture and sensitivity provide confirmation of gonococcal infection and sensitivity to antimicrobials.

Treatment considerations

Some Pacific small island countries and territories have reported a large proportion of resistant gonococcal isolates to penicillins, tetracyclines and quinolones.\textsuperscript{56, 89, 90} Adding anti-chlamydia therapy for all patients with gonorrhoea is strongly recommended because dual infection is common and difficult to differentiate. Also in most countries and territories of the region, laboratory testing for the presence of chlamydia is not available.

Table 23 sets out the recommended regimens for treating a variety of manifestations of gonococcal infection, along with some alternatives.

Prevention of gonococcal ophthalmia neonatorum

Identifying and treating pregnant mothers for both gonococcal and chlamydial infection is the best form of prevention. However, if this approach is not possible, any of the preparations below can be instilled into the infant’s eyes immediately after delivery:

- silver nitrate 1% aqueous solution in a single application;
  or
- erythromycin 0.5% ophthalmic ointment in single application;
  or
- tetracycline ophthalmic ointment 1% in a single application.

It must be remembered that these alternative measures do not provide ocular protection against chlamydial infection.

Management of sex partner(s)

Sexual partners should be treated for both gonococcal and chlamydial infections similar to those of the index patient’s protocol. Categories of sexual contacts to be treated include:

- all sex partners within the preceding 14 days, or last partner if longer, for symptomatic index of gonorrhoea; and
- in asymptomatic cases, all partners within the preceding 90 days.\textsuperscript{71,99}
Table 23: Recommended treatment and alternate regimens for gonococcal infection

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncomplicated gonorrhoea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin 500 mg orally as a single dose</td>
<td>Amoxicillin 2.5g plus Amoxicillin/clavulanic acid 500mg/125 mg plus Probenecid 1 g orally all as a single dose</td>
<td>Ciprofloxacin is contraindicated in pregnancy, and is not recommended for use in children and adolescents.</td>
</tr>
<tr>
<td>Ceftriaxone 125 mg by intramuscular injection (IM) as a single dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefixime 400 mg orally as a single dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plus medication below for chlamydial infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin 1 g orally as a single dose</td>
<td>Doxycycline 100 mg orally twice a day for 7 days</td>
<td></td>
</tr>
<tr>
<td><strong>Disseminated gonococcal infection (DGI)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone 1 g IM or IV every 24 hours for 7 days Note: Use another third generation cephalosporins if ceftriaxone is not available</td>
<td>Cefotaxime 1 g IV every 8 hours for 7 days</td>
<td>For gonococcal meningitis and endocarditis, the same drug regimen can be applied; but for endocarditis, the duration will be for 4 weeks.</td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin 500 mg IV every 12 hours for 7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spectinomycin 2 g IM every 12 hours for 7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin 500 mg orally twice daily</td>
<td>Also, for DGI, the above regimen may be continued for 48 hours after clinical improvement of patients, and then consider switching to oral preparations.</td>
</tr>
<tr>
<td></td>
<td>Ofloxacin 400 mg orally twice daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cefixime 400 mg orally twice daily</td>
<td></td>
</tr>
<tr>
<td><strong>Adult gonococcal ophthalmia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone 1 g intramuscular (IM) as a single dose</td>
<td>Spectinomycin 2 g IM as a single dose</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin 500 mg orally as a single dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neonatal gonococcal ophthalmia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone 50 mg/kg IM as a single dose to a maximum of 75 mg</td>
<td>Kanamycin 25 mg/kg IM as a single dose to a maximum of 75 mg</td>
<td>Frequent conjunctival irrigation with saline</td>
</tr>
<tr>
<td>Ciprofloxacin 25 mg/kg IM as a single dose to a maximum of 75 mg</td>
<td>Spectinomycin 25 mg/kg IM as a single dose to a maximum of 75 mg</td>
<td></td>
</tr>
</tbody>
</table>
Chlamydia infections
Survey in some of the countries and territories of the region\(^{56,92–94}\) indicate that Chlamydia trachomatis is the most common bacterial STI in the general population. Contact tracing and treatment of sexual partners are important.

Transmission
Like the gonococcal infection, chlamydia is basically sexually transmitted. Similarly, transmission from mother to newborn during vaginal delivery, causing neonatal conjunctivitis, is also possible.

Diagnosis
The signs and symptoms are mainly of those secondary to cervicitis or urethritis and to complications. Chlamydial infection is symptomatic in about 30 per cent of women and 75 per cent of men.\(^{71,98}\)

Clinical Features
In males, it may present as:
- urethritis;
- prostatitis; and
- epididymitis.
In females, it may present as:
- cervicitis and/or pelvic inflammatory disease (PID); and
- ectopic pregnancy.
In both sexes, it may present as:
- infertility;
- proctitis (rectal disease and bleeding); and
- reactive arthritis.
In newborns, it may present as conjunctivitis or lung infection.

Laboratory diagnosis
Laboratory diagnostic tests with sensitivity of over 90 per cent and specificity of over 99 per cent provide ideal results. However, in most Pacific small island countries and territories routine laboratory test to identify chlamydial infection is not available except in surveys.

Treatment considerations
Table 24 sets out recommended regimens for treating chlamydia in a range of different age and weight groups, along with some alternatives.
Management of sex partner(s)
Counsel the index client on safer sexual practices, and the importance of contact tracing for treatment.

Also ask them to abstain from sexual intercourse until they complete the seven-day drug regimen.

Screen and treat the last sex partner even if the last sexual contact was about two months prior to the index patient being diagnosed.\textsuperscript{71}

Syphilis
Syphilis is a curable systemic disease caused by the spirochaete, Treponema pallidum (T. pallidum). The majority of people with infectious and latent syphilis will be detected as a result of having a blood test for syphilis rather than presenting with symptoms. Screening people at risk of syphilis (i.e. through antenatal screening and offering testing to people who present with HIV or other STIs) is therefore an important way to detect and treat it.

Transmission
The infection can be transmitted through sexual contact, through blood transfusion or from mother-to-child in utero.\textsuperscript{72,88} The time between infection with syphilis and the start of the first symptom can range from 10 to 90 days (average 21 days).

Acquired syphilis is further classified into early and late syphilis. Early syphilis is categorised still further into primary infection (i.e. ulcer or chancre at the infection site), secondary infection (manifestations that include but are not limited to skin rash, mucocutaneous lesions, and lymphadenopathy), and late or tertiary infection (i.e. cardiac, ophthalmic, auditory abnormalities and gummatous lesions). Latent infection has no clinical manifestations but is only detected through serologic testing.

Latent syphilis is further categorised into early latent syphilis, where the infection is acquired within the preceding year and of less than two years’ duration, and late latent syphilis, were the infection is of more than two years’ duration without clinical evidence of treponemal infection. These classifications had been provided by WHO based on infectiousness of the syphilis infection, and its response to drug therapy. Though the early stages are more infectious, patients tend to respond better to treatments during this time.

A few weeks after infection occurs, the body produces syphilis antibodies that can be detected by an accurate, safe and inexpensive blood test. A low level of antibodies will likely stay in the blood for months or years even after the disease has been successfully treated. Because untreated syphilis in a pregnant woman can infect and possibly kill her developing baby, every pregnant woman should have a blood test for syphilis.
Table 24: Recommended treatment and alternate regimens for Chlamydial trachomatis infections

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimens</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adults, adolescents, and children &gt;45 kg – uncomplicated anogenital infections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin 1 g as single dose orally or Doxycycline 100 mg twice daily for 7 days</td>
<td>Erythromycin base 500 mg orally 4 times a day for 7 days or Erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 days or Amoxicillin 500 mg orally 3 times a day for 7 days or Ofloxacin 300 mg orally twice a day for 7 days or Tetracycline 500 mg orally 4 times a day for 7 days</td>
<td>Azithromycin may be more appropriate as a single dose. Doxycycline may be cheaper and has been on the market much longer.</td>
</tr>
<tr>
<td><strong>Chlamydia in pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin base 500 mg orally 4 times a day for 7 days</td>
<td>Doxycycline (and other tetracyclines) and ofloxacin are contraindicated in pregnancy. Erythromycin estolate is contraindicated during pregnancy because of possible related hepatotoxicity, while erythromycin base and erythromycin ethylsuccinate are considered safe for use. Efficacy of 1 g azithromycin as a single dose in pregnancy is not clear.</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin 500 mg orally 3 times a day for 7 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neonatal chlamydia conjunctivitis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin 50 mg/kg/day orally 4 times a day for 14 days</td>
<td>Because of possible co-infection with N. gonorrhoeae, treat both microbes.</td>
<td></td>
</tr>
<tr>
<td>Trimethoprim 40 mg/Sulfamethoxazole 200 mg orally twice a day for 14 days</td>
<td>There is not enough evidence on added benefit if topical agent is added to the systemic therapy.</td>
<td></td>
</tr>
<tr>
<td><strong>Infantile chlamydial pneumonia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin 50 mg/kg a day orally divided four times a day for 14 days.</td>
<td>Treatment is offered based mainly on clinical and chest X-ray findings.</td>
<td></td>
</tr>
<tr>
<td><strong>Chlamydial infections among children &lt;45 kg</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin 50 mg/kg/day orally divided 4 times a day for 7 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Children who weigh &gt;45 kg but are aged &lt;8 years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin 1 g orally in a single dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Children &gt; 8 years old</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin 1 g orally in a single dose</td>
<td>Doxycycline 100 mg orally twice daily for 7 days</td>
<td></td>
</tr>
</tbody>
</table>
The syphilis bacterium can infect the baby of a woman during her pregnancy. Depending on how long a pregnant woman has been infected, she may have a high risk of having a stillbirth or neonatal death. An infected baby may be born without signs or symptoms of disease. However, if not treated immediately, the baby may develop serious problems within a few weeks. Untreated babies may become developmentally delayed, have seizures or die.

Genital sores (chancres) caused by syphilis bleed easily. When they come in contact with oral or rectal mucosa during sex, they increase the infectiousness of and susceptibility to HIV by disrupting barriers that provide protection against infections. The risk of acquiring HIV increases by an estimated two to five times if a person when syphilitic lesions are present.

**Diagnosis**

**Clinical features**
- Incubation period is 9 to 90 days;
- Many people infected with syphilis have no symptoms for years;
- Some of the symptoms may not be clear.

