STANDARD TREATMENT GUIDELINES AND ESSENTIAL DRUGS LIST

FOR THE

Standard Treatment Guidelines and Essential Drugs List: Ministry of Health.


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1. **FOREWORD:**

**Foreword by the Hon. Minister for Health**

In 1985, the World Health (WHO) provided a definition of Rationale use of Medicines as “Patients receive medications appropriate to the clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community”.

Worldwide, more than 50% of all medicines are prescribed, dispensed, or sold inappropriately, while 50% of patients fail to take their medicines correctly. Moreover, about one-third of the world’s population lacks access to essential medicines.

In our effort to address this very important issue, legislations were formulated and work started to develop this document.

I am very glad indeed with this publication and the tremendous work of the editors and all the contributions of other health professionals are very much appreciated.

It is sincerely hoped that this will help all health professionals in the kingdom of Tonga maintain and improve our patient management. We should all try to be very familiar with this publication as education is an ongoing, process.

I would like to thank the editors, Dr. Siale ‘Akau’ola and Mr. Siutaka Siua, and everyone else who has contributed to this edition. Every country is expected to have her own version of Standard Treatment Guidelines and Essential Drug List. Tonga now joins those countries.
### 2. ABBREVIATIONS AND ACRONYMS:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<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>
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<tr>
<td>≥</td>
<td>More than or equal to</td>
</tr>
<tr>
<td>↑</td>
<td>Increase</td>
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<tr>
<td>↓</td>
<td>Decrease</td>
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<tr>
<td>®</td>
<td>Trade name</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Accidents and Emergencies</td>
</tr>
<tr>
<td>ABC</td>
<td>Airway, Breathing and Circulation</td>
</tr>
<tr>
<td>ABG</td>
<td>Arterial Blood Gas</td>
</tr>
<tr>
<td>ACEI</td>
<td>Angiotensin Converting Enzyme Inhibitor</td>
</tr>
<tr>
<td>ACS</td>
<td>Acute Coronary Syndrome</td>
</tr>
<tr>
<td>AFB</td>
<td>Acid Fast Bacilli</td>
</tr>
<tr>
<td>ALS</td>
<td>Advanced Life Support</td>
</tr>
<tr>
<td>AMI</td>
<td>Acute Myocardial Infarction</td>
</tr>
<tr>
<td>Amps</td>
<td>ampoule(s)</td>
</tr>
<tr>
<td>ARDS</td>
<td>Acute Respiratory Distress Syndrome</td>
</tr>
<tr>
<td>ARM</td>
<td>Artificial rupturing of membrane</td>
</tr>
<tr>
<td>ASOM</td>
<td>Acute suppurative otitis media</td>
</tr>
<tr>
<td>bd</td>
<td>Twice a day (sometimes ‘bid’ is used)</td>
</tr>
<tr>
<td>BMI</td>
<td>Body mass index</td>
</tr>
<tr>
<td>Ca++</td>
<td>Calcium ions</td>
</tr>
<tr>
<td>CCF</td>
<td>Congestive Cardiac Failure</td>
</tr>
<tr>
<td>CMO</td>
<td>Chief Medical Officer</td>
</tr>
<tr>
<td>CMV</td>
<td>Cytomegalovirus</td>
</tr>
<tr>
<td>COAD</td>
<td>Chronic Obstructive Airways Disease</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CPAP</td>
<td>Continuous Positive Airways Pressure</td>
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<tr>
<td>CPR</td>
<td>Cardio-pulmonary Resuscitation</td>
</tr>
<tr>
<td>CR</td>
<td>Chloride ions</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>Abbreviation</td>
<td>Description</td>
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<tr>
<td>EBV</td>
<td>Ebstein Barr virus</td>
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<td>ECG</td>
<td>Electrocardiography</td>
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<td>EDL</td>
<td>Essential Drugs List</td>
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<tr>
<td>ET</td>
<td>Endotracheal</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>FNA</td>
<td>Fine Needle Aspiration</td>
</tr>
<tr>
<td>GA</td>
<td>General anaesthetics</td>
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<tr>
<td>GCS</td>
<td>Glasgow Coma Scale</td>
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<tr>
<td>GDM</td>
<td>Gestational diabetes mellitus</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>GTN</td>
<td>Glyceryl trinitrate</td>
</tr>
<tr>
<td>GTT</td>
<td>Glucose tolerance test</td>
</tr>
<tr>
<td>HAP</td>
<td>Hospital Acquired Pneumonia</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>hr</td>
<td>Hour(s)</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
</tr>
<tr>
<td>IHD</td>
<td>Ischaemic Heart Disease</td>
</tr>
<tr>
<td>IMI</td>
<td>Intra-muscular</td>
</tr>
<tr>
<td>IU</td>
<td>Units</td>
</tr>
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<td>IUFD</td>
<td>Intrauterine foetal death</td>
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<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>J</td>
<td>Joules</td>
</tr>
<tr>
<td>K⁺</td>
<td>Potassium ions</td>
</tr>
<tr>
<td>L</td>
<td>Litre</td>
</tr>
<tr>
<td>LA</td>
<td>Local anaesthetics</td>
</tr>
<tr>
<td>LFT</td>
<td>Liver function test</td>
</tr>
<tr>
<td>LVED</td>
<td>Left Ventricular End Diastolic</td>
</tr>
<tr>
<td>LVF</td>
<td>Left Ventricular Failure</td>
</tr>
<tr>
<td>LVH</td>
<td>Left Ventricular Hypertrophy</td>
</tr>
<tr>
<td>max.</td>
<td>Maximum</td>
</tr>
<tr>
<td>Mg⁺⁺</td>
<td>Magnesium ions</td>
</tr>
<tr>
<td>MHA</td>
<td>Mental Health Act</td>
</tr>
<tr>
<td>min</td>
<td>Minute(s)</td>
</tr>
<tr>
<td>ml</td>
<td>Milliliters</td>
</tr>
<tr>
<td>MO</td>
<td>Medical Officer</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MVA</td>
<td>Motor Vehicle Accident</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
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<td>--------------</td>
<td>-------------</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>
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<tr>
<td>NGT</td>
<td>Nasogastric tube</td>
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<tr>
<td>NTT</td>
<td>Niuatoputapu</td>
</tr>
<tr>
<td>Obs &amp;Gyn</td>
<td>Obstetrics and Gynaecology</td>
</tr>
<tr>
<td>PA</td>
<td>Postero-anterior</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
</tr>
<tr>
<td>PEFR</td>
<td>Peak expiratory flow rate</td>
</tr>
<tr>
<td>PO₄⁻</td>
<td>Phosphate</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>
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<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>SCC</td>
<td>Squamous cell carcinoma</td>
</tr>
<tr>
<td>SGMO</td>
<td>Special Grade Medical Officer</td>
</tr>
<tr>
<td>SL</td>
<td>Sub-lingual</td>
</tr>
<tr>
<td>SMO</td>
<td>Senior Medical Officer</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>Tempero-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>
3. ACKNOWLEDGEMENTS:

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Pifeleti, Siu Senior Nursing Sister.

References are also made to the following documents, produced by various sections and committees of the MOH:

- Infection control manual for Vaiola hospital;
- Guidelines for the Prevention and Management of Diabetes in Tonga;
- Guidelines for the control and prevention of tuberculosis in Tonga, through DOTS strategy;
- Tonga Evidence Based Guidelines in Family Planning for Health Workers
We wish to acknowledge the continuous support of the MOH and WHO, in the production of this document. The funding for this project was provided by WHO.

Editors:

Dr. Siale ‘Akau’ola (Medical Superintendent – Clinical Services)
Siutaka Siua (Senior Pharmacist)
4. INTRODUCTION:

The production of the Standard Treatment Guideline (STG) and Essential Drugs List (EDL) for the MOH, is one of the major strategies aimed at the achievement of the three principal objectives of the National Drug Policy for Tonga, which are:

1. **To ensure of the consistent availability within the Kingdom of Tonga, of drugs which are of acceptable quality, safety and efficacy.**
2. **To ensure equity of access by the public to medicinal drugs.**
3. **To ensure that drugs are used rationally by: prescribers, other health professionals and consumers.**

The drugs listed in the EDL were selected, based on WHO guidelines for drawing up a National EDL, which encompasses the following:

- Any drugs used must meet the needs of the majority of the population;
- Sufficient proven scientific data regarding effectiveness must be available;
- Any drug included in the EDL must have a substantial safety and risk/benefit ratio;
- All products must be of an acceptable quality and must be tested on a continuous basis;
- The aim as a rule is to use products with a single pharmacologically active ingredient unless there are special cases where patient compliance is an issue;
- Products will be listed using their generic names only;
- When drugs are equally clinically effective, drugs will be compared along the following lines:
  - best cost advantage
  - best researched
  - best pharmacological properties
  - best patient compliance
  - most reliable supplier
A request for a new product to be included in the EDL must be directed to the National Drugs and Medical Supplies Committee, supported by scientific data and appropriate references, on the advantages and benefits over an existing product. As noted above, all recommended treatment regimes in this guideline have been carefully tailored to utilize the drugs listed in our EDL. However, since this is the first edition of the STG, a few of the drugs recommended for treatment may not be in the EDL. Health workers, particularly those who are stationed in the community health centers, are urged to consult relevant clinical consultants, when such situations arise; and especially, if the management recommendation is beyond the capacity of his/her health-care setting.

The production of this STG was a collaborative effort by senior clinicians and pharmacists, at Vaiola Hospital. It is intended to be used by: medical officers, dentists, health officers, nurses and pharmacy staff in Tonga.

The information provided are based on the latest scientific evidence available to the co-authors.

We plan to update this document on a regular basis in future, when new information comes to hand.
5. ACCIDENT AND EMERGENCY (A&E):

5.1. General Approach to A&E

Triage Scale.

<table>
<thead>
<tr>
<th>Colour code</th>
<th>Scale</th>
<th>Explanation</th>
<th>Some examples</th>
<th>Time Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>1</td>
<td>Immediate Resuscitation</td>
<td>Patient need immediate treatment to preserve life.</td>
<td>Cardiac arrest, open chest wounds, acute pulmonary oedema, unconscious head injury etc.</td>
</tr>
<tr>
<td>Orange</td>
<td>2</td>
<td>Very Urgent</td>
<td>Seriously ill or injured patient whose life is not in immediate danger.</td>
<td>Acute MI, acute chest pain, acute asthma, cervical spine injury, penetrating eye injury etc.</td>
</tr>
<tr>
<td>Green</td>
<td>3</td>
<td>Urgent</td>
<td>Patient with serious but apparently stable condition.</td>
<td>Severe headache, compound fracture, acute abdominal pain, renal colic, severe lacerations, heavy PV/PR bleeding.</td>
</tr>
<tr>
<td>Blue</td>
<td>4</td>
<td>Standard</td>
<td>Standard cases without immediate danger or distress.</td>
<td>Abdominal pain, gastroenteritis, sprained ankle, Colle’s Fracture etc.</td>
</tr>
<tr>
<td>Yellow</td>
<td>5</td>
<td>Non-urgent</td>
<td>Patients whose conditions are not true accident and emergencies.</td>
<td>Chronic rash, sprains, backaches etc.</td>
</tr>
</tbody>
</table>
The majority of admissions are in the triage scales 1, 2 and 3. Most consultations, on the other hand, are in triage scales 4 and 5.

**Note Keeping.**
In order to provide quality information from a patient’s record, clinicians should follow the following basic rules of good note keeping:

- Always write legibly in ball point pen, preferably with dark ink to facilitate photocopying.
- Always date and time the notes.
- Sign and print name and status.
- Make notes concise and to the point.
- Use simple line drawings or pre-printed sheets for wound/injury descriptions.
- Avoid idiosyncratic abbreviations.
- Never make rude or judgemental comments.
- Inform the referring clinician with a letter later.

Remember, that a clinician’s professional standing is often judged by how well he/she performs his/her note keeping!

**Handing Patients over.**
It is important to complete activities needed for a patient, either to the point of discharge, or handing over to an inpatient team, before one finishes his/her shift. If this is not possible, careful hand-over to the new A&E clinician should be done and at the same time, to inform the nursing staff too. It is also courteous to tell patients that further care will be provided by a new doctor.

**Coping with A&E.**
The majority of time when one is working at A&E, he/she will be on his/her feet; working, thinking and making decisions. It is physically demanding so one needs to be fit, well rested and ready to tackle this area, everytime one is rostered to work there.
It is important to take two, short 10 to 15 minutes breaks, in an 8 hour shift and a lunch break. Do drink lots of fluid. Once one is off from work, make the most of it and try to relax. Remember, tired doctors can make mistakes.

Another problem frequently faced by clinicians at A&E is mental fatigue. If one feels he cannot cope with the pressure; please, do tell someone!! Do not bottle it up; try to ignore it or assume that it reflects inadequacy. Trying to disguise or deny the situation is unfair to yourself, your colleagues and your patients. Always remember that as a professional, you should never lose your cool in public and you always put your patient’s interest first.

Shifts.
Remember the following general rules about shift work:

- Never be late to your shift.
- If, for whatever reason you cannot work a shift, let the department know in good time to allow time for replacement.
- Remember, working at A&E demands the highest ethical and professional standards from a doctor or health officer.
- Casual and special leaves must always be approved first by the Officer-In-Charge before they can be taken. Never send in a Casual leave request, on the same day one plans to take the leave. This is irresponsible behaviour, which is unfair to your colleagues who have to cover for your absence and also for the patients who may not be attended to in time, due to staff shortages.

Breaking Bad News.
Death at the A&E is usually a sudden, unexpected tragic experience to the relatives, who may already be distressed after witnessing the event which led to the fatality. Breaking the bad news to them should be done by the medical personnel in charge, who has good communication skills and empathy.
Common responses to bereavement include emotional distress, denial, guilt and aggression.

Remember to report the death to the police whenever indicated, as in MVA or suspected unnatural deaths. (Report to police should be done...
After each death, staff involved should take 5 to 10 minutes break, have a cup of tea, and try to relax before continuing on with the A&E activities.

**Violence.**
Most violent episodes can be predicted by watching warning body languages of the patient. (eg. Tone of voice, gestures and postures.) Do not aggravate it by confrontational postures. Try to give reassurance you are trying to help and keep your voice low. Engage the patient in a conversation.

Underlying causes of aggression in patients include hypoglycemia, hypoxia, distended bladder, mental illness. All can be compounded by alcohol.

**Approach to aggressive patient.**
- Avoid physical confrontation.
- Keep an escape route open.
- Direct body or eye contact can be provocative to patients.
- Remember personal space by psychotic patients.
- Get immediate help from security or police.

**Management.**
With physical violence, safety for staff and other members of the public takes priority. Concern for property is secondary. A calm approach with talking and listening can resolve a violent act.

Employ physical restraint only if there is risk that other members of the public may get hurt. Use minimum degree of force to control episode. Hold limbs near joints to prevent fracture. Grasp clothes not body if possible. Don’t apply pressure to neck, throat, chest or abdomen. If patient bites, the hair can be held firmly. Use the hospital’s security staff to assist in restraining violent patients and if necessary, call the police for assistance.