**Primary stage**
- There is often a single painless sore (chancre) usually 1–2 cm, firm, round and raised on the genitalia, rectum or lips (but there may be multiple sores.) The chancre lasts for six weeks, and heals without treatment. If not adequately treated, the infection progresses to the secondary stage.
- Untreated primary chancre will heal in three to eight weeks.

**Secondary stage**
- Secondary syphilis is a systemic infection (in the blood) and may come and go over a year (occasionally up to two years) after initial infection.
- Skin rash and mucous membrane lesions characterise the secondary stage. The rash usually does not cause itching and it appears as rough, red or reddish brown spots both on the palms of the hands and the bottoms of the feet. However, rashes with a different appearance may occur on other parts of the body.
- Other symptoms of secondary syphilis may include fever, swollen lymph glands, sore throat, patchy hair loss, headaches, weight loss, muscle aches and fatigue. The signs and symptoms of secondary syphilis will resolve without treatment within one to two years, but without treatment the infection will progress to the latent and possibly late stages of disease.

**Latent stages**
- In the latent stage, untreated syphilis will manifest with signs or symptoms of syphilis. (This stage usually occurs one to two years after the initial infection.)
- Latent syphilis is often referred to as either:
  - early latent syphilis (infection of less than two years); or
- late latent syphilis (infection of more than two years).

- Problems associated with latent syphilis are that:
  - transmission from mother to baby via blood can occur for up to nine years after the initial infection; and
  - tertiary syphilis can develop.

- There is no risk of transmission to sexual contacts. (Transmission usually only happens when there are genital lesions associated with primary or secondary syphilis.)

- Contacts may not need to be treated but should be tested.

Tertiary stage
- The late stages of syphilis appear 10 to 20 years after infection was first acquired.
- In the late stages of syphilis, the disease may subsequently damage the internal organs, including the brain, nerves, eyes, heart, blood vessels, liver, bones and joints.
- Signs and symptoms of the late stage of syphilis include difficulty coordinating muscle movements, paralysis, numbness, gradual blindness and dementia. This damage may be serious enough to cause death.

Neonatal
- Early signs are characteristic skin lesions, lymphadenopathy, hepatosplenomegaly, failure to thrive, blood-stained nasal discharge (snuffles), perioral fissures, meningitis, choroiditis, hydrocephalus, seizures, mental retardation, osteochondritis and pseudoparalysis.
- Later signs are gummatous ulcers, periosteal lesions, paresis, tabes, optic atrophy, interstitial keratitis, sensorineural deafness and dental deformities.

Laboratory diagnosis
- Syphilis can be diagnosed by examining material scraped from a chancre using a dark-field microscope and identifying spirochetes.
- Specific (treponemal) tests are one of the most common types of blood screening tests used to detect evidence of syphilis. They detect antibodies in the blood to Treponema pallidum and are specific to syphilis (and yaws):
  - While several specific tests are available, most laboratories use one specific test (e.g. Treponema pallidum particle agglutination, TPPA; Treponema pallidum hemagglutination TPHA; fluorescent treponemal antibody absorption, FTA-ABS; rapid tests such as Determine syphilis TP).
  - Specific tests are reported as either non-reactive or reactive. (See Table 25 for more on interpreting the results from a TPHA test.)
- Non-specific (non-treponemal) tests are the other commonly used type of blood screening test but they are not specific to syphilis:
  - Rapid Plasma Reagin (RPR) is the test used.
- RPR test is measurable, and the result is reported as non-reactive or reactive. (See Table 25 for more on interpreting the results from an RPR test.)
- If it is reactive, it is diluted to give a dilution or titre (1:1, 1:2, 1:4, 1:8, 1:16, 1:32 etc.) – see Figure 3 below.
- With a serial dilution, the person’s blood (serum) is diluted and more reagin is added. Therefore the higher the titre, the more diluted the person’s blood – so a high titre is usually an indication of recent acquisition and infectivity.
- The RPR generally rises early in a new infection, and will drop over time, or with treatment. The RPR will become non-reactive in only 25 per cent of people, so often people with either treated or untreated infection will have a low resting titre (1:1, 1:2, 1:4 and sometimes higher). In general, though, a titre of 1:8 or greater indicates that a person has acquired syphilis in the last two years.

Note: Venereal Disease Research Laboratory (VDRL) is a non-specific test that is no longer used in the region. (The terminology is still in use but should be phased out as it is misleading.)

- In some patients with syphilis (especially in the latent or late stages), a lumbar puncture (spinal tap) must be done to check for infection of the nervous system.

Figure 2: Variation in RPR titre after infection

Source: Reprinted with permission from Gavin Hart, courtesy of Anna McNulty, SPC.
Table 25: Interpreting serological test results

<table>
<thead>
<tr>
<th></th>
<th>RPR/VDRL*</th>
<th>RPR/VDRL* titre</th>
<th>TPHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active infection</td>
<td>+</td>
<td>&gt;1:8</td>
<td>+</td>
</tr>
<tr>
<td>Latent syphilis</td>
<td>+</td>
<td>Often &lt;1:4</td>
<td>+</td>
</tr>
<tr>
<td>False positive</td>
<td>+</td>
<td>Usually &lt;1:4</td>
<td>−</td>
</tr>
<tr>
<td>Successful treatment</td>
<td>+ / −</td>
<td>2 titres decrease (e.g. from 1:16 to 1:4)</td>
<td>+</td>
</tr>
</tbody>
</table>

Source: http://who.int/reproductive-health/publications/ris_gap/annex3.htm
Note:
*The terminology VDRL is still in use in some countries but this non-specific that is no longer used in the region.

Treatment considerations

The level of antimicrobials in the blood for an effective treponemicidal efficacy must be maintained both in the serum and the cerebrospinal fluid (CSF).

Penicillin G, administered parentally, is the preferred drug for all stages of syphilis.76 Before administering penicillin, find out about the penicillin sensitivity status of the client with syphilis.

Syphilis in pregnancy

Pregnant women who have reactive RPR or VDRL should be treated, even in absence of a confirmative test like the Treponema pallidum haemagglutination assay (TPHA).73, 99,102

The Jarisch Herxheimer74 reaction can be precipitated by the treatment of pregnant women during the second half of their pregnancy, risking premature labour or foetal distress. These women may be best referred from the peripheral health services for special medical and obstetrical care.

A pregnant woman who is not allergic to penicillin and is suffering from syphilis infection should be treated with penicillin on a dosage and schedule equal to those of a woman who is not pregnant. Following treatment, it is helpful to conduct a quantitative non-treponemal serological test (e.g. RPR titres) each month in evaluating the patient’s response to treatment. Any evidence of relapse or re-infection warrants re-treatment.

Syphilis among HIV-infected people

For all syphilis patients, VCCT for a HIV screening test must be offered.

In people who both are HIV positive and have syphilis, serologic responses are unusual. Thus, when clinical findings suggest syphilis but serological tests are non-reactive or unclear, undertake alternative investigative tests such as biopsy of the lesion, dark-field microscopy, and direct fluorescent antibody staining of lesion material.

The recommended antibiotic regimen for treatment of early syphilis is the same for any person regardless of HIV status. However, where feasible, CSF examination should be carried out to determine response to treatment.
Table 26: Recommended treatment and alternate regimens for early syphilis, late latent syphilis and neurosyphilis

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzathine benzylpenicillin* 2.4 million IU IM at a single dosage</td>
<td>Procaine benzylpenicillin** 1.2 million IU IM daily for 10 consecutive days</td>
<td>Because of the volume and the painful nature of this type of injection, the required quantity is often administered in two separate injections.</td>
</tr>
<tr>
<td>Alternate regimen for non-pregnant client who is allergic to penicillin: Doxycycline 100 mg orally twice daily for 14 days or Tetracycline 500 mg orally 4 times a day for 14 days</td>
<td>Doxycycline and tetracycline are contraindicated throughout pregnancy and breastfeeding.</td>
<td></td>
</tr>
<tr>
<td>Alternate regimen for pregnant patients who are penicillin allergic Erythromycin 500 mg orally 4 times a day for 14 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late latent syphilis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzathine benzylpenicillin* 2.4 million IU IM weekly for 3 weeks</td>
<td>Procaine benzylpenicillin** 1.2 million IU IM daily for 20 consecutive days</td>
<td></td>
</tr>
<tr>
<td>Alternate regimen for non-pregnant patients who are penicillin allergic: Doxycycline 100 mg orally twice daily for 30 days or Tetracycline 500 mg orally 4 times a day for 30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternate regimen for pregnant patients who are penicillin allergic: Erythromycin 500 mg orally 4 times a day for 30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurosyphilis (CNS disease can occur at any stage of syphilis)</td>
<td>Aqueous benzylpenicillin* 12–24 million IU IV per day, administered as 3–4 million units four-hourly or as continuous infusion for 10–14 days</td>
<td>A patient with syphilis who is showing clinical signs of central nervous system (CNS) involvement (e.g. cognitive dysfunction, motor or sensory deficits, ophthalmic or auditory symptoms, cranial nerve palsies, and signs and symptoms of meningitis) should have a CSF examination. Patients with neurosyphilis or syphilitic eye disease (e.g. uveitis, neuroretinitis or optic neuritis) should be treated with the same recommended regimen.</td>
</tr>
<tr>
<td>Procaine benzylpenicillin** 1.2–2.4 million IU IM daily for 10–14 days plus Probenecid 500 mg orally 4 times a day for 10–14 days (This regimen may be considered for patients who will most likely comply with it.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Recommended regimen | Alternate regimen | Comments
--- | --- | ---
Alternate regime for penicillin-allergic non-pregnant patients

| Doxycycline 100mg orally twice daily for 30 days  
| or  
| Tetracycline 500mg orally 4 times daily for 30 days  
| or  
| Ceftriaxone 2g IM or IV daily for 10–14 days |

Note: Ceftriaxone can be used as an alternate for neurosyphilis although cross-reactivity between it and penicillin exists. Before initiating therapy, determine the safety of ceftriaxone for a patient with neurosyphilis by conducting a skin test to confirm allergy to penicillin.

Notes:
* Other terms for benzathine benzylpenicillin are: benzathine penicillin G; benzylpenicillin benzathine; benzathine penicillin.
** Other terms for procaine benzylpenicillin are: procaine penicillin G.