At the same time, talk to the patient and try to reassure you are trying to help.
Pharmacologic restraint should be a last resort. IV diazepam is probably safest. However, be wary of the patient who may file a legal case against you for injecting him/her without consent. An alternative choice is midazolam IMI, at 0.1mg/kg up to 5-20mg.

Report all cases of violence to the appropriate authority (Medical Superintendent, Matron, Police and/or Psychiatrist).

**Aggressive and confused patients**
- Think of possible causes
- Sedate patient if necessary
- Maintain ABC and treat any reversible cause
- If psychiatric cause is suspected; admit to psychiatry ward.
- If organic cause is suspected, admit to medical ward after proper sedation.
- Always inform ward doctor and document it.

**Possible causes:**
- Substance intoxication or withdrawal: eg: alcohol, cocaine, benzodiazepines etc.
- Psychiatric disorders especially if there is history present, eg: psychosis due to schizophrenia, mania, personality disorders or dementia.
- Organic delirium due to hypoglycaemia, electrolyte disturbance, hypoxia, sepsis, head injury, meningitis, liver/renal failure.
- Intracerebral haemorrhage
- Epilepsy- postictal state or temporal lobe epilepsy.

**Restraint:**
- Use relatives, security guards or if necessary police to hold the patient.
- Sedation using IMI initially. The IV access may be safely obtained after initial control with IMI.

**Sedation:**
- **IMI midazolam** 5-20mg  
  OR
- **IMI chlorpromazine** 100-200mg  
  OR
- **IV diazepam** 5-10mg
Medico-legal aspects.
Avoiding trouble with the law at A&E can be achieved by the adoption of the following approaches:
- Be polite, honest and open with patients and explain reasons for delays/ errors promptly.
- Use consent forms when needed.
- Take extra care of return visits. (Treat as if for first visits and review investigations and so forth).
- Absconding needs to be well documented and patients should be well informed of possible outcome of such actions.
- Remember the principals of good note keeping.

Precautions against nosocomial infections
(Please refer to the Universal Precaution guideline in the “Infection Control Manual for Vaiola Hospital.”)

5.2. Cardiac Arrest
Process Standards

First on the Scene:
- Assess the patient.
- Call for help and commence one person CPR.
- Ask for the resuscitation trolley to be brought to the bed side.
- Assemble oxygen equipment, using bag mask device with oxygen flow at 15 litres.
- Bring defibrillator and attach monitoring leads to patient.
- Pull out bed and remove unwanted furniture.
- Two people CPR to commence.
- Draw up emergency drugs such as:
  - Adrenaline 1mg (10ml of 1:10,000 or 1ml of 1:1000)
  - Amiodarone 300mg diluted in 20ml of 5% dextrose
  - Atropine 1mg

CPR Ratios:
1 person: 30 compressions to 2 breaths
2 people: 30 compressions to 2 breaths
Documentation:
After team arrives, one member is delegated to document arrest procedure on the Emergency Documentation Sheet. A record should be kept of:
- Time resuscitation team and defibrillator arrived.
- Shocks- times/joules delivered.
- Drugs- times/doses administered.
- Time resuscitation ceased.
- Outcome
- Notification of family.

Debriefing
- This should occur after every emergency situation.
- Senior person to initiate debriefing for involved staff. The “Peer Support Network” is available to assist with debriefing. (Network to be set up if not available.)

BASIC LIFE SUPPORT ALGORITHM.
Basic life support is the technique of rescue breathing combined with chest compressions to temporarily maintain a circulation to preserve brain function until a specialized treatment is available (such as ALS).

CPR should be commenced when there is no sign of life, such as: unresponsiveness, unconscious, not breathing normal and not moving. The compression to ventilation ratio should be 30:2 for infants, children and adults.
Figure 1  Basic Life Support Flow-Chart (Note the “DRABCD” in diagram)

Check for Danger (hazards, risks, safety)

Responsive? (unconscious?; if not call for help)

Open Airway; Look for signs of life.

Give two Breaths if not breathing

Give 30 chest Compressions (almost 2 compressions/sec followed)

Attach Defibrillator ASAP and follow its

Continue CPR until qualified personnel arrives or signs
CARDIAC ARREST

Check responsiveness, shake and shout

Attach monitor Defibrillator

Assess rhythm/pulse

VF/VT

Defib X3 as needed; 200, 200-300, 360 J.

VF/VT persists, continue CPR.

IV access, intubation

Adrenaline 1mg then 1mg every 3 mins

Defib. Up to 3X 360J 1 min. after

VF/VT persists cont. CPR

Amiodarone 300mg IV push, once. Continue CPR

PEA/EMD (pulseless electrical activity)

Asystole, confirm on more than one lead.

Look for possible causes: See PEA causes, (EMD electromechanical dissociation; its old name)

Treat as asystole

Look for and treat reversible causes.

Causes:
H- Hypothermia, Hyperkalaemia, Hypoxia, Hypovolaemia.
T-Tension pneumothorax, Tamponade, Toxicology, Thromboembolism.

IV access/ Intubation

Adrenaline 1mg then 1mg every 3 mins.

Atropine 1.2mg every 5 minutes.

Continue CPR

VF/VT persists cont. CPR
For persistent VF, consider:

- **Magnesium 0.1-0.2mmol/kg (8-16mmol of Mg++ or 2-4g for adults) IV push over 10 minutes, for Torsade de pointes.**
- **Lignocaine 1-1.5mg/kg IV push.**
- Different defibrillator.
- Change pad position.

**Paediatric doses of resuscitation drugs:**

- **Amiodarone: 10mg/kg IV or intraosseous**
- **Lignocaine: 1mg/kg IV or intraosseous**
- **Adrenaline: 10mcg/kg IV or intraosseous**
- **Atropine: 20mcg/kg IV or intraosseous**
- **Magnesium: 0.1-0.2mmol/kg IV or intraosseous**
- **NaHCO₃ : 1mmol/kg IV slowly. This drug is incompatible with a lot of drugs and IV line must be flushed out before and after the administration of sodium bicarbonate.**

**Post-resuscitation care:**
Return of Spontaneous Circulation (ROSC) is considered to be the desired outcome of basic and ALS. However, to really achieve this goal, the patient’s airway, breathing, circulation, neurological and any associated medical or surgical condition, must be stabilized or at least identified before the patient is referred to the ICU for further management.

Prognostication of outcome of resuscitation, especially in terms of neurological ones should be regularly audited to give the resuscitators feedbacks on how they should improve their activities.

5.3. **Other Life Threatening Emergencies**
(Anaphylaxis, asthma, pulmonary oedema, AMI, acute poisoning, burns, coma, diabetic emergencies, dehydration, drowning, seizure).

5.3.1. **Acute anaphylaxis.**
This is defined as a sudden generalized acute hypersensitivity reaction to drugs (like penicillin, streptokinase, aspirin etc.), stings (bee/wasp), foods (nuts, shellfish) or vaccine etc.
Clinical features:
A feeling of impending death may be felt. Patients on β-blockers, asthmatics, or history of IHD may have especially severe features. Respiratory system has swelling of tongue, lips, pharynx and epiglottis leading to upper airway obstruction. The lower respiratory system show features similar to acute asthma. Skin shows urticaria, erythema, pruritis and angio-oedema. CVS shows peripheral vasodilatation and ↑ vascular permeability leading to plasma leakage, ↓ intravascular volume, hypotension and shock. Arrhythmias, ischaemic chest pain and ECG changes may be present.

Treatment:
- Discontinue or clean suspected agent.
- Ensure ABC.
- Open airway by intubations or tracheotomy (cricothyroidotomy) if needed.
- Give 100% oxygen (6L/min). If brochospasm present, nebulize with salbutamol (ventolin®) 5mg and oxygen.
- If IV access in adults, titrate adrenaline in 50-100mcg aliquots (0.5-1ml of 1:10,000), give an aliquot per minute, max. 5ml.
- If no immediate IV access, give adults IMI adrenaline 0.5ml (1:1,000 solution or 0.5mg), every 5 minutes if no clinical improvements.
- For children, make 1:10,000 adrenaline solution and give 0.1ml/kg of this solution either IMI or SC.
- Give oxygen by mask.
- Give IV fluid to correct hypotension. Use colloids unless it was the cause of the anaphylaxis. (use normal saline (N/S) solution or gelfusion, run at 20ml/kg fast then slow it when the patient improves).
- Give IMI promethazine (12.5-25mg or 0.1mg/kg in children; every 6 hours)
  PLUS
- IV hydrocortisone 100-200mg every 6 hours or 1-2mg/kg for children.
- Admit.
- Observe for 24 hours in case reaction relapses.
5.3.2. Acute Pulmonary Oedema
This can be due to either: cardiogenic, or non-cardiogenic causes.

Cardiogenic pulmonary oedema:
Due to left ventricular failure leading to ↑ LVED pressure, ↑ pulmonary capillary hydrostatic pressure, leading to the collection of fluid in the extravascular pulmonary tissue, at a faster rate than the lymphatic can clear it.

Causes:
AMI, IHD, arrhythmias, hypertension, valvular diseases, VSD, cardiomyopathy, drugs such as β-blockers, acute myocarditis, left atrial myxoma and pericardial diseases.

Signs and symptoms:
Shortness of breath, maybe chest pain, tachypnoea, tachycardia and anxiety. If the pulmonary oedema is severe, one may be centrally cyanosed and coughs up pink frothy sputum and is unable to talk. On auscultation, there may be fine inspiratory crepitations at lung bases plus wheezes. A 3rd and 4th heart sound could be heard too. (difficult to hear in a noisy A&E).

Investigations:
Cardiac monitor, SaO$_2$ with pulse oximeter, do ECG to check for ischaemia, request hospital notes, request CXR and send blood for FBC, UEC, RBS. (may be CK if possible).

Treatment:
- ABC.
- Sit patient up and support with pillows in a comfortable position.
- Oxygen high flow through face mask.
- IV access.
- *Give slow IV frusemide, 40mg stat.*
- *Repeat IV frusemide if needed after 20 minutes by 20mg increments up to a max. of 120mg while in A&E.*
Standard Treatment Guidelines Tianga 2007

- **IV morphine in 1-2mg aliquots, give slowly. (usually to a total of 5-10mg).** Do not give in COAD, low BP, and in cases with depressed mental state. *Give metoclopramide 10mg IV to counteract the emetic effect of morphine.*

- **If the systolic BP is >90mmHg, give SL glyceryl trinitrate (anginine®).**

- Treat or refer for treatment of underlying causes. (e.g. arrhythmias, AMI, cardiogenic shock, prosthetic valve problem etc.)

- If patient is hypotensive, *give IV dopamine infusion.*

- If hypertensive, *give nifedipine: chew and swallow nifedipine SR 20mg. (also see sections 5.5 and 6.7)*

**Non-cardiogenic Pulmonary Oedema:**

This occurs without the increase in pulmonary venous pressure. The following mechanisms can cause it:

- ↑ capillary permeability. (Commonest cause in non-cardiogenic pulmonary oedema; classical example is the ARDS).

- ↓ plasma oncotic pressure.

- ↑ lymphatic pressure.

**Causes:**

- ARDS secondary to sepsis, trauma, pancreatitis etc.

- Intracranial haemorrhage.

- IV fluid overload.

- Hypoalbuminaemia due to either liver or kidney failure.

- Smoke inhalation.

- Near drowning.

- Lymphangiitis carcinomatosis.

- Drugs, poisons, chemical inhalations etc.

**Approach:**

Distinguishing from cardiogenic pulmonary oedema is usually apparent from the *history.*

Attach cardiac monitors, do ECG, check for O₂ saturation with pulse oximeter, blood for UEC, glucose, FBC, blood gas if possible, sit patient up, give high flow oxygen, IV frusemide 40-100mg slowly, refer to ICU team for further managements.
5.3.3. Asthma

This is a pulmonary disease characterized by reversible airway obstruction, airway inflammation, and increased airway responsiveness to a variety of stimuli.

Severity is categorized into mild, moderate or severe.

Table 2: Asthma Severity Scale

<table>
<thead>
<tr>
<th>Severity of asthma</th>
<th>PR</th>
<th>RR</th>
<th>Costal Recession</th>
<th>PEFR</th>
<th>SaO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&lt;100</td>
<td>12-20 (N)</td>
<td>None</td>
<td>200-300</td>
<td>&gt; 95%</td>
</tr>
<tr>
<td>Moderate</td>
<td>100-120</td>
<td>20-40</td>
<td>Moderate</td>
<td>100-200</td>
<td>85-95%</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;120</td>
<td>&gt;40 or &lt;10</td>
<td>Extensive</td>
<td>&lt;100</td>
<td>&lt;85%</td>
</tr>
</tbody>
</table>

Mild Asthma:
- Take and record PEFR (peak expiratory flow rate).
- *Nebulize with salbutamol solution – 1ml of 5mg/ml solution added to 1ml of sterile water* PLUS
- *Ipratropium bromide 1ml (250mcg/ml).* Children below 10 years, use dose according to age.
- Review after 15-30 minutes. Take and record post-nebulize PEFR.
- *Repeat nebulized salbutamol if PEFR <250.*
- Reinforce compliance of maintenance treatment.
- Arrange follow-up clinic. Discharge home.

Moderately Severe Asthma:
- ABC
- Oxygen 10L/min via face mask.
- *Nebulize: Salbutamol solution 1ml (5mg/ml) added PLUS*
- *Ipratropium bromide 1ml (250mcg/ml).* Children below 10 years, use dose according to age.
- Steroids: *Oral prednisone 50mg stat for adults; children 1mg/kg for three days.*
Standard Treatment Guidelines

- Observe for 15-30 minutes. Repeat salbutamol nebulizer if PEFR <200.
- Observe and reassess after 30 minutes.
- Take PEFR if increases by >50% = improve, home.
- Take PEFR if increases by <50% = Require admission.
- If improves, home on prednisone 50mg/day for five days then stop.
- If no response; admit.

Patient’s emergency treatment before transfer to ward:

- Start IV line - N/S.
- Hydrocortisone 200mg IV stat.
- Aminophylline bolus injection: give slowly IV injection 250-500mg (5mg/kg) over 20 minutes. Use 250mg for the elderly, CCF or liver diseases. CAUTION- DO NOT GIVE BOLUS IV AMINOPHYLLINE IF PATIENT ALREADY TAKING ORAL THEOPHYLLINE (NUELIN®).
- Aminophylline Infusion: 0.5mg/kg/hr: For adult of 80-100kg weight, add 500mg aminophylline (2 ampoules) to 1L of N/S. Run at 20dpm or 1L over 12 hours (↓ rate to 15dpm in CCF or liver disease.)

Severe Asthma – Must admit:

- Oxygen at 10L/min.
- Nebulise with salbutamol— 1ml (5mg/ml) added to 1 ml sterile water PLUS
- Ipratropium (atrovent®) 1ml (250mcg/ml). Children <10 years, use dose according to age.
- Run continuos nebulizer (with O₂), if little response:
- Start IV N/S.
- Give hydrocortisone 200mg IV stat.
- Aminophylline injection: Give slow IV bolus dose 250-500mg (5mg/kg) over 20 minutes. CAUTION - DO NOT GIVE BOLUS IV AMINOPHYLLINE IF PATIENT ALREADY TAKING ORAL THEOPHYLLINE (NUELIN®).
- Aminophylline infusion: 0.5mg/kg/hr. For adult 80-100kg weight, draw 500mg (2amps) and add to1L N/S. Run at 20dpm or 1L over 12 hours (↓15dpm in elderly 60+ years, CCF, liver disease).
If no improvements to the asthma after the above steps have been taken, do the following:

- **IV salbutamol injection.** Dilute 1 amp (500mcg/ml salbutamol) in 10ml sterile water. Give slow IV injection of 250mcg (half of the diluted solution) over 2 minutes. Repeat dose if necessary after 5-10 minutes.
- **IV adrenaline injection can be used too; dilute 1ml of 1:1,000 ampoule in 10ml sterile water to get a 1/10,000 solution. Draw up 5ml of the diluted solution and give slowly by IV injection at a rate of 1ml per minute. Stop when a response is observed.