Recommended treatment regimen for early syphilis, late latent syphilis and neurosyphilis

Table 26 sets out the recommended regimens for treating early syphilis (meaning primary or secondary syphilis, or latent syphilis of not more than two years), late latent syphilis and neurosyphilis, along with one or more alternatives in each case.

Follow-up after treatment

Follow-up includes clinical evaluation at one to two weeks and then clinical and serologic evaluation at 3, 6, 9, 12 and 24 months after treatment with VDRL/RPR titres. If the patient is HIV-positive, annual testing should be continued. For a patient with neurosyphilis, follow-up examination of the CSF should be done at six-month intervals. The CSF-VDRL/RPR often will stay positive for years after therapy.

A significant and continuing drop (by four times or more) in VDRL/RPR titre is expected as an indication of cure for treated syphilis.\(^75\) The slope of the fall in non-treponemal antibodies is logarithmic and depends on the stage of disease at the time of treatment. Seroreversal is more rapid if the duration of infection prior to therapy is shorter, and if the pre-treatment titre is lower.

All patients should be monitored following therapy until free of clinical disease and until titres are stable at negative or low (1:4 or less) levels.

Management of sex partner(s)

Generally, any person who has been exposed sexually to a person diagnosed with syphilis should be clinically and serologically evaluated.

- People who were exposed within the 90 days preceding the diagnosis of primary, secondary or early latent syphilis in a sex partner should be treated presumptively.
- People who were exposed more than 90 days before the diagnosis of primary, secondary or early latent syphilis in a sex partner should be treated presumptively if serologic test results are not available immediately and the opportunity for follow-up is uncertain.
• For purposes of partner notification and presumptive treatment of exposed sex partners, patients with syphilis of unknown duration who have high non-treponemal serologic test titres (i.e. >1:32) can be assumed to have early syphilis. However, serologic titres should not be used to differentiate early from late latent syphilis for the purpose of determining treatment.

• Long-term sex partners of patients who have latent syphilis should be evaluated clinically and serologically for syphilis and treated on the basis of the evaluation findings.

The following guide is offered to assist with the identification of at-risk partners. Sex partners should generally be treated where exposure was within:

• three months plus duration of symptoms for primary syphilis;
• six months plus duration of symptoms for secondary syphilis; and
• one year for early latent syphilis.

Congenital syphilis

Congenital syphilis is divided into two categories: early syphilis (first two years) and late syphilis (which becomes apparent later in life).

In the first 15 months of life, diagnosing congenital syphilis may be complicated by maternal treponemal antibodies present in an infant. Therefore a reactive treponemal test after age of the 18 months is diagnostic of congenital syphilis. A reactive non-treponemal test at this age should be fully re-evaluated and the infant should be treated for congenital syphilis.

The antenatal treatment of the mother reduces the risk but the newborn needs to be followed up on a regular basis, for at least six months (as non-treponemal antibodies should decline by three months and should non-reactive by six months of age). It is possible to prevent vertical transmission through antenatal screening of all expectant mothers at 28 and 36 weeks of gestation and by providing appropriate treatment. Routine screening of newborns using their sera or umbilical cord blood is not recommended as the result may be influenced by the titre level of the mother or if the mother was infected late in the pregnancy.

Identify and trace any sex partner(s) exposed in the 90 days preceding the diagnosis of the mother with syphilis so that they are evaluated and treated accordingly.

Recommended treatment regimen

Table 27 sets out the recommended regimens for treating congenital syphilis, along with some alternatives for early syphilis.
Table 27: Recommended treatment and alternate regimens for congenital syphilis

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early congenital syphilis (up to two years of age) and infants with abnormal CSF</td>
<td>Aqueous benzylpenicillin 100,000–150,000 IU/kg/day administered as 50,000 IU/kg/dose IV every 12 hours during the first seven days of life and every eight hours thereafter for a total of 10 days</td>
<td>Procaine benzylpenicillin 50,000 IU/kg IM daily for 10 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital syphilis of two years or more</td>
<td>Aqueous benzylpenicillin 200,000–300,000 IU/kg/day IV or IM, administered as 50,000 IU/kg/dose every 4–6 hours for 10–14 days</td>
<td>Tetracyclines should not be used in young children.</td>
</tr>
</tbody>
</table>

Granuloma inguinale (donovanosis)

Granuloma inguinale is a genital ulcerative disease caused by the intracellular gram-negative bacterium Klebsiella granulomatis (also known as Calymmatobacterium granulomatis). It is said to be endemic in some tropical and developing countries like Papua New Guinea,54,77,99 central Australia and India. It may be an important differential in travellers returning from these endemic regions with a genital ulcerative disease.

Diagnosis

Clinical features

- painless and progressive ulcerative lesions without regional lymphadenopathy;
- lesions that are highly vascular (‘beefy red appearance’); and
- lesions that can bleed easily on contact.

Treatment considerations

Once treatment is started, it should be continued until all ulcers are granulated and completely epithelialised. Note that relapse can occur 6 to 18 months after effective therapy, and the patient may need re-treatment. Table 28 sets out recommended regimens for treating granuloma inguinale, along with some alternatives.
Table 28: Recommended treatment and alternate regimens for granuloma inguinale (donovanosis)

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin 1 g orally on first day then 500 mg orally each day thereafter</td>
<td>Ciprofloxacin 750 mg orally twice a day</td>
<td>Carefully consider the possibility of adding a parenteral aminoglycoside (e.g. gentamycin 1 mg/kg IV every eight hours) to any of these regimens if improvement is not evident within the first few days or for treatment of HIV positive patient. Discuss with a specialist in the field.</td>
</tr>
<tr>
<td>Doxycycline 100 mg orally twice a day for at least 3 weeks or until lesion is completely healed</td>
<td>Erythromycin base 500 mg orally 4 times a day</td>
<td></td>
</tr>
<tr>
<td>Trimethoprim-sulfamethoxazole one double-strength (800 mg/160 mg) orally twice a day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Management of sex partner(s)
Counsel, examine and offer treatment to all sex partners of the index client with granuloma inguinale who were exposed in the 60 days before onset of the client’s symptoms.99

Lymphogranuloma venereum

Lymphogranuloma venereum (LGV) is caused by Chlamydia trachomatis serovars L1, L2 or L3. This condition may be rare in the Pacific Island region but some cases have been recorded in Fiji.56, 103,109

Diagnosis

Clinical features
- tenderinguinal and/or femoral lymphadenopathy, usually unilateral;
- proctocolitis or inflammatory changes of perirectal or perianal lymphatic tissues resulting in fistulas and strictures (in women, and in men who have sex with men); and
- genital ulcer at site of inoculation (often self limited).

Diagnosis is by exclusion of other causes of inguinal lymphadenopathy or genital ulcers.

Treatment considerations
Table 29 sets out the recommended regimen for treating LGV, along with an alternative.
Table 29: Recommended treatment and alternate regimens for LGV

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doxycycline 100 mg orally twice daily for 21 days</td>
<td>Erythromycin base 500 mg orally 4 times a day for 21 days</td>
<td>Erythromycin can be used for treatment of pregnant women with LGV. Doxycycline is contraindicated in pregnancy.</td>
</tr>
</tbody>
</table>

Management of sex partner(s)

Counsel, examine and offer the same recommended regimen to all sexual contacts within the last 30 days before onset of the client’s symptoms.

Chancroid

Chancroid is an infection caused by gram-negative facultative anaerobic bacillus, Hemophilus ducreyi. Clients can be co-infected with T. pallidum or herpes simplex virus. Chancroid is common in the United States. In some Pacific small island countries and territories, like Fiji, three to four cases are seen annually.56,103,109

Diagnosis

Clinical features
- presence of one or more painful genital ulcers; and
- tender and suppurative inguinal lymphadenopathy.

Laboratory diagnosis
- Diagnosis can be done on special culture media or by polymerase chain reaction (PCR).

Treatment considerations

Table 30 sets out the recommended regimens for treating chancroid, along with an alternative.

Table 30: Recommended treatment and alternate regimens for chancroid

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin 500 mg orally twice daily for 3 days</td>
<td>Ceftriaxone 250 mg IM as a single dose</td>
</tr>
<tr>
<td>Azithromycin 1 g orally as a single dose</td>
<td></td>
</tr>
<tr>
<td>Erythromycin base 500 mg orally 4 times a day for 7 days</td>
<td></td>
</tr>
</tbody>
</table>
Management of sex partner(s)
Counsel, examine and treat sex partners of index clients with chancroid regardless of whether symptoms of the disease are present, especially if the patient had sex with the partner(s) in the 10 days preceding the patient’s onset of symptoms.

Genital herpes simplex virus infections
Two serotypes of herpes simplex virus (HSV) infect humans: HSV-1 and HSV-2. HSV-2 causes recurrent genital herpes which is usually life-long viral infection. The major public health importance of HSV-2 is in facilitating HIV transmission.73

Most people with HSV may have mild, unrecognised infections but continue to shed the virus into the genital tract, thus may continue to transmit to another person without recognising or being aware of it. HSV-2 is almost always sexually transmitted.

Herpes in pregnancy
Measures to prevent neonatal herpes include preventing transmission during late pregnancy and during delivery. (A caesarean section does not totally eliminate the risk of HSV transmission to the infant.)

Careful history taking and physical examination of pregnant patients with HSV should assist in the prevention of transmission to the newborn.

Herpes and HIV co infection
In the presence of HIV, atypical herpetic lesions complicate the diagnosis.77 In people who are HIV positive, most lesions respond well to acyclovir but the dose may need to be increased and given over a longer duration than is normally advised.

Suppressive therapy is usually beneficial.
Herpes and suppressive therapy
Suppressive therapy reduces the frequency of genital herpes recurrences by 70 to 80 per cent, especially in those patients who usually experience six or more recurrences per year.73, 76, 78-80 Safety and efficacy have been documented among patients who have used daily dosages of acyclovir for as long as six years, and among those using valaciclovir or famciclovir daily for one year.
Suppressive therapy reduces but does not eliminate sub-clinical viral shedding.

Diagnosis

Clinical features
- multiple painful vesicular or ulcerative lesions.

Laboratory diagnosis
- If available and necessary, serological and/or virological test to differentiate HSV-1 and HSV-2 may assist with prognosis and counselling of clients.

Treatment considerations

Antiviral therapy offers clinical benefits: altering the recurrence of the herpes; reduces formation of new lesions, duration of the pain, healing time and viral shedding.

Counselling regarding the natural history of the disease, sexual and perinatal transmission, and how to decrease transmission is also integral to herpes management.

Table 31 sets out the recommended treatment and alternate regimens for a range of conditions related to HSV infection, including both first and recurrent episodes of HSV.

Management of sex partner(s)

Counsel, evaluate and treat sex partners who are symptomatic in the same way as the index client. Counsel asymptomatic sex partners of symptomatic index clients regarding any histories of herpes; educate about the nature of the disease and offer safer sex options.

Venereal (genital) warts

Venereal warts (condylomata acuminata) are caused by human papilloma virus (HPV). There are over 100 subtypes of HPV, of which 30 to 40 can be sexually transmitted. Most do not cause significant disease in humans. However, some subtypes – notably types 16 and 18, 31 and 33 – have been confirmed to cause cervical, rectal and penile cancer, respectively.82

Transmission and incubation

HPV is spread through direct skin-to-skin contact during oral, genital or anal sex with an infected partner. The viral particles are able to penetrate the skin and mucosal surfaces through microscopic abrasions. Once cells are invaded by HPV, a latent (quiet) period of months to up to three years may occur.
Table 31: Recommended treatment and alternate regimens for HSV infection

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>For first clinical episode of identified infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 400 mg orally 3 times a day for 7 days</td>
<td>Valaciclovir 1 g orally twice a day for 7 days</td>
<td></td>
</tr>
<tr>
<td>Acyclovir 200 mg orally 5 times a day for 7 days</td>
<td>Famciclovir 250 mg orally 3 times a day for 7 days</td>
<td></td>
</tr>
<tr>
<td>For recurrent infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 800 mg orally twice a day for 5 days</td>
<td>Famciclovir 125 mg orally twice a day for 5 days</td>
<td></td>
</tr>
<tr>
<td>Valaciclovir 1 g daily for five days</td>
<td>Valaciclovir 500 mg orally twice a day for 5 days</td>
<td></td>
</tr>
<tr>
<td>For suppressive therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 400 mg orally twice a day, continuously</td>
<td>Giving the lowest continuous dose possible that will suppress recurrence of the condition is the aim of this therapy.</td>
<td></td>
</tr>
<tr>
<td>Valaciclovir 500 mg or 1 g orally daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famciclovir 250 mg orally twice a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For severe diseases in general</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 5–10 mg/kg IV every 8 hours for 5 to 7 days or until clinical resolution is reached</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For severe herpes simplex lesions with HIV co-infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 400 mg orally 3 to 5 times a day until clinical resolution is reached</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For severe disease in neonates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acyclovir 10 mg/kg IV 3 times a day for 10–21 days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis**

**Clinical features**
- most genital warts do not cause any symptoms;
- small, flesh-coloured or grey swellings in the skin of genital area, mouth, urethral meatus or cervix;
- several warts close together that take on a cauliflower shape;
- itching or discomfort in the genital area; and
- bleeding with intercourse in vaginal and rectal warts.

**Laboratory diagnosis**
- Identifying a specific subtype is difficult in the Pacific Island region.
- Pap smear can detect any HPV-induced cellular abnormalities.
Treatment considerations

The treatment of the venereal wart depends on what is available in the country or territory, the preference of the patients, and the experience of the health worker. Table 32 sets out some recommended treatments that can be either administered by the provider or applied by the patient.

Management of sex partner(s)

Counsel, evaluate and treat sex partners who are symptomatic. Also counsel asymptomatic sex partners of symptomatic index clients regarding any history of HPV, educate about the nature of the disease and, for female contacts of symptomatic male index, offer regular papsmear screening.

Trichomonas vaginalis infections

Trichomonas vaginalis infections are caused by protozoan Trichomonas vaginalis, and are almost exclusively sexually transmitted in adults. The prevalence of these infections in the Pacific Island region is high.\(^{53-56,92-94}\)

Diagnosis

Clinical features

- Most males may be asymptomatic while some may present with non-gonococcal urethritis (NGU).
- Women may present with an offensive and often frothy vaginal discharge and vulval itching, but some may be asymptomatic.

Laboratory

- Microscopic examination of vaginal secretion can be done to identify the protozoa but it usually has low sensitivity (60 to 70 per cent).
- Culture is most sensitive by polymerase chain reaction (PCR).

Trichomoniasis in pregnancy

T. vaginalis can lead to pre-term delivery, low birth weight and premature rupture of membranes.

Though metronidazole is not recommended during the first trimester, it can be started as soon as possible once it is considered safe to do so.

Treatment considerations

Table 33 sets out the recommended regimens for treating trichomoniasis in adults and neonates, along with an alternate regimen for vaginal infections.
Table 32: Recommended treatment and alternate regimens for venereal warts

<table>
<thead>
<tr>
<th>Superficial warts</th>
<th>Self applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider administered</td>
<td>Podophyllotoxin 05% solution or gel twice daily for three days, followed by four days of no treatment, then restart the cycle to a maximum of four times (total volume of podophyllin should not exceed 0.5 ml per day).</td>
</tr>
<tr>
<td>Podophyllin resin 10–25% in compound tincture of benzoin, applied to the warts only, and left to air-dry. External genitalia and perianal warts should be washed thoroughly one to four hours after application. Repeat on a weekly basis. Note: Use of this treatment in pregnant and lactating women is contraindicated. or Trichloroacetic acid (TCA) 80–90% or dichloroacetic acid (BCA) 80–90%. Apply a small amount to the warts and allow to dry. Powder the treated area with talc or baking soda or liquid soap to remove unreacted acid. Repeat weekly, if necessary. or Cryotherapy with liquid nitrogen, solid carbon dioxide or a cryoprobe. Repeat applications every one to two weeks. or Electrosurgery or Surgical removal</td>
<td>Imiquimod 5% cream. Patients should apply this preparation once a day before bed time, three times a week for up to 16 weeks. The treatment area should be washed with soap and water 6–10 hours after the application. The safety of this preparation during pregnancy has not been established.</td>
</tr>
<tr>
<td>Vaginal warts</td>
<td></td>
</tr>
<tr>
<td>Cryotherapy with liquid nitrogen or Podophyllin 10–25%. Allow to dry before removing speculum. or Trichloroacetic acid (TCA) 80–90%</td>
<td></td>
</tr>
<tr>
<td>Cervical warts</td>
<td></td>
</tr>
<tr>
<td>No TCA or podophyllin should be used. Pap smear is recommended. Consult and refer to specialists.</td>
<td></td>
</tr>
<tr>
<td>Meatal and urethral warts</td>
<td></td>
</tr>
<tr>
<td>Cryotherapy or Podophyllin 10–25%, in compound tincture of benzoin or podophyllotoxin 0.5%. Urethroscopy is necessary (if available) to diagnose intra-urethral warts; otherwise it should be suspected in men who are having repeated warts infection.</td>
<td></td>
</tr>
</tbody>
</table>
Table 33: Recommended treatment and alternate regimens for trichomoniasis

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole 2 g orally in a single dose or Tinidazole 2 g orally in a single dose</td>
<td>Metronidazole 400 mg or 500 mg orally twice daily for seven days or Tinidazole 500 mg orally twice daily for five days</td>
<td>The cure rate for females increases if the sexual partner(s) is also treated. Patients should not consume alcohol while taking the medication through to 24 hours after taking the last dose of medication. Metronidazole is not recommended for pregnant women during the first trimester.</td>
</tr>
<tr>
<td>Urethral infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole 400 mg or 500 mg orally twice a day for seven days or Tinidazole 500 mg orally twice a day for five days</td>
<td></td>
<td>The recommended regimen for urethral infection is the alternate regimen for vaginal infection. Patients should not consume alcohol while taking the medication through to 24 hours after taking the last dose of medication.</td>
</tr>
<tr>
<td>For neonatal infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole 5 mg/kg orally three times daily for five days</td>
<td></td>
<td>If infants have symptoms of trichomoniasis or with urogenital colonisation, persisting past the fourth month of life, they should be treated with metronidazole.</td>
</tr>
</tbody>
</table>

**Bacterial vaginosis**

Bacterial vaginosis (BV) is a clinical syndrome that results from replacement of normal hydrogen peroxide-producing Lactobacillus sp. in the vagina with high concentrations of anaerobic bacteria (e.g. Provitella sp. and Mobiluncus sp.), Gardnerella vaginalis and Mycoplasma hominis. BV is usually associated with multiple sex partners, douching and lack of vaginal lactobacilli but it is still unclear whether BV results from contracting infection from a sexually transmitted pathogen.

Treatment of sexual partners has not beneficial effects in preventing the recurrence of BV.
Diagnosis

Clinical features

- a homogenous, white, non-inflammatory discharge that smoothly coats the vaginal walls; and
- a fishy odour of vaginal discharge before or after addition of 10% potassium hydroxide (KOH) (i.e. the whiff test).

Laboratory diagnosis

Factors in diagnosis are:

- the presence of clue cells on microscopic examination; and
- a pH of vaginal fluid >4.5.

BV in pregnancy

BV during pregnancy may cause premature rupture of membranes, premature labour, pre-term birth and postpartum endometritis. Symptomatic pregnant women, and those with recurrence of symptoms after completing treatment, should be re-treated.

BV and surgical procedures

The use of antimicrobial coverage (metronidazole) for routine operative prophylaxis before abortion and hysterectomy reduces infectious complications associated with BV.\textsuperscript{77,88,99,102}

Any female with BV who is to undergo surgical procedures of the reproductive tract or therapeutic abortion should receive treatment with metronidazole.