For all patients seen at OPD/A&E with an acute asthma attack, they must be referred to the relevant medical clinic for implementation of the Asthma Self Management Plan. See section 22.5

### 5.3.4. Diabetic Emergencies

**Diagnosis:**

Is it hypoglycaemia or hyperglycaemia?

**HYPO** - Sudden onset of pallor, sweating and odd behaviour.

**HYPER** - Gradual onset of overbreathing, acetone breath and dehydration.

**(i) HYPOGLYCAEMIA:**

- Ensure ABC.
- Do a glucometer reading.
- Obtain blood for blood sugar, FBC and UEC.
- Administer glucose: If conscious give *sweet soft drink or 3 teaspoons of sugar in a glass of water or 3 lollies*. Repeat after 10 minutes if needed.
- If unconscious, give *IV glucose; 50% dextrose (25-50ml bolus via IV large canula*. Repeat after 10 minutes if no response or *10% Dextrose infusion and run full speed*.
- Repeat glucometer reading when level of consciousness improves.
- If satisfactory clinical improvement; send home but ensure a full meal is given within half hour to avoid a second hypoglycemic episode.
Check drug therapy and follow-up clinic schedule.

Provide education/counseling about compliance, meals and home treatment of hypo attack, and discharge home.

If drowsiness persists; give IMI glucagon 1mg; IV dextrose infusion with 10% dextrose and admit.

(ii) KETOACIDOTIC HYPER-GLYCAEMIA:

Features:

- Usually younger patients.
- Drowsy and dehydrated.
- Hyperventillating (Kussmaul’s breathing).
- Vomiting, oliguria and abdominal pain.
- In severe cases, may have also altered mental state and shock.

Aims of treatment at A&E.

- Correct dehydration.
- Correct hyperglycaemia.
- Correct electrolyte imbalance.
- Correct acidosis.
- Initiate treatment of precipitating cause.

Initial treatment at A&E.

- Insert IV line and infuse N/S; Run full speed 1 to 2 litres in first one hour.
- Blood for FBC, Blood glucose, UEC, blood culture if febrile.
- Cardiac monitor.
- Oxygen via mask.
- Soluble insulin: Stat. 10 units IV plus 10 units IMI, followed by 6 units IMI hourly until half hourly plasma glucose falls to 10 mmol/L.
- When glucose falls below 10mmol/L, give 6 units soluble insulin IMI every 2 hours and change infusion to IV dextrose 5%.
- Treat hypokalaemia confirmed by urgent potassium result. If low, add potassium 10-20mmol into second litre of fluid.
Standard Treatment Guidelines Tonga 2007

- Urinary catheter if unconscious, shocked or profound metabolic disturbance.
- Nasogastric tube if patient unconscious or vomiting. Note that acute gastric dilatation is a complication of this condition.
- Accurate observations: BP, PR, urine output, mental state.
- ADMIT.

5.3.5. Comatosed Patient (Checklist)

A = AIRWAY
Clear upper airway by position and suction.
Remove dentures and foreign bodies in mouth.
Insert oropharyngeal airway if tolerated.
Apply suction if needed.
Consider endotracheal intubations:
  - If breathing is inadequate.
  - If coma is associated with multiple injuries.
  - If patient has severe head injury and damage to face and jaw.
  - If bleeding obstructs upper airway.

B = BREATHING.
  - 100% oxygen at 4-6L/min.
  - Bag and mask if necessary.
  - Check adequacy of ventilation with oximeter.
  - Intubate if necessary.

C = CIRCULATION.
  - Check pulse, BP and fullness of neck veins.
  - Assess quickly for major injuries.
  - Cardiac monitoring.
  - Insert large bore needle and take blood for FBC, UEC, RBS, X-match if bleeding and blood culture if signs of infection.
  - Run IV fluids: N/S; rates depend on degree of hypovolaemia.

C = CERVICAL SPINE:
Immobilize the cervical spine (sandbags or collar) if trauma known or suspected. In non-traumatic cases, check for neck stiffness.
**D = DRUGS**
- *Give 20-50ml IV of 50% glucose if immediate glucose check is low, especially with history of diabetes.*

**E = ENDOCRINE.**
- Check glucometer and blood glucose.
- Consider the possibility of Addisonian crisis or myxoedema crisis- give hydrocortisone 100mg IV stat.

**E = EYES**
- Check pupil size and reaction to light
- Look for unilateral dilated pupil (? Tentorial herniation)
- Check fundi

**F = FITS:** *IV diazepam 10mg slow push, titrate to effect. (alternative treatment is midazolam IMI or IV)*

**F = FEVER.**
Check the temperature, may require rectal probe.
*Give rectal paracetamol suppository if febrile.*

**G = GLASGOW COMA SCALE** *(Please refer to section 25.5)*
Evaluate the verbal, motor and eye response to stimuli.

**G = GASTRIC TUBE.**
Insert nasogastric tube if intubated.

**H = HISTORY.**
H/O of trauma, diabetes, medication, drug ingestion, epilepsy and psychiatric history.

**NEUROLOGICAL EXAMINATION**
Assess level of consciousness:
- Assign GCS
- Breathing pattern
- Eye signs
- Cough, gag and lash reflex
- Posture
- Spontaneous movement and response to pain
GENERAL PHYSICAL EXAMINATION & INVESTIGATIONS
Blood for FBC, electrolytes, creatinine and blood glucose.
Radiology if indicated.

5.3.6. **Myocardial Infarction**
Make a clinical diagnosis from history and presenting condition of the patient. The patient must be wheeled to the emergency and resuscitation room, immediately.

Administer the following, one after another or simultaneously if possible:

- **Ensure ABC; give oxygen by mask or nasally, at 10-12L/min.**
- **Attach patient to cardiac monitor and ECG.**

- **Glyceryl trinitrate (GTN), one tablet sublingually stat or GTN spray under the tongue.**
- **Aspirin 300mg; one crushed tablet orally stat.**
- **Morphine 2.5mg IV stat and repeat every 5-10 minutes if chest pain persists. Maximum dose = 10-15mg.**
- **IV metoclopramide 10mg IV if needed.**
- **Heparin, if patient is not responding to morphine. Give 5,000 units IV stat.**
- **IV line, N/S TKVO.**
- **Draw blood while inserting IV access for FBC, UEC, glucose and cardiac enzymes.**
- **Give IV streptokinase (if available) where indicated and where there is no contraindication to its use. (refer to Section 6.2)**
- **Reassess vital signs**
- **Transfer to ward when stable; CXR on way.**

5.3.7. **Acute poisoning**
**General principles**

- **Clear and maintain airway**
If breathing appears inadequate, ventilate with Oxygen using bag and mask or ET tube; **never** with mouth to mouth.

- Check pulse; if unconscious and pulseless, do CPR.
- Gastric lavage where indicated and staff are competent. (Contraindicated in reduced level of consciousness and in ingestion of volatile and corrosive substances)
- Give charcoal and an emetic like ipecac
- Give antidote if available

**Table 3: Acute poisoning and their antidotes**

<table>
<thead>
<tr>
<th>Name of suspected agent/s</th>
<th>Antidote/s</th>
<th>Other management principals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol</td>
<td>Acetylcysteine</td>
<td>If within one hour, give charcoal and induce vomiting. If high level of ingestion is suspected, urgently refer for hospital treatment</td>
</tr>
<tr>
<td>Aspirin®</td>
<td>Oral charcoal</td>
<td>Vitamin K 10mg IMI stat, maintain hydration and blood glucose level; refer to hospital</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>100% oxygen</td>
<td>Refer for admission</td>
</tr>
<tr>
<td>Corrosives like acid, bleach, disinfectant etc.</td>
<td>Milk and water orally</td>
<td>Do not induce vomiting. Refer urgently if oesophageal damage is suspected.</td>
</tr>
<tr>
<td>Organophosphates like insecticide, pesticide, weed killer etc.</td>
<td>Pralidoxime. (For excessive parasympathetic activation, give atropine 15-50mcg/kg IMI stat. Dose of pralidoxime is 25-50mg/kg, diluted with 15ml water and)</td>
<td>Do not induce vomiting, remove poison by irrigating eye and the skin and give charcoal. Refer for admission.</td>
</tr>
<tr>
<td>Condition</td>
<td>Treatment</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Petroleum</td>
<td>Oxygen</td>
<td>Do not induce vomiting. Refer if symptoms are severe.</td>
</tr>
<tr>
<td>Centipede bite (molokau)</td>
<td>Clean the bite. Use ice on the bite to relieve the pain. If pain is very severe inject 1-2ml of 1% lignocaine around the bite. Pain may need opioids. Give antihistamine such as promethazine by mouth or IMI 1mg/kg (max. 50mg). Give tetanus toxoid, if needed. In anaphylaxis, refer to section 5.3.1</td>
<td></td>
</tr>
<tr>
<td>Stone fish sting (nofu)</td>
<td>Put sting into warm water (almost hot but not burning). Give pain relief with plain lignocaine 1%, injected along sting track. Opioid may be needed. Give tetanus toxoid if needed. Refer to hospital if severe symptoms or suspecting foreign body.</td>
<td></td>
</tr>
</tbody>
</table>
Fish (ciguatera) poisoning:
Presents with diarrhea, abdominal pain, vomiting usually within 2-12 hours (up to 36 hours), from eating larger fish. Paresthesia, pins and needles, muscle aches, depression, irritability, rarely breathing difficulty, slow pulse and low blood pressure.

<table>
<thead>
<tr>
<th>Methylated spirit (methanol)</th>
<th>Ethanol</th>
<th>Refer for management in hospital as soon as possible</th>
</tr>
</thead>
</table>

**Types of poisoning:**
- Accidental (especially in children 1-4 years who eats tablets, chemicals or poisonous plants!)
- Deliberate self poisoning, especially in adults but can also occur in susceptible children.
- Non-accidental: This is uncommon; as in attempted homicide or the rare case of Munchausen’s syndrome by proxy.

**Diagnosis:**
Based on history from friends or relatives; presence of empty bottles etc.
Signs may be coma, dilated pupils, divergent squint, tachycardia, ↑
muscle tone, ↑ reflexes and extensor plantar may suggest tricyclic antidepressant poisoning.

Coma with hypotension, respiratory depression and ↓ muscle tone suggest barbiturates, benzodiazepines with alcohol or severe tricyclic antidepressant poisoning.
Coma with pinpoint pupils and slow respiration is typical of opioid poisoning. (Treat this with naloxone).
Tinnitus, hyperventilation, deafness, sweating, nausea and tachycardia are typical of salicylate poisoning.
Standard Treatment Guidelines

Agitation, tremor, dialated pupils, tachycardia suggest amphetamines, “ecstasy”, cocaine or sympathomimetics.

Assessing and monitoring
- Assess and record conscious level (GCS)
- Observe frequently and if unconscious check blood glucose
- Monitor breathing, oxygen saturation (pulse oximeter)
- Monitor and record BP, temp, and ECG.
- Blood level of suspected poison if possible.

Supportive care.
- ABC
- Treatment of various symptoms/ signs depend on cause of poison.
- Hypotension (due to arrhythmia, cardiac depression or relative hypovolaemia): elevate foot of bed, consider plasma expander or dopamine.
- Cardiac arrhythmias: Correct hypoxia, electrolyte imbalance etc. Rarely, drugs are needed.
- Convulsion - *Give IV diazepam.*
- Hyperthermia: Do active cooling, *give chlorpromazine* and seek expert advice.

*Consult physician or Psychiatrist for further advice.*

5.3.8. Seizures
EMERGENCY MANAGEMENT OF SEIZURES.(Status epilepticus)

1. ABC
   - Airway – insert between teeth
   - Insert padded spatula to prevent tongue biting
   - Protect the patient from injury and danger.
2. Administer oxygen
3. Place in Coma position. Carefully observe pattern of seizure, looking for any focal features.
4. Insert IV and collect bloods.
5. Drug therapy if fit longer than 3-5 minutes.
First line treatment

- **Diazepam IV is the drug of choice.** Dose as follows:
  
  - **Adults:** Slow IV injection at 2mg/min until fit controlled. (Draw 10mg and give over 3 minutes). Repeat 5mg if fit not controlled after 15 minutes. Max. dose: 20mg.
  
  - **Children:** Slow IV injection at 0.2mg/kg OR rectal flush at 0.3mg/kg. Dilute with 1ml water for injection. Use a 1ml or 2ml syringe. Repeat dose if fits not controlled after 5 minutes.

<table>
<thead>
<tr>
<th>Table 4: Diazepam dosing rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>One yr (10kg)</td>
</tr>
<tr>
<td>Two yr (13kg)</td>
</tr>
<tr>
<td>Three yr (16kg)</td>
</tr>
<tr>
<td>Four/five yr (20kg)</td>
</tr>
</tbody>
</table>

**NB:** Above Diazepam dose/administration also applies to Febrile Convulsions in children.

If diazepam is not available, use any of the following drugs instead:

- **Midazolam:** Can be given nasally, buccal, IMI or IV. Nasal or buccal dose is 0.3mg/kg up to a max. of 7.5mg. IMI dose is 0.1mg/kg up to 5mg. Use the 5mg/ml strength. IV dose is 0.1mg/kg up to 5mg, slowly, over 2 minutes. Dilute the ampoule to make up a 1mg/ml strength. For the 5mg/ml strength, dilute 1ml of it, in 4ml of N/S.

- **Paraldehyde:** 10mg IMI in adults, 5mg in one injection site. In children: 1.5ml per year of age; max. 5ml. Use a glass syringe.
Second line treatment

- **Phenytoin IV**: If still fitting after the above drugs. Dose = 15mg/kg and give over 3 minutes by slow IV injection. For adults give phenytoin 100–150mg IV slowly.

- For children, use phenobarbitone (15-30mg/kg over half an hour IV infusion)

Other relevant managements of acute seizure

- Record details of fit from patient or witness.
- Do relevant physical examination. Note if fever or meningism present.
- Investigations: FBC, glucose if history of diabetes, UEC, Blood culture if febrile.
- Admit.

Beware of acute dystonia and hysterical seizure which may present like seizure.

5.3.9. Dehydration in Children

Symptoms and signs of dehydration

Table 5: Signs and Symptoms of dehydration

<table>
<thead>
<tr>
<th>Sign/symptoms</th>
<th>Mild &lt; 5% loss of body weight</th>
<th>Moderate 5-10% loss of body weight</th>
<th>Severe &gt; 10% loss of body weight</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ urine output</td>
<td></td>
<td>+</td>
<td>+</td>
<td>Beware watery diarrhea, making nappies appear wet.</td>
</tr>
<tr>
<td>Dry mouth</td>
<td>+/-</td>
<td>+</td>
<td>++</td>
<td>Mouth breathers are always dry.</td>
</tr>
<tr>
<td>↓ skin turgor</td>
<td>-</td>
<td>+/-</td>
<td>++</td>
<td>Beware of thin child, use several sites for assessment.</td>
</tr>
<tr>
<td>Sunken anterior</td>
<td></td>
<td></td>
<td></td>
<td>Crying</td>
</tr>
<tr>
<td>Standard Treatment Guidelines</td>
<td>Tonga 2007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fontanelle</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>increases pressure.</td>
</tr>
<tr>
<td>Sunken eyes</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>Tachypnoea</td>
<td>-</td>
<td>+/-</td>
<td>+</td>
<td>Metabolic acidosis and temperature worsen this.</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>-</td>
<td>+/-</td>
<td>++</td>
<td>Due to hypovolaemia, pyrexia and irritability.</td>
</tr>
<tr>
<td>Drowsiness/irritability</td>
<td>-</td>
<td>+/-</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

**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 6  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 diarrhea or vomiting</td>
</tr>
<tr>
<td>4-6 months</td>
<td>50-100ml after each diarrhoea or vomiting</td>
</tr>
<tr>
<td>6-12 months</td>
<td>100-150ml after each diarrhea or vomiting</td>
</tr>
<tr>
<td>1-2 years</td>
<td>150-200ml after each diarrhhoea 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 7 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 8 Severe dehydration

<table>
<thead>
<tr>
<th>IV fluid (Ringer’s lactate (hartman) 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.
5.3.10. Pneumothorax

Air in pleural space leading to partial or total collapse of lung.

Signs:
- **SOB**
- **Chest Pain**
- Tracheal shift away from injured side towards normal side.
- Decreased or absent breath sounds.
- Signs of shock – if severe bleeding.
- CXR if time permits

Potential Problems
- Disturbance of the airway & breathing.
- Negative thoracic pressure.
- Alteration of the integrity of the chest wall and rib cage.
- Changes to central nervous system when hypoxia occurs.
- Alterations in cardiac output.

Management
- Position patient propped up and reassure.
- ABC. Give oxygen – If using ventimask run 10–12L/min; 6L/min if using intranasal catheter.
- Attach Monitors for recording of vital signs and cardiac function.
- IV line and collect blood for investigations: Blood tests: FBC, UEC, Cardiac Enzymes.
- CXR
- IV fluids:
  - *Plasma expander (e.g. gelofusion®)* 500ml and run fast if bleeding or in shock.
  - If not in shock, hook up N/S TKVO.
- In a tension pneumothorax, insert an 18-gauge needle into the 2nd intercostal space, mid-clavicular line on the side of pneumothorax. When transferring to ward, an under-water seal chest tube inserted at the 5th intercostals space, anterior axillary line.

Drug Therapy

**Pain Relief**: Morphine IV 2.5mg stat and 1–2mg increments to max. of 5mg.
Please note: Do not give if: Oxygen saturation below 90%, or depressed mental state; or hypotensive.

Notes
You can get Pneumothorax from:
- Chest trauma, eg. stab wounds.
- Secondary to rib fracture injuring the lungs.
- Secondary to COAD due to ruptured emphysematous bulbae (spontaneous pneumothorax).

5.3.11. Burn
- ABC
- Oxygen
- Assess degree of burn using rules of 7 and 9: for children and adults:
  - **Children** - Rule of 7 (Each lower limb is 14%, each upper limb is 7%, trunk 28%, head is 21% and groin 2%) approximation only.
  - **Adults** - Rule of 9 chart (each lower limb is 18%, upper limb 9%, trunk 36%, head 9% and groin 1%).

Another way of estimating area of burn is by using patient’s own palm area, which is about 1% of his/her surface area; to make a quick calculation of the area. So the number of palm areas burnt is the % burnt.
- Resuscitation Intravenous fluid – Hartman’s solution® or N/S. For first 24 hours:
  - **Adults** - 4ml/kg x % area of burn (Rule of 9 chart)
  - **Children** - 3ml/kg x % area of burn

Note: Give half of the total volume for 24 hours in the first 8 hours then give the rest in the remaining 16 hours. The time noted here refers to the **time starting from the burn incident, and not** the time after being seen at hospital.

As an example: a 70kg adult who had 20% burn would need: 4ml x 70kg x 20 = 5,600ml per 24 hours. Give 2,800ml (half), must be given in the first 8 hours (350ml/hour) and the rest of the 2,800ml in the next 16 hours (175ml/hour).
Closely monitor patient’s pulse, BP, urine output and respiration, during resuscitation.

**Note:** The above formula estimates the volume of the resuscitation fluid only. Remember to add the ‘normal fluid requirements’ for the adult and children, on top of this volume.

- **Pain Relief – Morphine injection.**
  - **Adults** - Morphine 10mg by IMI or 2mg IV every 5-10 minutes, max. of 10mg.
  - **Children** - Below 12 months: 200mcg/kg IMI or SC
    - 1–5 years: - 2.5–5mg IMI or SC
    - 6–12 years: - 5–8mg IMI or SC
    - over 12 - 10mg IMI or SC

  **Note:** IV morphine for children is 100mcg/kg.

- **Tetanus prophylaxis:** 0.5ml tetanus toxoid by SC injection (if indicated).
- Cover and warm the patient.

### 5.3.12. Drowning

**Near drowning**
Manage the following:
- Aspiration of vomitus and water
- Hypoxia
- Hypothermia.

**Emergency management**

**AIRWAY**
- Lie patient on side
- Insert oropharyngeal airway
- Apply Suction

**BREATHING**
- If Breathing – give oxygen via intranasal tubes or mask. Assist breathing via bag & mask.
**Standard Treatment Guidelines**

- If not breathing – initiate breathing by endotracheal tube.

**CIRCULATION**
- Check for carotids pulse and apex beat.
- If absent cardiac activity do CPR.

**TEMPERATURE**
- Warm the patient with warm covers.

**DRUGS**
- Set up IV infusion with dextrose 5%.
- *IV hydrocortisone 200mg stat. Children 50–100mg IV stat*
- *IV frusemide 40mg stat. Children 20–40mg IV stat.*

**Stroke**
*(please refer to section 7.4)*

**5.4. Infectious Diseases**

**List of Notifiable Infectious Diseases:**

*Note:* In Tonga, 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 Division’s Infectious Disease Section.

**Notifiable Diseases:**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Disease</th>
<th>Disease</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Infectious Conjunctivitis</td>
<td>Poliomyelitis</td>
<td></td>
</tr>
<tr>
<td>Anthrax</td>
<td>Tuberculosis</td>
<td>Psittacosis</td>
<td></td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Influenza</td>
<td>Puerperual fever</td>
<td></td>
</tr>
<tr>
<td>Cholera</td>
<td>Leptospirosis</td>
<td>Rabies</td>
<td></td>
</tr>
<tr>
<td>Dengue</td>
<td>Malaria</td>
<td>Rheumatic fever</td>
<td></td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Meningitis (all forms)</td>
<td>Rubella</td>
<td></td>
</tr>
<tr>
<td>Dysentery (all forms)</td>
<td>Mumps</td>
<td>Tetanus</td>
<td></td>
</tr>
<tr>
<td>Encephalitis</td>
<td>Ophthalmia neonatorum</td>
<td>Trachoma</td>
<td></td>
</tr>
<tr>
<td>Filariasis</td>
<td>Paratyphoid fever</td>
<td>Leprosy</td>
<td></td>
</tr>
<tr>
<td>Food Poisoning</td>
<td>Typhoid fever</td>
<td>Viral haemorrhagic fever</td>
<td></td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>Pertussis</td>
<td>Yaws</td>
<td></td>
</tr>
<tr>
<td>Hepatitis A or B</td>
<td>Plague</td>
<td>Yellow fever</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 9: 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>Staph. Aureus</td>
<td>1-6 hours</td>
<td>Meat, milk</td>
<td>D,V,P, Shock</td>
</tr>
<tr>
<td>Bacillus cereus</td>
<td>1–16 hours</td>
<td>Rice</td>
<td>D,V, P.</td>
</tr>
<tr>
<td>Salmonella</td>
<td>6–48 hours</td>
<td>Meat, eggs</td>
<td>D, V, P.</td>
</tr>
<tr>
<td>E.coli</td>
<td>1-2 days</td>
<td>Any food.</td>
<td>DVP</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>1–3 days</td>
<td>Meat, milk</td>
<td>Fever, P, D.</td>
</tr>
<tr>
<td>Shigella</td>
<td>1–3 days</td>
<td>Any food.</td>
<td>Bloody D, V, fever</td>
</tr>
<tr>
<td>Vibrio parahaem.</td>
<td>2–3 days</td>
<td>Seafood</td>
<td>Watery D.</td>
</tr>
<tr>
<td>Cholera</td>
<td>12h–6 days</td>
<td>Water, seafood</td>
<td>D (watery), shock.</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>1–7 days</td>
<td></td>
<td>D, V, fever, cough.</td>
</tr>
<tr>
<td>Botulism</td>
<td>12–96 hours</td>
<td>Preserved food</td>
<td>V, paralysis.</td>
</tr>
<tr>
<td>Scombrotoxin</td>
<td>&lt; 1 hour</td>
<td>Fish</td>
<td>D, flushing, sweating.</td>
</tr>
<tr>
<td>Chemicals</td>
<td>&lt; 2 hours</td>
<td>Food, water</td>
<td>Various</td>
</tr>
<tr>
<td>Mushrooms</td>
<td>&lt; 24 hours</td>
<td>Mushrooms</td>
<td>D, V, P illusions</td>
</tr>
</tbody>
</table>

D = diarrheoa      V = Vomiting     P = Abdominal Pain

Treatment:
Mostly rehydration using ORS (oral rehydration solution). Antiemetic is rarely needed in adults and antidiarrhoeal 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: Mebendazole 100mg ‘o’ bd for three days OR</td>
</tr>
</tbody>
</table>
for adult and children: pyrantel 10mg/kg as a single dose.

<table>
<thead>
<tr>
<th>Lice (head)</th>
<th>Permethrin solution 1% (refer to section 23.1.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scabies</td>
<td>Benzyl benzoate application 25% OR Permethrin cream 5%. (refer to section 23.1.4)</td>
</tr>
</tbody>
</table>

**HIV and the A&E Staff**

Universal precautions as recommended by the “Vaiola Hospital 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.

**Septicaemia**

- Features seen are usually of a sick patient with: high fever and rigors, who may have embolic signs such as tender cutaneous nodules, enlarged spleen and optic fundal hemorrhages.
- Primary source of the infection may not be obvious and treatment may often be based on “best guess” as to causal organism.
- Take blood, Urine and stool cultures, do FBC, UEC, CXR then admit case for further investigations and management.

**Abscess**

- Incise and drain if possible.
- **Give (flu)cloxacillin 500mg ‘o’ 6-hourly for up to 7 days.**

**Acute epididymo-orchitis**

- May be sexually transmitted
- If this is suspected route, **give doxycycline 100mg bd for 10 days**
- If non-sexual transmission, **give cotrimoxazole (400/80mg) 2 tabs ‘o’ bd for 2 weeks.**
Boils, carbuncles.
Normally due to *Staphylococcal* infection but may be *Streptococcal*. *(refer to Skin infection; section 23).*

**Atypical pneumonia**
**Features:**
- Failure of response to penicillins
- Chest X-ray showing much greater lung involvement than the clinical picture would suggest.

**Treatment:**
- *Give doxycycline 200mg stat and 100mg daily thereafter for 7-10 days.* Ensure dose swallowed completely and washed down with liberal fluids-risk of oesophageal damage if the medication “sticks”
  OR
- *Erythromycin 500mg 6-hourly for 7-10 days.*

**Hospital acquired pneumonia**
**Features**
- Often acquired after surgery, intubation or in the old and debilitated.
- Organisms commonly mixed but include gram negatives

**Treatment:**
- *(Flu)cloxacillin, 1g IV 6-hourly for 10-14 days*  
  PLUS
- *Gentamicin as a loading dose of 2-3mg/kg over 30 minutes IV and continue on subsequent days with daily doses of 5mg/kg/day as single dose.* If plasma gentamicin cannot be measured, monitor renal function daily and do not exceed 3-days course.

**Acute bronchitis**
**Features**
- Acute onset normally in the respiratory disease “season”
Standard Treatment Guidelines

- Cough, wheeze, producing small amounts of green-yellow sputum
- No signs of consolidation in the lungs
- Fever slight or none

Treatment:
- Usually viral and therefore no antibiotic
- Maintain good hydration
- Steam inhalations
- If bacterial secondary infection suspect.
  - *Give amoxicillin 500mg orally 8 hourly for 5 days*  
    OR
  - *Erythromycin 500mg 12-hourly for 5 days.*

Acute exacerbation of chronic bronchitis/COAD
- Wheezing, cough.
- Sputum may be colourless or green-yellow
- Considerable breathlessness
- History of recurrent episodes with residual cough and breathlessness in between.

Treatment:
- *Give amoxicillin 500mg orally 8-hourly for 5 days*
  OR
- *Erythromycin 500mg orally 12-hourly for 5 days.*

Refer to management of COAD and asthmatic section 22.3

Acute community-acquired pneumonia.
Features
- Acute onset with breathlessness, often pleuritic pain, harsh unproductive cough, occasionally a little blood streaking in the sputum, fever and rapid respiration.
- Signs of consolidation in the lung-dullness to percussion, diminished breath sounds, use of accessory muscles of respiration.

Treatment: (refer to section 22.6)

Acute sore throat
- Usually viral caused, in which case, *give aspirin gargles (not in children under 5 years).*
If Streptococcal infection suspected, especially in children (risk of acute rheumatic fever), give phenoxymethylpenicillin (penicillin V) 500mg orally 12-hourly for 10 days. If penicillin hypersensitive, give erythromycin 250mg 6-hourly OR 500mg orally 12-hourly, for 10 days.

Note: Important to complete the course to prevent rheumatic fever.

Acute bacterial sinusitis and/or otitis media (refer to section 8)

- Amoxicillin 500mg orally 8-hourly for 5-7 days
  OR
- Doxycycline 100mg orally 12-hourly for 5 days.

Fungal infections (refer to section 23.1.2).
Fungal infection of the skin (ringworm, tinea cruris or pedis) is common and usually responds to:
- Topical antifungal creams such as clotrimazole 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 Tonga 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.

Acute epiglottitis (Refer to 19.3.3)
Diabetic foot infections (see also “limb ischaemia” under Cardiovascular Diseases) (Refer to section 16.4)
Herpes simplex encephalitis (suspected or proven). (refer to section 16.2)
Meningitis (bacterial) (refer to section 16.2)
Needle-stick injury (refer to the “Infection Control Manual for Vaiola Hospital”)
Osteomyelitis (refer to section 16.13)
Pyomyositis (refer to section 16.13)
Septic arthritis (refer to section 16.13)
Sexually transmitted Infections: (Refer to section 24)
Staphylococcal infections (refer to section 16.14 and 23.1.1)
Streptococcal Infections (refer to section 16.15)
Typhoid (refer to section 16.16)
Urinary tract infections (refer to section 16.17)

5.5. Severe Hypertension

General managements:
- Ensure ABC. Give oxygen 10L/min: Ventimask or intranasal catheter.
- IV line and collect blood for investigations
- Connect monitors for vital signs and cardiac function

Drug Therapy
- Nifedipine 20mg SR chewed and swallowed. Repeat after 30 minutes if needed. If no improvement,
- Give hydrallazine 5–10mg IV, slowly over 20 minutes.
- If not responding after above treatment, discuss with a senior colleague.