Treatment considerations

Table 34 sets out the recommended regimens for treating BV, including in pregnant women, along with some alternatives.
**Table 34: Recommended treatment and alternate regimens for bacterial vaginosis**

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Metronidazole 400–500 mg orally twice a day for seven days | Metronidazole 1 g orally as a single dose  
or  
Clindamycin 2% vaginal cream 5 g intravaginally at bed time for seven days  
or  
Metronidazole 0.75 g gel, 5 g intravaginally twice a day for five days  
or  
Clindamycin 300 mg orally twice a day for seven days | Regimen for pregnant women |

| Tinidazole 500 mg orally twice daily for five days  
or  
Metronidazole 200 mg or 250 mg orally three times a day for seven days after the first trimester  
or  
Metronidazole 1 g orally as a single dose | Clindamycin 300 mg orally twice a day for seven days  
or  
Metronidazole 0.75% gel, 5 g intravaginally twice a day for seven days | Clindamycin cream or oral clindamycin can be used on cases where the patient is intolerant of or allergic to metronidazole. |

**Candidiasis**

Vulvo-vaginal candidiasis, in the majority of cases, is caused by Candida albicans.

It does not usually spread by sexual intercourse but if infection recurs in the female sex partner despite therapy, treatment of sex partner(s) is recommended.

Candidiasis usually occurs in conditions where there is diminished immunity such as the use of antibiotics, antiseptic/antibiotic vaginal preparations or vaginal douching, uncontrolled diabetes, immunosuppression and corticosteroid. All these factors therefore increase the chances of recurrence.

**Diagnosis**

Clinical features

In women:
- non-offensive curd-like vaginal discharge; and
- vulval itching and soreness.
In men:

- erythema of glans penis or inflammation of glans penis or foreskin (balanoposthitis).

Laboratory diagnosis

- C. albicans is isolated on fungal culture.

**Vulvo-vaginal candidiasis in HIV infection**

Candidiasis at several sites is an important correlate of HIV infection. It may be severe and often relapsing.

**Treatment considerations**

Table 35 sets out the recommended regimens for treating vulvo-vaginal candidiasis and balanoposthitis, along with some alternatives.

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>For vulvo-vaginal candidiasis</td>
<td></td>
</tr>
<tr>
<td>Miconazole or clotrimazole 200 mg intravaginally daily for 3 days</td>
<td>Nystatin 100,000 IU intravaginally daily for 14 days</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Clotrimazole 500 mg intravaginally as a single dose</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Fluconazole 150 mg orally as a single dose</td>
<td></td>
</tr>
<tr>
<td>For balanoposthitis</td>
<td></td>
</tr>
<tr>
<td>Clotrimazole 1% cream twice a day for 7 days</td>
<td>Nystatin cream twice a day for 7 days</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Miconazole 2% cream twice a day for 7 days</td>
<td></td>
</tr>
</tbody>
</table>

**Scabies**

Scabies is caused by the mite Sarcoptes scabiei and is transmitted by direct body contact. However, scabies can also be transmitted through infested beddings, clothes and other materials.

Within one hour of being transmitted to another person’s skin, the mite burrows. The mite’s faecal matter containing the proteases (enzymes) generates a hypersensitivity reaction, causing itching, which leads to typical pruritis manifestation after two to six weeks after infestation.
Treatment considerations
Table 36 sets out the recommended regimens for treating scabies, including specific recommendations for those under 10 years of age and pregnant and lactating women, along with an alternate regimen.

Table 36: Recommended treatment and alternate regimens for scabies

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Alternate regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>For adults, adolescents and children:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindane 1% lotion or cream applied thinly to all areas of the body from the neck and washed off thoroughly after eight hours or Permethrin cream 5% or Crotamiton 10% lotion applied to entire body from neck down nightly for two nights and washed off thoroughly 24 hours after the final application or Sulphur 6% in petrolatum applied to the entire body from neck down nightly for three nights. Patients may bathe before reapplying the product and should bathe 24 hours after the final application.</td>
<td>Benzy1benzoate 25% lotion applied to the entire body from neck down nightly for two nights</td>
<td>Lindane is not recommended for pregnant or lactating women. Sexual contact(s) and household contacts should be treated also.</td>
</tr>
<tr>
<td>For infants, children &lt;10 years of age, pregnant and lactating women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crotamiton 10% as above or Sulphur 6% as above or Permethrin 5% cream applied in the same way as the sulphur regimen, described above</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pubic lice
The louse, Pthirus pubis, is the causative agent transmitted by sexual contact.

Treatment considerations
Table 37 sets out the recommended regimens for treating pubic lice.
Table 37: Recommended treatment regimens for pubic lice

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lindane 1% lotion or cream rubbed gently and thoroughly into the infested area and adjacent hairy areas. Leave for eight hours and then wash off thoroughly. or Lindane 1% shampoo applied and then left for four hours before thoroughly washing off or Pyrethrins plus piperonyl butoxide applied to the infested and adjacent hairy areas. Leave for 10 minutes and then wash off. If after seven days there are lice or eggs observed at the hair–skin junction, re-treatment is recommended. Clothing or bed linen, which may have been contaminated by the patient, especially 48 hours prior to the commencement of the treatment, can then be washed thoroughly and dried. or Permethrin 1%</td>
<td>Lindane is not recommended for pregnant or lactating women.</td>
</tr>
</tbody>
</table>

Hepatitis B

Hepatitis B is a virus that can cause serious or even fatal damage to the liver. Hepatitis B is usually transmitted through contact with blood, semen, vaginal fluids or saliva, or from mother to baby before or during birth. The virus is many times more infectious than HIV.

Hepatitis B can be acute or chronic. People with self-limiting infection clear the infection spontaneously within weeks to months.

Children are less likely than adults to clear the infection. More than 95 per cent of people who become infected as adults or older children will stage a full recovery and develop protective immunity to the virus.53

Acute infection begins with general ill health, loss of appetite, nausea, vomiting, body aches, itchy skin, mild fever, dark urine, and then progresses to development of jaundice. The illness lasts for a few weeks and then gradually improves in most affected people but a few may have more severe liver disease and may die as a result of it. The infection may be entirely asymptomatic and may go unrecognised in some.

Chronic infection may be either asymptomatic or may be associated with a chronic inflammation of the liver, leading to cirrhosis over a period of several years. This type of infection dramatically increases the incidence of hepatocellular carcinoma. Chronic carriers are encouraged to avoid consuming alcohol as it increases their risk for cirrhosis and liver cancer.

Hepatitis B and HIV

Hepatitis B generally does not influence HIV disease progression and severity. However, liver disease due to hepatitis B causes significant morbidity and mortality in people with HIV.
Hepatitis B and antiretroviral therapy

Highly active antiretroviral therapy (HAART) can be used safely and effectively with HIV-positive people co-infected with hepatitis B. Short-term flare of hepatitis B can occur during the initial phase of HAART in many of these co-infected people due to immune reconstitution. To avoid this flare, treating hepatitis B infection together with HAART is recommended.

Some anti-HIV drugs can increase liver enzymes in people with hepatitis B. The drugs particularly associated with liver side effects are ritonavir, indinavir, nevirapine, zidovudine, didanosine; as well as some drugs used to treat other infections to which people with HIV can be vulnerable, including pentamidine, some sulphur-based antibiotics, and ketoconazole.

Diagnosis

Laboratory diagnosis

- Hepatitis B viral antigens and antibodies are detectable in the blood following acute infection.

- Hepatitis B viral antigens and antibodies are detectable in the blood of a chronically infected person.

- Hepatitis B surface antigen (HBsAg) is most frequently used for screening purposes. However, early in an infection, this antigen may not be present and it may be undetectable later in the infection as it is being cleared by the host. Individuals who remain HBsAg positive for at least six months are considered to be hepatitis B carriers.  

- More recently, PCR tests have been developed to detect and measure the amount of viral nucleic acid in clinical specimens. These tests are called viral loads and are used to assess a person's infection status and to monitor treatment. 

Treatment considerations

Acute hepatitis B infection does not usually require treatment because most adults clear the infection spontaneously. Early antiviral treatment may only be required in less than 1 per cent of patients, whose infection takes a very aggressive course (fulminant hepatitis) or who are immunocompromised. On the other hand, treatment of chronic infection may be necessary to reduce the risk of cirrhosis and liver cancer. Chronically infected individuals with persistently elevated serum alanine aminotransferase (ALT), a marker of liver damage, and HBV DNA levels are candidates for therapy.

Although none of the available drugs can clear the infection, they can stop the virus from replicating, and prevent liver damage such as cirrhosis and liver cancer. Treatments include: antiviral drugs such as lamivudine, adefovir and entecavir, and immune system modulators such as interferon alpha.

Infants born to mothers known to carry hepatitis B can be treated with antibodies to the hepatitis B virus (hepatitis B immune globulin or HBIG). When given with the vaccine within
12 hours of birth, the risk of acquiring hepatitis B is reduced by 95 per cent. This treatment allows a mother to safely breastfeed her child.

Table 38 sets out the recommended regimens for treating hepatitis B.

Hepatitis B treatment in HIV co-infection
HAART in a person with hepatitis B should include an anti-HIV drug that is also effective against hepatitis B, such as 3TC or tenofovir. Combining 3TC and tenofovir may provide effective treatment for both HIV and hepatitis B. Anti-HIV drugs should not be used for the treatment of hepatitis B if the person is not taking HAART. Instead, alpha interferon should be administered to reduce the possibility of resistance.

Table 38: Recommended treatment regimens for hepatitis B

<table>
<thead>
<tr>
<th>Recommended regimen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-interferon given by injection, usually three times a week for four months</td>
<td>Alpha-interferon works less well in men, people who have had hepatitis B for a long time, people who have large amounts of hepatitis B DNA, and people who are also infected with HIV.</td>
</tr>
<tr>
<td>Lamivudine 3TC 100 mg taken orally daily for a year or two</td>
<td>It is not known how long it is necessary to take 3TC for; life-long therapy may be needed in some. 3TC should never be given as monotherapy to people who have hepatitis B and HIV co-infection if they have a detectable HIV viral load, as the low dose could lead to the development of 3TC resistance.</td>
</tr>
</tbody>
</table>

Prevention

Prevention of transmission
In preventing the transmission of hepatitis B, important measures are to:

- practise safe sex;
- avoid sharing needles;
- immunise at-risk individuals;
- wear gloves when exposed to blood or body fluids;
- clear up blood or body fluids with warm water and detergent;
- use disposable surgical instruments or sterilise reusable ones adequately;
- handle sharps safely;
• if there is risk of infected material splashing into the eye, wear goggles; and
• for health care workers who are positive for HBeAg, work away from areas where they could be a risk to others.