Refer to section 6.7, for recommended use of labetalol, ACEI and certain important precautions.

Investigations
- ECG tracing
- Blood tests: FBC, UCE, Cardiac Enzymes
- CXR

Transfer
- When stable
- Oxygen with patient to ward. Nurse to accompany
- IV LINE – N/S TKVO
- Draw blood while inserting IV access. Request for: FBC, UEC, Cardiac enzymes.
- Do ECG and CXR if possible
- Reassess vital signs
5.6. Abdominal Pain

- ABC
- IV line if hypotension or in shock
- Document vital signs and main features of pain to help in arriving at a diagnosis.
- In cases with suspected colicky abdominal pain, give hyoscine bromide 20mg IMI stat.
- Pain relief if really necessary:
  - Adult: Morphine IV 2mg increments every 5-10 minutes until pain is tolerable, max. of 10mg. (Dilute 10mg with N/S to make 10ml). Dose of IMI morphine is 0.1mg/kg and for IMI pethidine: 0.1mg/kg (pethidine can also be used).

Beware: Opioid analgesics can mask clinical signs and symptoms and delay timely diagnosis.
Avoid the use of morphine in biliary colics.

- Give metoclopramide for nausea and vomiting.
- Review patient and decide:
  - Discharge or Admit.

Table 10: Abdominal Pain (Location of pain can help arrive at diagnosis)

<table>
<thead>
<tr>
<th>R) Upper quadrant pain</th>
<th>Biliary Colic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hepatitis</td>
</tr>
<tr>
<td></td>
<td>Liver abscess or tumour</td>
</tr>
<tr>
<td></td>
<td>Pneumonia (anywhere in abdomen)</td>
</tr>
<tr>
<td>Epigastric pain</td>
<td>Gastric or duodenal ulcer (perforated or not)</td>
</tr>
<tr>
<td></td>
<td>Pancreatitis</td>
</tr>
<tr>
<td></td>
<td>Aortic Aneurysm</td>
</tr>
<tr>
<td></td>
<td>Myocardial Infarct</td>
</tr>
<tr>
<td></td>
<td>Biliary</td>
</tr>
<tr>
<td>L) Upper quadrant pain</td>
<td>Splenic Infarct</td>
</tr>
<tr>
<td></td>
<td>Ruptured spleen (history of trauma)</td>
</tr>
<tr>
<td></td>
<td>Pancreatitis</td>
</tr>
<tr>
<td>Flank Pain</td>
<td>Pyelonephritis</td>
</tr>
<tr>
<td></td>
<td>Nephrolithiasis (Abdominal Aortic</td>
</tr>
</tbody>
</table>
Aneurysm may present as renal colic with haematuria too
• Retrocaecal appendicitis
• Retroperitoneal bleeding

5.7. Surgical Problems

Major Trauma

Severe trauma and injuries

A. AIRWAY
• Use basic manoeuvres (chin lift). Avoid tilting head or moving neck if possibility of cervical injury is there. (In such cases, apply a cervical collar if needed).
• Do cricothyroidotomy if required (ie. In upper airway obstruction).
• Insert airway
• Suction if necessary

B. BREATHING
• Assess breathing
• Assist breathing with bag and mask
• Oxygen at 2–4L/min.

C. CIRCULATION
• Feel for carotid pulse or apex beat
• Take BP
• Estimate blood loss
• IV line – N/S run according to degree of hypovolaemia.
• Generally, run 500ml blood plasma expander (gelofusion®) in the first hour if major injuries followed by 1L N/S at 40dpm.

D. DISABILITY
• Assess trauma sites – head to toe examination. Note assessment quickly (ensure patient is completely undressed to allow full examination).
• Attend to fractures, bleeding wounds.
• Clean wounds and apply clean dressing.
E. Take temperature. Keep patient warm.

F. Tetanus Toxoid injection - 0.5ml SC injection (if indicated).

G. Write thorough examination notes.
   - Blood – FBC, UEC, hold serum for possible grouping and X-match.
   - X-ray
   - Call surgeon before sending patient to ward.
   - Surgeon may help insertion of chest drains and other resuscitation and definitive management efforts.

Other Measures:
   - Analgesia – give morphine and metochopramide (maxolon®).
   - Antibiotics for compound injuries.
   - Tetanus toxoid in all patients.

Note: Once ABC has been stabilized, other injuries can be dealt with by the surgeons.

Examples of injuries seen in Major Trauma
   - Airway obstruction
   - Tension pneumothorax and haemothorax
   - Penetrating chest injuries
   - Blunt abdominal injury
   - Penetrating abdominal injury
   - Renal trauma
   - Pelvic fracture and urethral injury
   - Serious head injury and cervical spine injury
   - Gun shot wounds
   - Major burns

Common Fractures and Dislocation (refer to section 25.4)

Sporting Injuries

Soft tissue injuries:
Sprains:
This occurs from over stretching and tearing of ligaments; ranging from sparse fibrous tears to complete disruption of ligament complex. Clinically presents as pain, tenderness and soft tissue swelling. Sprains respond to: ice, compression with elastic support, elevation and progressive mobilization as symptoms allow; simple analgesics like paracetamol (panadol®) and ibuprofen do help. Complete ligament disruption, paradoxically, may not be too painful.

Note: If a sprain is associated with: joint instability, haematoma and/or fracture; please refer for surgical review.

Strains:
This refers to muscular injury, graded 1 (partial muscle fibre tear) to grade 4 (complete muscular rupture). Management is similar to sprains.

Contusions:
These result from direct impact to a limb, body surface or internal organ causing local pain, ecchymoses and soft tissue swelling. Superficial contusions require ice, analgesia and early mobilization within limits of symptoms. Bone contusions can occur as in the perimeniscal areas of knee.

Haematomas:
Intrathoracic, intraabdominal, intracranial or pelvic haematomas can be life threatening. Take care of deceptively loss of blood and need for coagulation test if indicated. Minor haematomas are treated with ice, compression dressing and massage/ultrasound therapy if available. Large haematomas and/or superinfection requires drainage.

Basic physiotherapy at A&E:
For most acute soft tissue injuries, this requires: rest, ice, compression, elevation and exercise.
- Rest for 24–48 hours after injury.
- Ice (crushed ice wrapped in damp cloth) is placed against injured area. Do not apply for more than 10-15 minutes at a time. Repeat treatment every few hours, initially since it helps to significantly reduce the swelling and pain, quite considerably.
Standard Treatment Guidelines  Tonga 2007

- **Compression:** Most injured joints are more comfortable in some support, like crepe bandage/or tubular one).
- **Elevation:** This reduces swelling and pain.
- **Exercise:** Start gentle exercise as soon as symptoms allow.

**Wound Management**

Wounds often have medico-legal implications, therefore, record them properly.
From history note: what, where, when, who caused the wound? Is tetanus cover required?

On examination note site, dimension and preferably, draw it. Describe neuro-vascular damage, tendon injuries, loss of functions and bony fractures. Give an opinion on what could possibly have caused the injury (eg. sharp or blunt instrument). Try to use the following descriptive terms where indicated: incised wound, laceration, puncture wound, abrasion, bruises etc.

**Note:** X-Ray for suspected fracture or foreign bodies. Swab for bacteriology in infected wounds.

**Do not explore the following wounds in A&E:**

- Stab wounds to neck, chest, abdomen or perineum.
- compound fracture wounds requiring surgery
- wounds over infected joints or tendon sheaths
- most wounds needing neurovascular/tendon repairs
- wounds needing expert surgery (eg. eye wounds etc.)

However, arresting bleeding that cannot be arrested with pressure alone may be life saving at A&E before the surgical team arrives.

**Note:** Do not blind clip bleeding points with artery forceps. It may cause further neurovascular damage. Also, never leave a patient alone with a tourniquet on!

**Aims of wound repair:**

- Apposition
- Eversion
- Minimal tension
Standard Treatment Guidelines

Anaesthesia

Local

- Lignocaine 1 or 2% plain
- Lignocaine + adrenaline (never in digits, ears or penis)

Cleaning

- Antiseptic eg. chlorhexidine
- Irrigation with N/S (copious amount). This is the most important measure.

Exploration

- Extent of wound
- Foreign bodies

Debridement

- Remove dead/devitalized tissue

Closure

- Primary
- Delayed primary
- Secondary

Dressing/immobilization

Wound closure

CLOSURE TECHNIQUES (simple guides)

Simple Interrupted Sutures

- Use same distance from wound edge
- Space so that wound doesn’t ‘gape’

Complicated Sutures

- Vertical Mattress
- Corner Stitch
- Deep Stitch

Adhesive Strips

- e.g. ‘steri – strips’
- Best with clean, tidy wounds without tensions
SUTURE MATERIAL
- Non-absorbable – Nylon, Silk, Prolene
- Absorbable – Gut, Dexon, Vicryl

<table>
<thead>
<tr>
<th>SUTURE MATERIAL</th>
<th>STG</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>-</td>
<td>5.0, 6.0 silk or monofilament</td>
</tr>
<tr>
<td>Scalp</td>
<td>-</td>
<td>2.0, 3.0 silk or catgut</td>
</tr>
<tr>
<td>Rest</td>
<td>-</td>
<td>3.0, 4.0 silk or monofilament</td>
</tr>
</tbody>
</table>

Suture Removal
- Face - 5 days
- Scalp - 6 days
- Digits - 7 days
- Trunk/limbs - 7 to 10 days

Leave longer if sutured across tension areas.

TETANUS PROPHYLAXIS
Tetanus prophylaxis of wounded patients is given according to immunization status.

Below 10 years - no tetanus toxoid needed if fully immunised

10 – 15 years - If patient has not received tetanus toxoid in the last five years, give one booster dose 0.5ml SC injection

Over 15 years - If patient has not received tetanus toxoid in the last 5 years, give one booster dose stat 0.5ml SC injection and repeat after 4 weeks.

ANTIBIOTICS
- Use only in contaminated wounds
- (Flu)cloxacillin for 3 days.

DRESSINGS
- Gauze and Bandage
- Plaster for tendons/fingers/joints
- Elevation
• Rest and immobilize

**Remember:**
• Heavily contaminated wounds should be thoroughly cleaned and dressed and should not be sutured.
• Crushed wounds of hands and fingers should also be cleaned and dressed only and not sutured.

5.8. **Red Eye**  
(refer to Section 9)

**Conjunctivitis**  
Wash the eye regularly with N/S before applying the antibiotic ointment or drops  
Do not pad the affected eye

**Foreign body**  
Wash out eye using syringe with clean water

**Flash keratitis (‘flash burns’)**
• History of welding without protective goggles
• Apply topical local anaesthesia initially
• Apply eye pad
• *Give systemic analgesia – paracetamol or codeine phosphate*

**Hordoleum (stye)**
• Acute inflammation of meibomian glands of upper lid. Usually *Staphylococcal*.
• *Treat with topical antibiotics – chloramphenicol (chloromycetin) eye ointment.*

**Chemical Eye Injury (acid & alkali)**
• Immediate irrigation with clean water: irrigation should continue for 30 minutes.
• Refer to Ophthalmologist.

**Corneal foreign body**
Standard Treatment Guidelines                   Tonga 2007

- Local anaesthetic drops instilled (typically amethocaine 1%)
- Remove FB with a sterile cotton swab. If unsuccessful use a 25G or 29G needle.
- Apply chloromycetin drops and ointment
- Apply eye pad
- The patient should be instructed not to drive
- Review in 24 hours to assess healing of the corneal ulceration.

Corneal Abrasion
- Apply topical chloromycetin drops and ointment
- Eye pad. Review in 24 hours to assess healing.

Contusion (“Black Eye”)
- Cold compressors. Paracetamol or codeine.

5.9. Dog Bite

This is a fairly common injury. Dog bites inject a wide range of micro-organisms and should be treated as soon as possible. Assume that Gram positive, Gram negative and anaerobic infections are present.
- clean the wound
- remove any dead or non-viable tissue
- ensure tetanus prophylaxis has been given.
- below 10 years of age – no toxoid needed if fully immunized
- 10-15years – if no toxoid in the last 5 years, give one booster of 0.5ml tetanus toxoid SC.

Antibiotic coverage:
- (Flu)cloxacillin 500mg ‘o’ qid for 5 days
  PLUS
- Metronidazole 400mg tds for 5 days.
- Give parenteral gentamicin if clinically indicated.
6. CARDIOVASCULAR CONDITIONS.

Please note that a lot of the treatment protocols in this section are hospital based ones. Health workers in the community setting are advised to contact the physician by phone or fax, for further advice where necessary.

6.1. Heart Failure

Description:
“Heart failure” is a pathophysiological syndrome. It is neither a diagnosis nor pathological process.

Management requires each of the following
- Recognition of the pathophysiological disturbance/s.
- Identification of the pathological process.
- Identification of precipitating cause/s.

Aetiology

Primary disease processes
- Ischaemic heart disease: myocardial infarction, ischaemic cardiomyopathy.
- Hypertension: systemic or pulmonary.
- Heart valve disease: especially mitral and aortic valve disease.
- Pericardial disease: constrictive pericarditis, tamponade.
- Congenital heart disease.
- High output states: cardiac beri-beri (alcoholics), Paget’s disease, thyrotoxicosis.

Contributing factors
The following are generally not the primary cause of heart failure, but may exacerbate the physiological disturbance and therefore need to be considered when managing heart failure:
- Arrhythmias.
- Drugs:
  - Drugs with negative inotropic action such as β blockers, calcium antagonists, most antiarrhythmics.
Standard Treatment Guidelines

- Withdrawal of diuretics, ACE inhibitors, or digoxin, or poor compliance.
- Fluid retention: steroids, NSAIDS, liquorice, bismuth subnitrate (de-nol®).
- Anaemia.
- Thyrotoxicosis – particularly in the elderly.
- Infections (especially endocarditis and pulmonary infection).
- Pulmonary embolism.
- Fluid overload – e.g. transfusion, renal failure.

Investigations

May be delayed while acute therapy is instituted and initial symptoms controlled.

- CXR (pulmonary venous congestion/oedema, cardiac size, pulmonary infiltrates).
- ECG (arrhythmias, ischaemia, past infarction).
- Myocardial injury markers: CK, AST, LDH.
- ABG (hypoxia, metabolic acidosis – suggests lactic acidosis due to compromised peripheral circulation).
- Na⁺, K⁺ (urgently if ECG or rhythm abnormal), creatinine, Ca++, PO₄.
- FBC + diff.
- Echocardiography to assess LV function, valves, RV pressure estimate (urgent if tamponade or bacterial endocarditis suspected).
- TFT.

Therapy

Correct any contributing factor such as arrhythmias, infection etc.

Acute pulmonary congestion, pulmonary oedema:

- Sit patient upright.
- Oxygen at 4-6L/min to maintain SaO₂ >90%.
- Glyceryl trinitrate – 0.6mg tablet or spray sublingually. Repeat doses every 5 minutes in an acceptable blood pressure.
- Morphine 2.5-5mg IV slowly over 3-5 minutes, count respiratory rate every 5 minutes. Care needed in patients with diminished level of consciousness and/or CO₂ retention.
**Standard Treatment Guidelines**

- *Frusemide 40mg IV – repeat as necessary to initiate diuresis. The effective dose will vary and a larger dose may be needed if patient is on frusemide maintenance or has renal impairment.*

- Less distressed patients may not need morphine and oral frusemide may be sufficient. Be alert to poor absorption from an oedematous GI tract.

- If patient does not respond to initial treatment then CPAP by face mask; and haemodynamic monitoring in ICU should be considered.

- CPAP is useful if hypoxia persists after initial treatment and may avert the need for intubation and mechanical ventilation. It is best started before the patient becomes severely fatigued. If prolonged therapy with high O₂ concentrations is required, consider other ventilatory supports.

- Compromised myocardial function: Low output states can be managed by increasing myocardial contractility (inotropic support) or reducing the cardiac workload (pre load and after load reduction).

- Inotropic Support:
  - *Digoxin* – indicated for control of ventricular response in atrial fibrillation and atrial flutter and has value as third line agent in heart failure with sinus rhythm. *Initial dose (if not already on maintenance treatment)* of 0.5mg (IV or oral) then 0.25-0.5mg at 4 and 8 hours to complete a loading dose of 1-1.5mg. *Maintenance dose* 0.25mg per day usually given at night. *In renal failure and the elderly, reduce the dose.*

  - Intravenous adrenergic agonists are useful as a short term emergency treatment in patients with severe heart failure on the basis of diminished myocardial function with low output and/or refractory congestion. They require ECG monitoring for arrhythmias can be done within the ward or ICU as necessary.

  **Dobutamine** is probably the best drug to use for its positive inotropic effect as it causes little tachycardia and minimizes the increase in myocardial oxygen consumption. Place 500mg (2 ampoules) in 500ml 5% dextrose (1mg/ml) and run at 10ml/hour (approximately 2.5mcg/kg/min).
Standard Treatment Guidelines
Tonga 2007

Increase dose as required to achieve clinical response. Doses up to 10-15mcg/kg/min can be used.

If BP remains below 80mmHg systolic, a vasoconstrictor drug should be given (dopamine or adrenaline) to keep BP above 80mmHg and thus maintain coronary perfusion. Give dopamine (2.5-5.0mcg/kg/min) by IV infusion. Can be increased to 7.5-10mcg/kg/min if necessary (2 hourly steps of 2.5mcg/kg/min). **Adrenaline is rarely needed.** If considered unavoidable place 1mg in 1000ml 5% dextrose water or N/S and run at 1-4mcg/min IV infusion.

**Caution:** This regimen may differ from that used in ICU.

- **Pre load reduction:**
  - Nitrates, diuretics, morphine.

- **After load reduction:**
  - If BP well maintained use vasodilator therapy. ACE inhibitors are the treatment of choice.
  - ACE inhibitor dosing:
    - The start dose of captopril for a patient with normal renal function is 6.25-12.5mg 2-3 times daily.
  - **Spironolactone in low dosage (12.5-25mg/day) has proven of benefit in heart failure when added to ACE inhibitors and loop diuretics.**

- **Further Management**
  - Daily weigh. Fluid balance for the first 24 hours is essential to check diuresis. Thereafter a daily weight will provide the best indication of the effectiveness of diuretic therapy. Check previous weights from old notes.
  - Repeat CXR prior to discharge or if dyspnoea and/or clinical features fail to respond. Consider ECHO if cardiomegaly present (e.g pericardial effusion).
  - **Low molecular weight heparin such as enoxaparin 20-40mg SC every 24 hours.** Start on admission. Consider full heparinization then warfarin in those with severe left ventricular impairment, or chronic atrial fibrillation.
  - **Potassium supplements will be needed with most diuretics.** Requirements may be reduced or unnecessary in
renal failure, with ACE inhibitor treatment or when using potassium sparing diuretic therapy.

- Re-evaluate the primary cause of the heart failure – attempt to confirm the primary disease process and exclude aggravating factors.
- Beta-blocker drugs do not have any role in the management of acute heart failure. However carefully titrated administration of β-blocker reduces mortality in stable chronic heart failure associated with diastolic dysfunction.

6.2. Myocardial Infarction

Description
The diagnostic criteria for an acute myocardial infarction are 2 out of 3 from:

- Central chest pain lasting >30 minutes.
- ST elevation (transmural or Q wave infarction).
- Cardiac enzyme release – CK.

Causes
Acute coronary occlusion due to:

- Coronary artery plaque rupture and thrombosis.
- Emboli (rare).
- Spasm (Prinzmetal’s angina, rare).

Clinical features
A history of severe crushing retrosternal chest pain radiating to neck and arms is typical. However, atypical presentations are very common. May present as collapse, LVF, hypotension, peripheral embolus, stroke, or “malaise”. A difficult diagnosis to exclude even with normal ECG. Generally if in doubt, admit to hospital. If the initial ECG is normal then the diagnosis may be suspected on the basis of history alone and ECG repeated in 2-4 hours.

Investigations

- ECG daily for 3 days before discharge. Repeat ECG when pain resolved or if pain recurs.
Cardiac Enzymes: A creatinine kinase (CK) should be done on admission and at 8-12 hours and 24 hours after the onset of symptoms. For patients admitted more than 24 hours after the onset of pain, the above enzyme should be measured on three consecutive days.

CXR can usually wait until normal working hours or prior to discharge. Indications for urgent X-ray:

- Suspicion of aortic dissection (widened mediastinum; separation of calcified intima).
- Moderate or severe cardiac failure.

FBC + diff.

U & E, Cr, glucose.

Total cholesterol, HDL cholesterol and triglycerides on admission and repeat at 3 months.

Patients with suspected myocardial infarction require rhythm monitoring.

Complications of Myocardial Infarction

The following problems may complicate even small myocardial infarcts:

- Left ventricular failure.
- Deep vein thrombosis/ Pulmonary embolism.
- Dressler’s syndrome (pericardial and/or pleural inflammation).
- Arrhythmias.
- Cardiogenic shock/low cardiac output states.
- Valvular dysfunction.
- Myocardial rupture (septal or free wall).
- Mural thrombi (with systemic embolization).

Management

- “Time is Muscle” – expedite treatment and assess suitability for thrombolysis urgently.
- Transfer to Medical Ward (Intensive Room) – any patient with definite acute myocardial infarction is at risk from an acute arrhythmia and should be administered to the Medical Ward.
• **IV access** – IV insertion on admission. Flush 4 to 6-hourly with N/S.

• **Oxygen** – should be administered to all patients with MI or unstable angina for the first 12 hours unless there is a strong contra-indication.

• **Pain relief** – continuing pain suggests ongoing ischaemia which should be treated with nitrates, β-blockers, calcium antagonists and morphine as required. Give morphine IV according to severity and repeat up to 4-hourly if necessary. Draw morphine 10mg (1ml) up with 9ml of water for injection (1mg/ml). Give 2-3mg (2-3ml) increments until pain is controlled observing the patient’s BP and respiration.

• **Metoclopramide 10mg or prochlorperazine 12.5mg given IV at the same time reduces nausea and vomiting.**

• **Aspirin® 300mg chewed and then swallowed stat then 150mg orally daily if no contra-indications.**

• **Thrombolytic Therapy** – streptokinase (SK) is the most widely used thrombolytic agent.

• **Nitrites** may be helpful for continuing pain (patch or isosorbide nitrate).

**Current Indications for thrombolysis**

• All patients presenting with acute myocardial ischaemic symptoms lasting more than 30 minutes with ST elevation on ECG.

• New ST elevation greater than 1mm in at least 2 limb leads or greater than 2mm in 2 pre-cordial leads or new left bundle branch block with typical symptoms.

• Thrombolytic therapy is beneficial if the duration from onset is <12 hours and occasionally up to 24 hours from onset of symptoms particularly if pain is ongoing or marked ST elevation.

**Administration of streptokinase**

• *Add 1,500,000 units of streptokinase to 100ml N/S and infuse over 30 minutes.*
Monitoring requirements for thrombolytic therapy

Figure 3  Use of Thrombolysis Therapy

Check for Contra-indications

No Contra-indication for SK

Sublingual nitrates, aspirin® 300mg ‘o’

Insert IV lines x 2 and take blood for coagulation profile, Group & Hold

Relative Contra-indications
(to be discussed with Physician)

- Prolonged CPR (>5 minutes) or known chest wall injury during resuscitation
- Severe liver disease
- Severe diabetic retinopathy
- Uncontrolled hypertension (diastolic >115 or systolic >180mmHg)
- CVA of embolic cause or unknown type between 6-12 months
- On going oral anticoagulation

*Note
SK should not be readministered more than five days after a first dose. Recent streptococcal infection is a relative contra-indication to the first administration of streptokinase.

Contraindications present

Sublingual nitrates, aspirin® 300mg ‘o’

Beta-blocker. Discuss with Medical Registrar/Consultant Physician

Absolute -indications
Active bleeding (excluding menstruation)
Known bleeding disorder
Major surgery or trauma in the last four weeks
Recent non-compressive vascular puncture
Haemorrhagic CVA in previous year
Cerebrovascular accident of unknown type within six weeks
Active peptic ulcer disease within four weeks
Pregnancy

*SK should not be readministered more than five days after a first dose. Recent streptococcal infection is a relative contra-indication to the first administration of streptokinase.
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- Continuous ECG monitoring with senior nurse and doctor in attendance.
- 15 minutes pulse, BP and temperature for 12 hours, then hourly for 4 hours, then as needed.
- Maintain availability of drugs and defibrillator.
- Record times of:
  - onset of pain.
  - first ECG/start SK, finish SK.

**Note:**
- If ST segment depression is present, or ST-T wave changes are non-specific but symptom/risk factors are suggestive of myocardial infarction, then **give β-blocker (atenolol 25-50mg ‘o’ daily, may need 100mg ‘o’) as well as aspirin and nitrates.**
- Inferior infarct, check right sided leads for ST elevation (i.e. look actively for right ventricular infarction). **If AMI strongly suspected give thrombolysis.**
- Move to Medical Ward early.
- Err on side of excess consultation with physician/medical registrar.

**Complications**
- Hypotension associated with SK infusions:
  - Slow or stop SK temporarily.
  - Head down tilt.
  - Consider giving IV N/S 250ml boluses x 2-3 (contraindicated in LVF, particularly useful in right ventricular infarcts).
  - If above unsuccessful, consult physician. **Consider promethazine IV 25-50mg, adrenaline 0.1mg IV (1ml 1:10,000) very cautiously (wait and repeat at 5-10 minutes intervals). Adrenaline IV in a patient with an acute MI should only be given in the event of a catastrophic anaphylactic reaction since it may precipitate ventricular fibrillation.**
  - Allergic or febrile reactions which may vary in severity from rigors to typical anaphylaxis. **Give hydrocortisone 100mg IV and/or promethazine 12.5-25mg IV stat.**
Haemorrhage – apply local pressure over all IV access and arterial puncture sites before starting thrombolysis. If significant bleeding occurs despite appropriate local pressure, administer 2-3 units fresh frozen plasma and seek advice from haematology.

If bradycardic atropine may be helpful. Give atropine 0.3mg IV with further doses over 30 minutes to a total of 1.2mg.

Other treatments
- If thrombolytic therapy is not given, use low molecular weight heparin e.g. enoxaparin 1mg/kg every 12 hours with a max. of 100mg per dose. If there is moderate renal impairment or if reversal of the heparin effect is likely to be needed, use a continuous infusion of unfractionated heparin and monitor by APTT.
- Hypnotics if sleep disturbed.
- β-Blockers – continue if patient is already on them and no contraindication exists. β-blockers such as atenolol (25-50mg ‘o’ daily) or metoprolol, should be commenced on admission. They should be continued for at least 2 years. Avoid in the first few hours after an inferior MI unless sinus tachycardia is present.
- Amiodarone may be indicated for some atrial and ventricular arrhythmias.
- Continuing chest pain in spite of appropriate morphine IV and sublingual nitrates; consider β-blocker therapy.

6.3. Cardiogenic Shock

Clinical Features
The presence of shock following myocardial infarction implies the loss of a large area of myocardium and carries an extremely high mortality (>80% in hospital).

Dobutamine is probably the best drug to use for its positive inotropic effect; as it causes little tachycardia and less increase in myocardial oxygen consumption than other drugs (refer to section 6.1 for dosing instructions). If BP remains below
80mmHg systolic, a vasoconstrictor drug should probably be started to keep the BP above 80mmHg and thus maintain coronary perfusion. *Consider early addition of dopamine in a dose of 2.5-5mcg/kg/min in the presence of baseline or evolving renal impairment.*

- About 20% of patients with cardiogenic shock have low LV filling pressure (e.g. right ventricular infarction or patients on diuretic therapy) and may benefit from fluid infusions (250ml bolus N/S, repeated if necessary).
- All patients with cardiogenic shock should be considered for management in Medical Ward or ICU.

**In-Hospital Management following Myocardial Infarction**

- Mobilization protocols – these protocols are available in Medical Ward. Some patients can be discharged as early as three days after admission.
- Investigation after myocardial infarction:
  - 2D echocardiography should be considered in all patients to assess left ventricular function for prognostic reasons and review the need for on-going therapy with ACE inhibitors. Priority should be given to those with anterior MI, left ventricular failure or hypotension.
  - Medical therapy should be tailored to each individual patient, but include aspirin unless contra-indicated, β-blockers unless contra-indicated and ACE inhibitors if there is evidence of left ventricular dysfunction. Nitrates are appropriate for control of symptoms. The use of verapamil could be considered in patients who have contra-indications to β-blocker therapy and have good left ventricular function without clinical evidence of congestive failure.
  - Action to reduce the effects of any risk factor present – smoking cessation, cholesterol lowering agents, control of hypertension, diet if overweight.
  - Overseas referral for coronary arteriography should be considered if patients experience recurrent post infarction angina. Coronary angiography should also be considered if there is evidence of poor left ventricular function or congestive failure. Sub-maximal exercise testing should be considered if there is recurrent pain of uncertain origin.
6.4. Acute Coronary Syndrome (ACS)
The following may be defined as acute coronary syndromes:

- Angina of recent origin (<1 month) which is severe and/or frequent.
- Severe prolonged or more frequent angina superimposed on previous stable angina.
- Angina developing at rest or with minimal exertion.
- Non ST elevation myocardial infarction.

Definition
The pain experienced with unstable angina is similar to stable angina, though often more intense and of longer duration. It may also be associated with other signs such as sweating and nausea. Very often it is difficult to distinguish between unstable angina and acute myocardial infarction during the initial assessment of the patient. Thus, management in the first few hours will often be similar to that for myocardial infarction (see above).

Causes
- Coronary artery disease, often with intracoronary thrombus at the site of a ruptured plaque.
- Coronary artery spasm.

Investigations and Management
These are similar to the treatment of acute myocardial infarction except that thrombolysis is not indicated. A physician should be consulted.