Immunisation
The hepatitis B vaccine is safe and effective.

It is recommended for:
• those who may be exposed to blood or blood products through their occupation, such as health care workers, ambulance crews, carers of high-risk or known patients, and morticians;
• travellers who intend to stay for long periods in areas with a high prevalence of hepatitis B;
• those considered to be at risk of hepatitis B through their planned activities, such as volunteers undertaking manual work, contact sports, casual sex;
• young children who may be in close contact with the local population and therefore at risk of cuts and scratches; and
• haemophiliacs.

All pregnant women should be screened for HBV. If positive, the baby should receive vaccination soon after birth. The sexual partner and any existing children should also be immunised.

Immunisation schedule
The hepatitis B vaccine is administered intramuscularly, usually into the deltoid muscle. The vaccine should be given into the deltoid region or anterior thigh in babies. It is less effective if given into the buttock. It is quite possible that a course may give life-long immunity, but for health professionals with good antibody response a booster every five years is recommended. Antibody titres should be tested in health professionals two to four months after the primary course. A titre above 100 mIU/ml is regarded as adequate.

The following are the range of schedules:
• The standard course of immunisation involves three injections at zero, one and six months.
• An accelerated course of three injections at zero, one and two months is possible.
• Adults who need protection very quickly can have a schedule of 0, 7 and 21 days. After an accelerated course, a booster at one year is recommended. It can be used in those who are immunocompromised, as with HIV infection, but a higher dose or extra booster injections may be required.

Post-exposure management
Post-exposure prophylaxis (PEP) involves giving the hepatitis B vaccine and possibly immunoglobulin too if required.
Immunoglobulin is given at a different site and it does not reduce the immune response to the vaccine.

If the status of the source is unknown, assume infection.

PEP may be indicated even if the exposed person has received the hepatitis B vaccine previously.

It should be given within 48 hours and certainly no later than seven days after exposure.

Management of STIs among survivors of sexual abuse and violence

All reproductive health facilities should have up-to-date policies and procedures, in line with local law, for managing people who have survived or experienced sexual abuse or violence. Whether comprehensive services are provided on site or through referral, providers need to be clear about the protocol to be followed and how to manage crises. They should have the necessary supplies, materials and referral contact information in order to deal confidentially, sensitively and effectively with people who have experienced sexual abuse and violence.

The following services should be available, on site or through referral, for patients who have experienced sexual violence:

- essential medical care for any injuries and health problems;
- collection of forensic evidence and proper documentation for legal purposes, including forensic specimens;
- evaluation for STI and preventive care, including STI prophylaxis;
- evaluation of pregnancy risk and prevention with emergency contraception, if necessary;
- specialised counselling and psycho-social support (both at time of crisis and in the long term);
- follow-up services for all of the above; and
- availability of referral services.

STIs among children and adolescents thought to have been sexually abused

Sexual abuse and assault of children and adolescents seriously affect their mental and physical health. The management of the survivors is an important aspect of child and adolescent health care.

STIs in children and adolescents may be asymptomatic. Children thought to have been sexually abused must be routinely screened for STIs. Children diagnosed with an STI must be investigated for the source of infection because the identification of a sexually transmissible agent in a child beyond the neonatal period is suggestive of sexual abuse. However, exceptions do exist. For example, genital infection with C. trachomatis may be perinatally acquired, which may persist for up to three years. In addition, BV and genital
mycoplasma have been identified in non-abused children. Genital warts, although suggestive of assault, are not specific for abuse.

Susceptibility and clinical presentation of STIs in children and adolescents

The clinical presentations of STIs are similar in children and adults. However, adolescents (particularly females) are regarded as being more biologically susceptible to infection and at increased risk of morbidity as the genital tract undergoes changes in response to increasing levels of ovarian hormones.

Evaluation for STIs in children and adolescents

Examination of children and adolescents for sexual assault or abuse should be arranged in a way that minimises further trauma.

Only well-trained health care workers must handle children and adolescents, and they must show respect and maintain confidentiality. Knowledge of how to take a good medical and sexual history and of how to overcome the patient’s fear of pelvic examination is essential in managing STIs in children.

Special care must be taken in collecting the required specimens in order to avoid undue psychological and physical trauma to the patient. A paediatric speculum is rarely, if ever, needed in examination of pre-pubescent sexual assault victims. STIs in children sometimes manifest differently from adults.

The scheduling of examinations should be based on the history of assault or abuse, taking into consideration that repeat examination and collection of additional specimens may be required to allow sufficient time for infections to incubate and antibodies to develop.

Initial investigation

The choice of tests must be made on a case-by-case basis. An initial investigation should include:

- swabs for microscopy/culture/sensitivities for N. gonorrhoeae and C. trachomatis from the pharynx and anus in both sexes, the vagina in girls, and the urethra in boys. Cervical specimens should not be collected from pre-pubertal girls. In boys, a meatal specimen of urethral discharge is an adequate substitute for an intraurethral swab specimen when a discharge is present;
- a vaginal swab for T. vaginalis wet-mount microscopy to identify the presence of clue cells for BV;
- where available, tissue culture for herpes simplex virus and dark-field microscopy or direct fluorescent antibody testing for T. pallidum from a specimen collected from vesicles or ulcers in children of all ages and in adolescents; and
- if the last sexual exposure occurred more than 12 weeks before the initial examination, a serum test for antibodies to T. pallidum, hepatitis B virus and HIV, after consent from the parents.
Examination at 12 weeks following assault

An examination and serological tests for T. pallidum, HIV and hepatitis B virus should be repeated at 12 weeks following the last sexual exposure to allow time for the development of antibodies to infectious agents.

Treatment considerations

Table 39 sets out presumptive treatment options for children, with guidance on when these recommendations cease to apply for older children and adolescents.

Table 39: STI presumptive treatment options for children and adolescents

<table>
<thead>
<tr>
<th>STI</th>
<th>Children</th>
<th>Adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syphilis</td>
<td>Benzathine penicillin 50,000 units/kg of body weight by single intramuscular injection or Erythromycin 12.5 mg/kg of body weight orally four times a day for 14 days</td>
<td>&gt;45 kg, use adult protocol</td>
</tr>
<tr>
<td>Gonorrhoea/ chancroid</td>
<td>Cefixime 8 mg/kg of body weight as a single dose or Ceftriaxone 125 mg by intramuscular injection or Spectinomycin 40 mg/kg of body weight (maximum 2 g) by intramuscular injection</td>
<td>&gt;45 kg, use adult protocol</td>
</tr>
<tr>
<td>Chlamydia/ LGV</td>
<td>Erythromycin 12.5 mg/kg of body weight orally four times a day for seven days</td>
<td>12 years or older, use adult protocol</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>Metronidazole 5 mg/kg of body weight orally three times a day for seven days</td>
<td>12 years or older, use adult protocol</td>
</tr>
</tbody>
</table>

Sexual violence (rape) in adults

STIs among adult victims of sexual violence

- Sexual violence is common in both males and females but is frequently not talked about. Health care workers should maintain a high index of suspicion.

- Many individuals are reluctant to talk directly about abuse by their intimate partner. They may be ashamed to discuss it, or they may be afraid of future violence if the situation is exposed.

- Male survivors of rape rarely come forward due to shame and fear of stigma and discrimination.

- People who have been sexually abused may need shelter and legal protection.

- Psycho-social management includes counselling and supportive services, which should be available on site or by referral.
Medical and psycho-social support for survivors of sexual assault

- Survivors of sexual assault should be rapidly evaluated to determine whether they need emergency medical, psychological or social intervention.

- It is important to remember that the trauma of the event may make parts of the examination difficult.

- Explain carefully the steps that will be taken and obtain written informed consent from the patient before proceeding with examination, treatment, notification or referral for legal reasons.

- History and examination findings must be well documented.

- It is the client’s right to decide whether to be examined.

- Treatment can be started without examination if that is the patient’s choice.

- For minors under the age of consent, usually parental consent is required. If at all possible, do not deny adolescents immediate access to medical services.

Where facilities or referral for a more complete examination are not available, the following minimal information should be collected:

- date and time of assault;

- date and time of examination;

- patient’s statement; and

- results of clinical observations and any examinations conducted.

Such information should be collected or released to the authorities only with the survivor’s consent. Be aware of legal obligations that will follow if the assault is reported and goes to legal proceedings. Ideally, a trained health care provider of the same sex should accompany the survivor during the history taking and examination.

A careful written record should be made of all findings during the medical examination. Pictures to illustrate findings may help later in recalling details of the examination.

The medical management of the survivor includes treatment of any injuries sustained in the assault, and initial counselling. Emergency contraception and STI prophylaxis should be offered early to survivors of sexual violence. For many women, the trauma of the event may be aggravated and prolonged by fear of pregnancy or infection. Knowing that the risks can be reduced may give immense relief.

Emergency contraception

Emergency contraceptive pills can be administered immediately, preferably within 72 hours but not after five days after unprotected intercourse.

A second option for emergency contraception is insertion of a copper-bearing intrauterine device (IUD) within five days of the rape. The IUD may be removed during the woman’s next menstrual period or left in place for continued contraception. Even if an IUD is inserted, full STI treatment should still be given as recommended in Table 40.
Counsel the client about the possibility of pregnancy at a later time. However, she should first be offered a pregnancy test to rule out the possibility of pre-existing pregnancy.

**Post-exposure prophylaxis of STIs**

STI post-exposure prophylaxis must be started on the same day as emergency contraception, although the doses should be spread out (and taken with food) to reduce side effects.

Table 40 lists options that are effective taken either soon after exposure or after the appearance of symptoms.