- Daily ECG and cardiac enzymes on at least two occasions are mandatory, as is assessment of cardiac risk factors including lipids.
- Elevation of CK indicates high risk.
- ECG changes such as ST depression of T wave inversion or any serial change over the first 24 hours suggest a poorer prognosis.
Enoxaparin at 1mg/kg SC twice daily (max. 100mg/dose) should be started in patients with ECG changes suggesting ischaemia, a positive CK or a high index of suspicion of ACS.

All patients with ACS should be given oxygen and require ECG monitoring for at least 24 hours.

Start aspirin, nitrate and a β-blocking agent (or calcium antagonist if β-blocker is contraindicated). If patient has presented with unstable angina on anti-anginal therapy, plan to discharge on increased doses or add another anti-anginal. Patients should not be discharged on the same therapy as they were on at admission. Remember to investigate for anaemia, hyperthyroidism, heart failure.

Patients with prolonged episodes of chest pain (<20 minutes per episode) or with persistent abnormalities of subendocardial ischaemia (evolving T wave changes, reversible ST depression) are at very high risk of a major cardiac event during short term follow up. These patients should be considered for overseas referral for cardiac catheterization to define their coronary anatomy and plan further treatment.

All patients leaving hospital with the discharge diagnosis of unstable angina should be reviewed at least once in “Cardiac Outpatient Clinic” to assess symptom and review risk factor assessment.

6.5. Cardiac Arrhythmias

Note: Inappropriate treatment of arrhythmias can be rapidly fatal. Whenever possible, seek expert advice.

Classification

- Ectopic activity (atrial and ventricular).
- Heart block.
- Bradyarrhythmias.
- Supraventricular tachycardias.
- Ventricular tachycardias.

Aetiology

- Common in presence of structural cardiac disease, especially acute myocardial infarction.
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- Electrolyte imbalances (especially hypokalaemia) and acid/base imbalance may initiate and/or perpetuate the arrhythmia and these should be corrected.
- Drugs including tricyclics, phenothiazines, theophylline, digoxin and anti-arrhythmics.
- Hyperthyroidism.

Clinical features
- Check pulse at apex and wrist, blood pressure, tissue perfusion.
- If there is evidence of hypotension or heart failure due to arrhythmia, urgent treatment is required.
- Assess venous pressure waves:
  - Regular cannon waves in junctional rhythm.
  - Irregular cannon waves in ventricular tachycardia or heart block.

Investigations
- ECG – 12-lead and rhythm strip with the best P wave. If bizarre/wide QRS complexes then check speed of paper.
- Check for abnormalities of K⁺, Mg⁺⁺, Ca⁺⁺; acidosis and hypoxia. Metabolic factors may contribute to the initiation/perpetuation of the arrhythmia.
- Thyroid function tests.

Management

Ectopic Activity
- Atrial ectopics – often normal, benign. Look for atrial beat (may just deform preceding T wave) when diagnosing “extrasystoles”. Does not require treatment.
- Ventricular ectopics – common, usually benign. May be confused with aberrant atrial ectopics. Treatment usually not required.

Heart Block
- Prolonged PR Interval:
  - 1ˢᵗ degree block does not require treatment. Monitor closely in anterior infarcts. Doses of β-blockers, calcium antagonists and digoxin should be reduced.
  - 2ⁿᵈ degree block:
Standard Treatment Guidelines

- Type I, a progressive increase in PR interval until beat is dropped. May be observed in inferior infarcts but is more serious in anterior infarcts.
- Type II, PR interval normal or increased but beats lost in unpredictable fashion. Indicates disease in or below the bundle of His. This may progress to complete heart block and a very slow ventricular escape rhythm.
- Bifascicular block (bundle branch block + hemi block) – stable asymptomatic bifascicular block does not necessarily require treatment. However, following anterior myocardial infarction it may progress to complete heart block.
- Complete heart block requires monitoring in Medical Ward. If stable with regular ventricular escape rhythm and satisfactory blood pressure, may be observed overnight. Be prepared to use isoprenaline (see dosing instructions below) to maintain rate if atropine alone is not effective. Symptomatic AV block not associated with infarction usually merits referral overseas for placement of a permanent pacemaker.

Bradyarrhythmias
- Sinus Bradycardia – check for excessive β-blockade. Common after myocardial infarction. Treat with atropine 0.6mg if heart rate <40, if symptomatic or hypotensive. Smaller additional doses of 0.3mg may be required. Total dose of 2-2.5mg before atropine side effects occur. Isoprenaline may also be used. Place 2mg in 500ml 5% dextrose (5% dextrose water) = 4mcg/ml, and start at 1ml (4mcg) per minute but then run as slowly as possible (0.5-10mcg/min) to keep heart >60.
- Sinus Arrest – common in inferior infarction and usually benign, as nodal escape rhythm maintains adequate heart rate. It may require treatment with atropine or isoprenaline but rarely needs pacing. When sinus arrest is not associated with infarction, it is due to the sick sinus syndrome and requires permanent pacing if symptomatic.

Note: Inferior infarcts are associated with a wide range of rhythms which rarely have much adverse effect on myocardial performance. AV block is common. These arrhythmias are generally not treated...
Supraventricular Tachycardia

- Always perform a 12 lead ECG.
- **Sinus** – slow onset, pulse rate usually below 150/min, slows gradually with carotid sinus massage. Does not require treatment itself but requires an explanation as to its cause (e.g. LVF, anxiety, pain, hyperthyroidism, infection, hypoxia).
- **Paroxysmal Tachycardia** – sudden onset, rate usually >150/min. Carotid sinus massage causes either no response or reversion to normal or increased AV block. Atrial flutter usually gives a ventricular rate of approximate 150/min (2:1 block) and may be misdiagnosed as another SVT. If not distressed and not in failure and history of short-lived attacks either:
  - Do nothing,
  - OR
  - Valsalva manoeuvre (supine)
  - Dive reflex – face into iced water
  - Carotid sinus massage at the upper point of the thyroid cartilage for 2cms up and down (one side at a time). Do not perform if carotid vascular disease present; **check for carotid bruit**.
  - Monitor the effect of these manoeuvres with ECG, as this may induce 2:1 block.
  - **Adenosine given as a rapid bolus IV into a large vein, in increasing doses 6mg then 12mg, then 18mg, in step wise fashion at 2 minutes intervals.** Flush rapidly with 10-20ml saline, effective for AV nodal re-entrant tachycardia but will not revert atrial flutter.
  - If unsuccessful and not on β-blockers:
    - **Verapamil 5mg by slow IV bolus (5 minutes) followed by 1mg/min to a total of 15mg if not on β-blockers.** ECG monitoring required, measuring BP and with resuscitation equipment nearby as asystole may result.

**Note:** Verapamil should never be used for a broad complex tachycardia as this may be ventricular tachycardia. It has considerable negative inotropic effects and should not be used in the presence of ventricular dysfunction, hypotension.
If on β-blockers and no structural cardiac disease present consider further β-blockade (make sure patient is not asthmatic).

If unsuccessful, proceed to cardioversion. The patient should be managed in the resuscitation room of the Outpatient Department, Medical Ward or ICU. An experienced doctor with anaesthetic skills should be present. When sedated (either with midazolam/fentanyl or diazepam), start with 100J, then 200J, then 400J. Do not shock more than twice with 400J – consult physician.

Atrial Flutter
This rhythm is often mislabelled as paroxysmal atrial tachycardia because carotid sinus massage has not been performed to increase AV block, decrease ventricular rate and demonstrate flutter waves. If compromised, cardiovert as for paroxysmal tachycardia. If not compromised, digitalize using oral protocol given below. If spontaneous reversion to sinus rhythm does occur within 24 hours, the patient should be referred for cardioversion.

Atrial Fibrillation
New onset atrial fibrillation with rapid ventricular rate:

- FBC, creatinine, Na⁺, K⁺, thyroid function tests
- Digitalize:
  - Give 0.5mg digoxin initially (IV if in heart failure or nauseated).
  - Give a further 0.25-0.5mg at 4 and 8 hours to complete a loading dose of 1-1.5mg.

- Other options include:
  - Oral β-blocker (e.g. metoprolol; start with 50mg daily, max. dose 200mg/day).
  - Oral calcium antagonist (e.g. verapamil).
  - Most patients with recent onset atrial fibrillation, will revert to sinus rhythm within 24 hours. Chemical cardioversion may be attempted in patients with structurally normal hearts.

- Heparin:
  - All patients with atrial fibrillation or flutter should be treated with full dose low molecular weight heparin subcutaneous, unless there are contra-indications. Warfarin
may not be required if heparin started within 12-24 hours of onset of fibrillation and sinus rhythm achieved within 48 hours and there is no left atrial enlargement or major mitral valve abnormality.

- Electrical cardioversion:
  - Indicated if there is cardiac compromise with hypotension, angina or impaired cerebral function or persistent atrial fibrillation. Consult physician.

**Chronic atrial fibrillation on digoxin with rapid ventricular rate:**
- Exclude aggravating causes (ischaemia, heart failure, volume depletion, infection, alcohol).
- Check digoxin concentration.
- Add oral β-blocker or calcium antagonist as above.
- Add aspirin if heart structurally normal on echocardiogram.
- Consider warfarin if left atrium dilated or mitral valve abnormal, or age >70 years, previous embolic event.

**Ventricular Arrythmias**
- **Idioventricular** (rate <100/min.) – this is common after myocardial infarction and no treatment is required.
- **Ventricular Tachycardia** (VT) – may be confused with SVT when aberrant AV conduction causes broad QRS complexes. Cannon waves and a variable first sound are suggestive of ventricular tachycardia. ECG diagnosis depends on P waves, and these are best seen in V1 or V2. P waves independent of ventricular rate or fusion beats are diagnostic. Remember VT may be prolonged and not associated with collapse. Treatment is by cardioversion. Lignocaine 100mg IV can be used (and repeated x 1) but can precipitate hypotension or VF. Unless an emergency this should be undertaken in hospital (ICU). In an emergency situation proceed to 200-400 Joules shock.
- If in doubt assume that all regular, broad complexes tachycardias are VT. Treatment of choice is cardioversion.
- **QT prolongation**
  - Acquired long QT
Generally, QT prolongation is acquired and is associated with bradycardias, myocardial ischaemia, metabolic disturbances or drugs.

- Causes of acquired QT prologation
  - Drugs
    - Antihistamines
    - Anti arrhythmics
    - Class 1
    - Class 3 (amiodarone)
    - Psychoactive drugs (lithium, tricyclics, haloperidol, phenothiazines).

**Note:** Drug interactions:
The following may increase the concentration of the above drugs. Metronidazole, macrolides, SSRIs (Selective Serotonin Reuptake Inhibitors), fluconazole, grapefruit juice, diltiazem and many others.
  - Check for possible causes and withhold any drugs that may be potentially responsible.
  - Correct all metabolic disturbances and treat ischaemia.

**Congenital long QT**
Usually presents in patients younger than 40 years
  - Withhold all QT lengthening drugs.
  - Check and correct any metabolic disturbances.
  - B blockers may help suppress recurrent episodes.
  - Refer to physician for long term management.

**Torsade de pointes**
This polymorphic ventricular tachycardia is due to QT prolongation, either congenital or acquired. It may revert spontaneously; otherwise it may require immediate cardioversion.
If recurrent, IV magnesium 2-4g IV may be tried.

**Ventricular Fibrillation (VF)** – D.C. shock (see below).
**Amiodarone** – Intravenous amiodarone is very effective in the acute treatment of atrial and ventricular arrhythmias. However, potentially important side effects may occur with long term therapy.

Amiodarone has less effect on myocardial contractility than other anti-arrhythmics. Therefore, intravenous amiodarone may be the
treatment of choice for arrhythmias if there is known severe left ventricular impairment or concurrent left ventricular failure. Give 5mg/kg or 150mg-300mg dissolved in 250ml of 5% dextrose over 30-60 minutes intravenously. Continue with 10mg/kg or 900mg/500ml/24 hours.

Because of risk of chemical thrombophlebitis, amiodarone should be given into a proximal arm vein. Consider a central line if planning to give more than 24 hours intravenous infusion. Patients receiving intravenous amiodarone should be on continuous ECG monitoring.

6.6. Cardiac Arrest

- Commence basic life support – using the ABCs of CPR. Call for Cardiac Arrest trolley. Praecordial thump if witnessed. See section 5.2

REMEMBER:
- External cardiac compressions at 100/min.
- Ventilate twice for every 30 compressions, for both 1 and 2 persons CPR.
- Use oropharyngeal airway with ambu bag and face mask rather than intubate unless you are confident of success. If you insert an endotracheal tube basic life support must not stop for more than 30 seconds.
- When the defibrillator arrives identify the rhythm utilizing the paddles and/or by attaching ECG leads.
- Paddle positions at right or upper sternum below the clavicle, and left of the left nipple in the anterior axillary line. Use either paste on the paddles or pre-jelled pads on the chest to decrease impedance.
- Do not use dilated pupils as an indication to stop resuscitation.

Identify the Cardiac Rhythm

Ventricular Fibrillation (VF):
- Defibrillate immediately using 200J.
Check rhythm; if still in VF, repeat defibrillation using 200J.
If still in VF, repeat defibrillation using 360J.
If unsuccessful, give adrenaline 1mg IV. This may be repeated every 3 minutes. Perform CPR for 1 minute.
If still in VF defibrillate using 360J x 3, then 1 min. CPR, then further 360J, x 3 shocks.
If still in VF, give lignocaine 50-100mg IV bolus and repeat defibrillation using 360J.
If still in VF consult physician regarding the use of other agents.

Ventricular asystole:

Note: Exclude the possibility of monitor failure resulting in apparent asystole. Always attempt thump pacing. Check for evolved QRS and pulse for effectiveness.

Give adrenaline 1mg IV. This may be repeated frequently.
If still in asystole, give atropine 3mg IV.
Consider adrenaline infusion. Add 1mg adrenaline to 100ml N/S (10mcg/ml) and infuse at an initial rate of 15ml/hr (2.5mcg/min) and thereafter at a rate, generally 15-60ml/hr (2.5-10mcg/min), sufficient to produce an acceptable heart rate.

Bradycardia and Heart Block:

“Thump pacing” may be effective in inducing ventricular depolarization and an adequate cardiac output.
Atropine 0.6mg IV and repeat if necessary.
Adrenaline infusion as described under asystole.
Definitive management is by pacemaker.

Electromechanical dissociation, i.e. organised electrical activity on ECG but failure of effective myocardial contraction:

Consider and treat possible causes including hypovolaemia, major electrolyte imbalance, tension pneumothorax, cardiac tamponade, pulmonary embolism, overdose, anaphylaxis. Urgent echocardiography may be useful.
In absence of other specific therapy give adrenaline 1mg IV. This may be repeated every 3-5 minutes.
Post-Arrest Management

- Maintain basic life support unless the patient has an adequate spontaneous circulation and respiration.
- Provide high inspired oxygen.
- Monitor ECG and transfer when stable to Medical Ward or ICU, depending upon level of consciousness and requirement for artificial ventilation.

6.7. Hypertension

Description:
A blood pressure (BP) elevated above normal, measured on three separate occasions, a minimum of 3 days apart:

Children: age related diastolic blood pressure equal to or above
- less than 6 years     80mmHg
- 6-12 years           84mmHg
- over 12 years        90mmHg

Adults: Systolic blood pressure >140mmHg and diastolic blood pressure >90mmHg.