**Table 40: STI presumptive treatment options for adults**

<table>
<thead>
<tr>
<th>STI</th>
<th>Option 1</th>
<th>Option 2</th>
<th>If patient is pregnant, breastfeeding or under 16 years old</th>
<th>Choose one from each box (= three or four drugs).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syphilis</td>
<td>Benzathine penicillin 2.4 million units by single intramuscular injection</td>
<td>Doxycycline 100 mg orally twice a day for 14 days</td>
<td>Benzathine penicillin 2.4 million units by single intramuscular injection</td>
<td></td>
</tr>
<tr>
<td>Gonorrhoea/ chancroid</td>
<td>Cefixime 400 mg orally as a single dose or Ceftriaxone 125 mg by intramuscular injection</td>
<td>Ciprofloxacin 500 mg orally as a single dose or Spectinomycin 2 g by intramuscular injection</td>
<td>Cefixime 400 mg orally as a single dose or Ceftriaxone 125 mg by intramuscular injection</td>
<td></td>
</tr>
<tr>
<td>Chlamydia/ LGV</td>
<td>Azithromycin 1 g orally as single dose</td>
<td>Doxycycline 100 mg orally twice a day for seven days or Tetracycline 500 mg orally four times a day for seven days</td>
<td>Azithromycin 1 g orally as single dose or Erythromycin 500 mg orally four times a day for seven days</td>
<td></td>
</tr>
<tr>
<td>T. vaginalis</td>
<td>Metronidazole 2 g orally as a single dose</td>
<td>Tinidazole 2 g orally as a single dose</td>
<td>Metronidazole 2 g orally as a single dose, or 400–500 mg three times a day for 7 days</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1: OSSHHM-endorsed content for basic core HIV care team training

Training is conducted as six half-day sessions.

<table>
<thead>
<tr>
<th>Session 1: Introduction to support for HIV care under the Pacific Regional HIV Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test to assess participants’ knowledge in advance of training</td>
</tr>
<tr>
<td>Presentation covering the following topics:</td>
</tr>
</tbody>
</table>

- Introductory discussion on HIV epidemiology and the ‘state of play’ with HIV services in the country
- Introduction to the Pacific Regional HIV Strategy Implementation Plan (PRSIP) including:
  - partners involved
  - countries covered
  - funding streams
- Key messages about antiretroviral therapy:
  - It does not have to be expensive and is currently available under regional funding streams.
  - It does not just delay death but can keep people well for the long term.
  - HIV is a chronic manageable illness.
- Provision of antiretroviral therapy under the PRSIP:
  - regional procurement mechanism in Suva
  - drugs are WHO pre-approved
  - country eligibility for funding streams
  - pharmacist-to-pharmacist support for stock management
  - training, technical support and mentorship for clinical teams from SPC in medium term, plus WHO
  - OSSHHM
- Nine criteria for effective and sustainable antiretroviral therapy (ART):
  1. National decision-making bodies are committed to providing ART in the country.
  2. An assigned central unit, with an identified leader, is responsible for provision of medical care to people receiving ART.
  3. People living with HIV have been involved in development of care services.
  4. Ongoing supply of ART has been secured and at least six months’ supply is available in country.
5. A technically sound ART protocol has been developed and is available.

6. A local partnership of public health services, clinical services and community organisations exists to ensure a continuum of care and support for people taking treatment, including support for ART adherence.

7. A core multidisciplinary HIV care team has received appropriate training.

8. Diagnostic services are available to perform HIV antibody tests and essential routine tests to monitor for drug toxicity.


Tea break

Group work to assess the site against the nine criteria and plan action needed to ensure they are met in the near future.

Session 2: The biology of HIV and HIV treatment

Presentation covering the following topics:

- HIV life cycle (demonstrated using an animated film):
  - fusion
  - reverse transcription
  - integration
  - transcription and polyprotein synthesis
  - protease activity
  - assembly
  - budding

- Resistance
  - application of evolutionary theory
  - relationship between resistance and adherence
  - clinical implications

Tea break

Group work on the factors that bear on adherence and strategies to enhance it.
Session 3: Introduction to the spectrum of HIV disease

Presentation covering the following topics:

- The dynamic nature of HIV infection in terms of production and destruction of HIV and CD4 lymphocytes (bucket and tap analogy)
- Likely impossibility of eradication due to long-lived cells with integrated proviral DNA
- ‘AIDS’ – discussion of history and current meaning
- Monitoring people with HIV not yet on treatment (including ‘prevention with positives’)
- Physical examination
- CD4 count
- Viral load
- Common course of HIV infection
- Common HIV-related conditions, their management and prophylaxis:
  - skin problems
  - candidiasis
  - oral hairy leukoplakia
  - acute necrotising ulcerative gingivitis
  - Kaposi’s sarcoma
  - aphthous ulcers
  - CMV retinitis
  - pneumocysis pneumonia
  - tuberculosis
  - wart virus infections
  - herpes simplex
  - varicella zoster
  - tinea
- WHO clinical staging of HIV

Tea break

Interactive case discussion:

1. A young woman presenting with recurrent vaginal thrush turns out to have HIV.
2. A 35-year-old man who is known to have HIV diagnosed overseas presents for a ‘check up’.
Session 4: Prevention of mother-to-child transmission of HIV

Presentation covering the following topics:

- Prevalence and mechanisms of mother-to-child transmission (MTCT) of HIV
- Risk factors for MTCT:
  - overall
  - specific to transmission during pregnancy
  - specific to transmission during labour and delivery
  - specific to transmission during breastfeeding
- The four elements of preventing MTCT under the WHO/UNICEF guidelines:
  - primary prevention of HIV in women
  - prevention of unintended pregnancy in women with HIV
  - measures to reduce risk of transmission from HIV-positive mothers to their babies
  - treatment, care and support services for women with HIV, their babies and their families, including:
    - antenatal care and HIV testing
    - antiretroviral therapy
    - labour and delivery
    - neonatal prophylaxis
    - infant feeding
    - diagnosis of HIV in infants
    - care of infants born to mothers with HIV

Tea break

Interactive case discussion

A 20-year-old woman presents to antenatal clinic at 30 weeks' gestation by dates. She is found to have gonorrhoea and also tests positive for HIV.

Session 5: Antiretroviral therapy

Presentation covering the following topics:

- Fusion inhibitors:
  - mode of action (illustrated by animated film)
- Nucleoside reverse transcriptase inhibitors (NRTI):
  - names, codes and combinations
- mode of action (illustrated by animated film)
- adverse effects
- final common pathway of most NRTI toxicity:
  o structure and function of mitochondria
  o consequences of mitochondrial failure
- peripheral lipoatrophy

• Non-nucleoside reverse transcriptase inhibitors (NNRTI):
  - names and codes
  - mode of action (illustrated by animated film)
  - adverse effects

• Protease inhibitors:
  - names and codes
  - mode of action (illustrated by animated film)
  - adverse effects

• Drug interactions
• When to start?
• Choice of starting regimen
• Monitoring people taking antiretroviral therapy
• Antiretroviral failure and second-line regimens
• Continuum of care and engaging other health and welfare services

Tea break

Interactive case discussion

1. A 26-year-old man, diagnosed HIV positive two years ago, presents with weight loss and falling CD4 – preparation for starting therapy and early follow-up (including role plays).

2. A 36-year-old woman, on treatment with stavudine/didanosine/nevirapine overseas for several years, presents with mitochondrial adverse effects – diagnosis and management.

Post test to assess effectiveness of training
Session 6: Next steps and clinical mentorship

Interactive discussion covers any issues that remain unclear and identifies the next steps for implementation.

This session is also utilised to provide direct mentorship of clinicians in clinic if patients are available to be seen.
Appendix 2: Summary of WHO clinical staging of HIV in adults and adolescents

<table>
<thead>
<tr>
<th>Clinical stage 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
</tr>
<tr>
<td>Persistent generalised lymphadenopathy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical stage 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexplained moderate weight loss (under 10% of presumed or measured body weight)</td>
</tr>
<tr>
<td>Recurrent upper respiratory tract infections (sinusitis, tonsillitis, otitis media, pharyngitis)</td>
</tr>
<tr>
<td>Herpes zoster</td>
</tr>
<tr>
<td>Angular cheilitis</td>
</tr>
<tr>
<td>Recurrent oral ulceration</td>
</tr>
<tr>
<td>Papular pruritic eruptions</td>
</tr>
<tr>
<td>Seborrhoeic dermatitis</td>
</tr>
<tr>
<td>Fungal nail infection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexplained severe weight loss (over 10% of presumed or measured body weight)</td>
</tr>
<tr>
<td>Unexplained chronic diarrhoea for longer than one month</td>
</tr>
<tr>
<td>Unexplained persistent fever (intermittent or constant for longer than one month)</td>
</tr>
<tr>
<td>Persistent oral candidiasis</td>
</tr>
<tr>
<td>Oral hairy leukoplakia</td>
</tr>
<tr>
<td>Pulmonary tuberculosis (current)</td>
</tr>
<tr>
<td>Severe bacterial infections (e.g. pneumonia, empyema, pyomyositis, bone infection, meningitis, bacteraemia, severe pelvic inflammatory disease)</td>
</tr>
<tr>
<td>Acute necrotising ulcerative stomatitis, gingivitis or periodontitis</td>
</tr>
<tr>
<td>Unexplained anaemia (below 8 g/dl), neutropaenia (below 0.5 x 10^9/l) and/or chronic thrombocytopaenia (below 50 x 10^9/l)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV wasting syndrome</td>
</tr>
<tr>
<td>Pneumocystis pneumonia</td>
</tr>
<tr>
<td>Recurrent bacterial pneumonia</td>
</tr>
<tr>
<td>Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month’s duration or visceral at any site)</td>
</tr>
<tr>
<td>Oesophageal candidiasis (or candidiasis of trachea, bronchi or lungs)</td>
</tr>
<tr>
<td>Extrapulmonary tuberculosis</td>
</tr>
<tr>
<td>Kaposi sarcoma</td>
</tr>
<tr>
<td>Cytomegalovirus infection (retinitis or infection of other organs)</td>
</tr>
<tr>
<td>Central nervous system toxoplasmosis</td>
</tr>
<tr>
<td>HIV encephalopathy</td>
</tr>
<tr>
<td>Extrapulmonary cryptococcosis including meningitis</td>
</tr>
<tr>
<td>Disseminated non-tuberculous mycobacterial infection</td>
</tr>
<tr>
<td>Progressive multifocal leukoencephalopathy</td>
</tr>
<tr>
<td>Chronic cryptosporidiosis</td>
</tr>
<tr>
<td>Chronic isosporiasis</td>
</tr>
<tr>
<td>Disseminated mycosis (coccidiomycosis or histoplasmosis)</td>
</tr>
<tr>
<td>Recurrent septicaemia (including non-typhoidal Salmonella)</td>
</tr>
<tr>
<td>Lymphoma (cerebral or B cell non-Hodgkin)</td>
</tr>
<tr>
<td>Invasive cervical carcinoma</td>
</tr>
<tr>
<td>Atypical disseminated leishmaniasis</td>
</tr>
<tr>
<td>Symptomatic HIV-associated nephropathy or HIV-associated cardiomyopathy</td>
</tr>
</tbody>
</table>
Appendix 3: Flowchart for management of urethral discharge

Patient complains of urethral discharge or dysuria

Take history and examine
Milk urethra if necessary

Discharge confirmed? NO

Any other genital disease? NO

YES

Use appropriate flowchart

TREAT FOR GONOCOCCAL INFECTION AND CHLAMYDIA TRACHOMATIS
- Educate and counsel
- Promote condom use and provide condoms
- Manage and treat partner
- Offer HIV counselling and testing if both facilities are available
- Ask patient to return in 7 days if symptoms persist

Appendix 4: Flowchart for the management of persistent/recurrent urethral discharge in men

Appendix 5: Flowchart for the management of vaginal discharge

Appendix 6: Flowchart for the management of vaginal discharge (Bimanual and speculum, with or without microscope)

Appendix 7: Flowchart for the management of lower abdominal pain

Patient complains of lower abdominal pain

Take history (including gynaecological) and examine (abdominal and vaginal)

Any of the following present?
- Missed/overdue period
- Recent delivery/abortion/miscarriage
- Abdominal guarding and/or rebound tenderness
- Abnormal vaginal bleeding
- Abdominal mass

Refer patient for surgical or gynaecological opinion and assessment
Before referral set up an IV line and apply resuscitation measures if necessary

Is there cervical excitation tenderness, or lower abdominal tenderness and vaginal discharge?

Yes
- Manage for PID
  - Review in 3 days

No
- Any other illness found?
  - Manage appropriately

Patient has improved?

Yes
- Refer

No
- Continue treatment until completed
  - Educate and counsel
  - Promote condom use and provide condoms
  - Offer HIV counselling and testing if both facilities are available
  - Ask patient to return if necessary

Appendix 8: Flowchart for the management of neonatal conjunctivitis

1. Neonate with eye discharge
   - Take history and examine

2. Bilateral or unilateral swollen eyelids with purulent discharge?
   - NO: Reassure mother, Advise to return if necessary
   - YES: TREAT FOR GONORRHOEA AND CHLAMYDIA
     - Educate mother
     - Counsel mother
     - Advise to return in 3 days

3. Improved?
   - NO: Refer
   - YES: Continue treatment until completed
     - Reassure mother

Adapted from: WHO. Guidelines for the management of sexually transmitted infections, 2003: 32
Appendix 9: Flowchart for the management of scrotal swelling

Patient complains of scrotal swelling/pain

- Take history and examine

Swelling/pain confirmed?

- NO
  - Reassure patient and educate
  - Provide analgesics, if necessary
  - Promote condom use and provide condoms
  - Offer HIV counselling and testing if both facilities are available

- YES
  - Testis rotated or elevated, or history of trauma?

- NO
  - Refer for surgical opinion

- YES
  - TREAT FOR GONOCOCAL INFECTION AND CHLAMYDIA TRACHOMATIS
    - Educate and counsel
    - Promote condom use and provide condoms
    - Manage and treat partner
    - Offer HIV counselling and testing if both facilities are available
    - Review in 7 days or earlier if necessary; if worse, refer

Appendix 10: Flowchart for the management of genital ulcers

Patient complains of a genital sore or ulcer

Take history and examine

Only vesicles present? NO

TREAT FOR HSV2
TREAT FOR SYPHILIS IF INDICATED

YES

Sore or ulcer present? NO

Educate and counsel
Promote condom use and provide condoms
Offer HIV counselling and testing if both facilities are available

YES

Educate and counsel on risk reduction
Promote condom use and provide condoms
Manage and treat partner
Offer HIV counselling and testing if both facilities are available

Ulcer(s) healed? NO

Ulcer(s) improving? NO

Refer

YES

YES

Continue treatment for a further 7 days

Appendix 11: Flowchart for the management of inguinal bubo

Appendix 12a How to use a female condom

Insert the condom into the vagina before sexual contact to assist in the prevention of sexually transmitted infection and pregnancy.

Open the package; handling carefully to avoid tearing the condom.

1. Squeeze the flexible inner ring at the closed end of the sheath.
2. Gently insert the inner ring into the vagina.
3. Place the index finger on the inside of the condom, and push the inner ring up as far as it will go.
4. Be sure the sheath is not twisted. The outer ring should remain on the outside of the vagina.

Guide the penis into the sheath’s opening - be sure that the penis is not entering on the side, between the vagina wall and the sheath.

If the condom moves out of place during sex, lubrication can be used either on the inside of the condom or on the penis.

5. To remove the condom, twist the outer ring and gently pull the condom out to avoid spilling the semen.
6. Dispose of the condom in the garbage (not in the toilet). Use only once.

Using a condom makes sex safer for both you and your partner.

Illustrations accessed from http://www.engenderhealth.org/res/ons/sti/preventing/mini/sti6m06.html.
Appendix 12b: How to use a Male Condom

Condoms protect you from the AIDS virus (HIV) by preventing any contact between semen and vaginal fluids. Contact with the other person's blood is also avoided. Since the AIDS virus (HIV) lives in these fluids, condoms stop it being passed on to sexual partners.

1. Check the expiry date on the packet. Open the packet carefully.

2. Wait until the penis is erect. Don't unroll the condom before putting it on.

3. Squeeze the teat on the tip of the condom between two fingers and hold it against the tip of the penis. Note: You must always use a water-based lubricant eg. KY. Never use an oil-based lubricant e.g. Vaseline.

4. Gently unroll the condom, all the way down to the base of the penis.

5. Withdraw the penis immediately after ejaculating and hold the condom firmly on to the penis to stop any spillage. Point the penis downwards and slip the condom off carefully, holding it just below the teat.

6. Put the used condom in a plastic bag. Knot the bag and dispose of it in the garbage. Don't put it down the toilet. Condoms aren't biodegradable and can cause your toilet or septic tank to block up.

Appendix 13: Identified leaders of core HIV care teams in Pacific Island countries and territories as of September 2008

<table>
<thead>
<tr>
<th>Australia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Adam Jenney</td>
<td><a href="mailto:jenneya@unimelb.edu.au">jenneya@unimelb.edu.au</a></td>
</tr>
<tr>
<td>Dr Gary Rogers</td>
<td><a href="mailto:g.rogers@griffith.edu.au">g.rogers@griffith.edu.au</a></td>
</tr>
<tr>
<td>Dr Anne Drake</td>
<td><a href="mailto:a.drake@fsm.ac.fj">a.drake@fsm.ac.fj</a></td>
</tr>
<tr>
<td>Dr Janet Knox</td>
<td><a href="mailto:jan@knoxenich.com">jan@knoxenich.com</a></td>
</tr>
<tr>
<td>Dr Teatao Tiira</td>
<td><a href="mailto:teataotiira@yahoo.com">teataotiira@yahoo.com</a></td>
</tr>
<tr>
<td><strong>Federated States of Micronesia</strong></td>
<td></td>
</tr>
<tr>
<td>Dr Dorina Fred</td>
<td>Chuuk <a href="mailto:ochochkon@hotmail.com">ochochkon@hotmail.com</a></td>
</tr>
<tr>
<td>Dr Yoster Yichiro</td>
<td>Chuuk <a href="mailto:ygyiro@yahoo.com">ygyiro@yahoo.com</a></td>
</tr>
<tr>
<td>Dr Carolee Masao</td>
<td>Kosrae <a href="mailto:cmasao@fsmhealth.fm">cmasao@fsmhealth.fm</a></td>
</tr>
<tr>
<td>Dr Elizabeth Keller</td>
<td>Pohnpei <a href="mailto:supjkeller@yahoo.com">supjkeller@yahoo.com</a></td>
</tr>
<tr>
<td>Arlene Takesy</td>
<td>Pohnpei <a href="mailto:artee.puli@gmail.com">artee.puli@gmail.com</a></td>
</tr>
<tr>
<td>Dr James Edilyong</td>
<td>Yap <a href="mailto:jedilyong@fsmhealth.fm">jedilyong@fsmhealth.fm</a></td>
</tr>
<tr>
<td>Maria Marfel</td>
<td>Yap <a href="mailto:mmarfel@fsmhealth.fm">mmarfel@fsmhealth.fm</a></td>
</tr>
<tr>
<td>Dr Vincent Tafleimal</td>
<td>Yap <a href="mailto:vtafleimal@fsmhealth.fm">vtafleimal@fsmhealth.fm</a></td>
</tr>
<tr>
<td><strong>Fiji Islands</strong></td>
<td></td>
</tr>
<tr>
<td>Dr Tahmina Mirza</td>
<td>Suva <a href="mailto:tahmina_mirza@hotmail.com">tahmina_mirza@hotmail.com</a></td>
</tr>
<tr>
<td>Dr Mike Kama</td>
<td>Suva <a href="mailto:Mikekarmer@yahoo.co.uk">Mikekarmer@yahoo.co.uk</a></td>
</tr>
<tr>
<td>Mary Kama</td>
<td>Suva <a href="mailto:mary.kama@govnet.gov.fj">mary.kama@govnet.gov.fj</a></td>
</tr>
<tr>
<td>Dr Jason Mitchell</td>
<td>Suva <a href="mailto:jmitch69hk@yahoo.com.hk">jmitch69hk@yahoo.com.hk</a></td>
</tr>
<tr>
<td>Dr Alan Garvez</td>
<td>Suva <a href="mailto:agarvez@health.gov.fj">agarvez@health.gov.fj</a></td>
</tr>
<tr>
<td>Dr Selaima Lalabalavu</td>
<td>Suva <a href="mailto:slalabalavu@gmail.com">slalabalavu@gmail.com</a></td>
</tr>
<tr>
<td>Caroline Mataitoga</td>
<td>Suva <a href="mailto:carol_whippy07@yahoo.com">carol_whippy07@yahoo.com</a></td>
</tr>
<tr>
<td>Dr Lisi Tikoduadua</td>
<td>Suva <a href="mailto:ltikoduadua@health.gov.fj">ltikoduadua@health.gov.fj</a></td>
</tr>
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References


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