A severe hypertension emergency is a severe hypertension associated with some of the following:
- Neurological signs eg severe headache, visual disturbances, confusion, coma and seizures.
- Pulmonary oedema

Table 11 Levels of hypertension

<table>
<thead>
<tr>
<th>Level of hypertension</th>
<th>Systolic mmHg</th>
<th>Diastolic mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&gt;140</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt;169</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;199</td>
<td>&gt;114</td>
</tr>
</tbody>
</table>

Classification

- Primary Idiopathic, “essential”
- Secondary Renal, endocrine or neurological disease, diabetes mellitus, coarctation of aorta. Drug induced.
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- Malignant Severe hypertension with rapidly progressive end organ damage e.g. acute left ventricular dysfunction, encephalopathy, retinopathy (haemorrhages, exudates and papilloedema) and renal failure.

Aetiology
- Renal: Acute nephritis, renal impairment (acute or chronic), renovascular and volume overload (especially dialysis patients).
- Endocrine: Cushing’s syndrome, phaeochromocytoma, Conn’s, hyperparathyroidism, hyperthyroidism, hypothyroidism, acromegaly.
- Neurological: Raised intracranial pressure, autonomic neuropathy.
- Diabetes mellitus: Both Type I and II patients are commonly hypertensive.
- Coarctation of the Aorta
- Respiratory: Obstructive sleep apnoea.
- Drugs: Presence or absence (clonidine withdrawal).
- NSAIDs, steroids, sympathomimetics (including non-prescription drugs), alcohol, liquorice, cocaine, erythropoietin, cyclosporin.

Investigation
- Blood pressure measurements – lying and standing (should be confirmed by medical staff).
- ECG and CXR.
- Collect blood for catecholamines before treatment, if phaeochromocytoma is suspected, as therapy will alter the blood levels.
- Plain abdomen x-ray or ultrasound for renal size and calcification.
- Urinalysis (dip-test for proteinuria/haematuria, microscopy for cells and casts).
- Plasma Na⁺, K⁺, Cl⁻, creatinine, Ca++. Haemolysis of samples may obscure hypokalaemia.
- 24 hour urine collection for protein.
- 24 hour urine for creatinine clearance, Na⁺, K⁺, VMA, metanephrines and free catecholamines.
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- Renin and aldosterone plasma levels if Conn’s syndrome possible.

Management objectives:
- Achieve and maintain the target blood pressure as close as possible to normal, which is systolic of 120mmHg and diastolic of 80mmHg.

Non-drug treatment:
- Weight loss if above ideal weight (Normal weight for height has a BMI below 30, and normal waist circumference should be <100cm)
- Regular physical exercise (30-45 minutes exercise for 5 days a week)
- Stop smoking
- Restrict salt intake
- Moderate or no alcohol intake
- Restrict cholesterol intake.

Drug treatment of essential hypertension:

Table 12: Step wise treatment of hypertension:

<table>
<thead>
<tr>
<th>Steps and their characteristics</th>
<th>Treatment</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1:</strong> Mild to moderate hypertension with no risk factors</td>
<td>Lifestyle modification (exercise, diet and loose weight)</td>
<td>Blood pressure at around 120/80mmHg and definitely below 140/90mmHg.</td>
</tr>
<tr>
<td><strong>Step 2:</strong> Failure of step 1 after 3-6 months implementation plus one risk factor, or deterioration of hypertension.</td>
<td>Lifestyle modification and Start an antihypertensive such as either hydrochlorothiazide 25-50mg ‘o’daily OR captopril 12.5mg bd OR enalapril 2.5mg daily OR atenolol 25mg ‘o’ daily.</td>
<td>Blood pressure control within 1 to 3 months. Aim at 120/80 and definitely below 140/90mmHg.</td>
</tr>
<tr>
<td><strong>Step 3:</strong> Failure of step two after 1-3 months</td>
<td>Lifestyle modification. If a thiazide was initiated, increase the dose or ADD</td>
<td>Blood pressure control within 1-3 months to be</td>
</tr>
</tbody>
</table>
an ACEI OR a 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. around 120/80 and definitely below 140/90mmHg.

| Step 4: Failure of step 3 | Refer to physician for further advice |

All cases suspected of secondary hypertension should be referred to hospital for further investigations and treatment.

Management of acute hypertensive crisis
Monitor blood pressure frequently:

- The excessive use of powerful IV agents may lead to severe cerebral and myocardial insufficiency. Gentle reduction over hours and days enables compensatory vasodilatation and cardiovascular changes to develop and decreases possibility of end organ damage.

- Hypertensive encephalopathy in adults is usually associated with systolic BP >200mmHg and diastolic >130mmHg but can occur at lower levels if there has been a rapid rise in pressure. Aim to reduce diastolic to around 100mmHg only. Oral therapy is generally best but patients with evidence of hypertensive encephalopathy (confusion, restlessness, convulsions, hypoventilation, papilloedema) require IV treatment. Consider admission to ICU or Medical Ward.

- **Oral therapy** – A calcium antagonist (e.g. nifedipine SR 20mg) OR a β-blocker can be used. Alternatively captopril 6.25mg ‘o’ may be used but should be avoided in the presence of hyponatraemia. Labetalol gives combined alpha and β-blockade and may be used if no contraindications to β-blockade (200mg ‘o’ stat then repeat as required up to 1200mg daily). Avoid a pure β-blocker alone, if phaeochromocytoma is a possibility. In this situation, labetalol is generally a preferred choice.

- **IV therapy** – for true acute hypertensive encephalopathy, i.e. sudden sever rise in diastolic blood pressure, give labetalol 50mg IV over 1 minute followed by further slow IV push to total 300mg.
Note:

- Do not treat cerebrovascular accidents with IV therapy – oral therapy is best which will result in a slower reduction in blood pressure and preserve cerebral autoregulation.
- If hypertension is associated with acute LVF or volume overload IV frusemide should be used along with and ACE inhibitor.
- Phaeochromocytoma, if suspected, requires alpha–blockade or the combination of alpha plus β-blockade (e.g. labetalol). Avoid β-blocker monotherapy as it may cause paradoxical hypertensive crisis via unopposed alpha adrenergic activity.
- Plasma sodium gives some index of volume depletion and activity of the Renin-Angiotensin-Aldosterone system (RAAS) in hypertension. A low sodium usually indicates low circulating volume and high RAAS activity. The use of ACE inhibitors may produce profound hypotension.
- If hypertension is associated with withdrawal of clonidine or other centrally acting drugs used in hypertensive treatment avoid giving a β-blocker alone. Stopping clonidine may induce a phaeo-like state which is exacerbated giving a β-blocker. Labetalol is recommended as it provides alpha and β-blockade.

6.8. Aortic Dissection

Clinical features
This diagnosis should be specifically considered in all cases of acute chest pain. Pain is sudden and severe, most often in the interscapular region. It can mimic angina. Pain, hypovolaemic shock and an abnormal mediastinum on chest X-ray suggest aortic dissection. Seek urgent advice from the physician on call. The immediate priority is to determine the presence and type of dissection urgently since this will influence management and prognosis.

Aetiology
- Cystic medial necrosis.
- Marfan’s syndrome.
- Atherosclerosis.
- Hypertension.
Investigations

See fig. 4 – *Diagnosis of Aortic Dissection*

- CXR - Widened mediastinum, pleural effusion mainly left sided, calcified intimal flap separated from aortic outline, high aortic arch.
- ECG – dissection involving the aortic root may occlude the coronary arteries, more often the right coronary to produce a myocardial infarction. LVH may be present from long standing hypertension.
- Consider echo
- Crossmatch blood.
CLINICAL SUSPICION OF AORTIC DISSECTION
(History, Examination, ECG, CXR)

Consult cardiologist on call

CXR/ECHO

Normal Aorta
Abnormal Aorta

Seek alternate diagnosis
Identify type of dissection

Type A*

Type B*

Medical therapy with surgical consultation

*Type A – Involves ascending aorta with dissection origin between the aortic leaflet and the innominate artery.
*Type B - Dissection not involving the ascending aorta (i.e. origin distal to the innominate artery)
Treatment

- Aim to reduce systolic pressure to 100-120mmHg and reduce contractility of left ventricle.
- Monitor BP and urine output.
- *Give intravenous and later ‘o’ β-blockers (e.g. labetalol) unless contraindicated by: cardiac failure, bradycardia <60/min, heart block, and obstructive airways disease like bronchial asthma.*
- Analgesia: morphine 10-15mg. Give prochlorperazine 12.5mg IV to prevent vomiting.
- Seek advice urgently from physician.

6.9. **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.

6.10. Infective Endocarditis Prophylaxis

The following tables are taken from the New Zealand Heart Foundation Technical Report “Prevention of Infectious Endocarditis associated with Dental Treatment and other Medical Interventions. (July 1999)”.

A. Cardiac conditions and endocarditis prophylaxis

Endocarditis prophylaxis is recommended

High risk category

- All patients with a previous episode of endocarditis.a
- Prosthetic cardiac valves, including bioprosthetic and homograft valves.b
- Complex cyanotic congenital heart disease (e.g. tetralogy of Fallot, tricuspid atresia, complex anomalies with functional single ventricle, or transposition of the great arteries).
- All major left-sided valve anomalies.
- Surgically constructed systemic-pulmonary shunts, or conduits from the heart to the great arteries.

Moderate risk category

- With the exception of those listed in the “low risk” category in the following section, most other congenital cardiac malformation carry a moderate risk. These include:
- All high-pressure (left sided) congenital anomalies even if minor, including supravalvular, valvular and subvalvular aortic stenosis, coarctation of the aorta, and ventricular septal defects.
- All acquired valvular dysfunction, e.g. rheumatic heart disease.
- Hypertrophic cardiomyopathy.
- Mitral valve prolapse with valvular regurgitation and/or thickened leaflets and dysplastic myxomatous valves.d
Standard Treatment Guidelines Tonga 2007

- Major congenital right-sided lesions, e.g. Ebstein’s anomaly of the tricuspid valve and significant pulmonary stenosis.

Endocarditis prophylaxis for low risk category

- Isolated secundum atrial septal defect.
- Complete surgical or device closure of atrial septal defect, ventricular septal defect, or patent ductus arteriosus (beyond six months after repair).\textsuperscript{e}
- Previous coronary artery bypass graft surgery.
- Mitral valve prolapse without valvular regurgitation or dysplasia.
- Previous Kawasaki disease without valvular dysfunction.
- Previous rheumatic fever without valvular dysfunction.\textsuperscript{f}
- Cardiac pacemakers (intravascular and epicardial) and implanted defibrillators.
- Physiological, functional or innocent murmurs.\textsuperscript{g}

Notes:

\textsuperscript{a}
Even if the underlying lesion is minor, a previous attack of endocarditis demonstrates risk.

\textsuperscript{b}
The risk of endocarditis remains high after replacement of the native valve with any prosthesis.

\textsuperscript{c}
All surgical conduits carry a high risk, particularly as the wall becomes irregular and thickened.

\textsuperscript{d}
A degree of mitral valve prolapse is very common. Dysplastic, myxomatous mitral valves are associated with connective tissue anomalies, such as Marfan’s syndrome, and with increasing age. Sometimes both these types of valves can leak with exercise, but an increased risk of endocarditis has not been shown unless valvular regurgitation is present at rest, or valve structure is very distorted.

\textsuperscript{e}
Six months allows sealing of minute leaks around the periphery of the closure, and endothelialisation of surfaces. The same period is advised for these lesions treated by percutaneous placement of a mechanical device. In the small number of patients with a residual leak, long-term prophylaxis may be recommended.
Prophylaxis is recommended when subclinical, echocardiography-demonstrated mitral or aortic regurgitation are present after acute rheumatic fever.

A systolic murmur (often associated with a fever) can be recorded in well over 50% of young children. Most of these are “benign systolic murmurs” where the heart is normal. This diagnosis is established by:

- Exclusion of any cardiac symptoms and any associated signs including reduced femoral pulses.
- Recognising the signs that are typical of the “benign murmur”, i.e. a grade 1-2/4 low-pitched, mid-systolic vibratory murmur, maximal around the 3rd to 4th left interspace and not radiating prominently to the suprasternal notch – unlike an aortic murmur, which is softer in the sitting than in the lying position.

B. Dental Procedures and endocarditis prophylaxis

Endocarditis prophylaxis recommended
In general, any procedures that causes bleeding from the gingiva, mucosa or bone.

- Periodontal procedures including probing, scaling, root planning and surgery.
- Endodontic instrumentation or surgery beyond the apex.
- Application of matrix bands below the gingival margin.
- Subgingival placement of gingival retraction cord/straps.
- Placement of orthodontic bands, but not brackets.
- Intraligamentary local anaesthetic injections.
- Reimplantation of avulsed teeth and repositioning of teeth after trauma.
- Oral surgical procedures including biopsy procedures and raising of mucosal flaps.
- Surgical drainage of dental abscesses.
- Extraction of teeth.

Endocarditis prophylaxis NOT recommended
- Natural shedding of primary deciduous teeth.
- Dental examination, other than periodontal probing.
- Radiographic examination.
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- Local anaesthetic injections, unless intraligamentary.
- Restorative dentistry where the procedure is above the gingiva.
- Impressions, construction and placement of removable prosthodontic/orthodontic appliances.
- Adjustment of orthodontic appliances.
- Placement of rubber dam, other than subgingival manipulation. Postoperative suture removal.

C. Other procedures and endocarditis prophylaxis

Endocarditis prophylaxis recommended

Respiratory tract
- Tonsillectomy and/or adenoidectomy.
- Surgical operations that involve the respiratory mucosa.
- Bronchoscopy with a rigid bronchoscope (with or without biopsy).

Genitourinary tract
- Prostatic surgery, transrectal prostatic biopsy, cystoscopy, or urethral dilatation (even in the absence of infection).
- Surgical procedures in the presence of infection, e.g. urethral catheterisation, uterine dilatation and curettage, therapeutic abortion, sterilisation procedures, insertion and removal of intrauterine devices, circumcision.

Gastrointestinal tract
- Sclerotherapy for oesophageal varices or oesophageal stricture dilatation.
- Endoscopic retrograde cholangiography and biliary tract surgery.
- Surgical operations involving the intestinal mucosa (other than endoscopic biopsy and percutaneous endoscopic gastrostomy).

Other sites
Incision and drainage of focal sepsis, e.g. subcutaneous abscess. (Note that prophylaxis here will often necessarily be part of more prolonged antibacterial treatment).
Endocarditis prophylaxis **NOT** recommended

**Respiratory tract**
- Endotracheal intubation.
- Bronchoscopy with a flexible bronchoscope, with or without biopsy.
- Tympanostomy tube insertion.

**Genitourinary tract**
- Vaginal delivery, Caesarean section, vaginal hysterectomy.
- Surgical procedures in the absence of infection, e.g. urethral catheterization, uterine dilatation and curettage, therapeutic abortion, sterilization procedures, insertion and removal of intrauterine devices, circumcision.

**Gastrointestinal tract**
- Transoesophageal echocardiography.
- Endoscopy with or without biopsy.
- Percutaneous endoscopic gastrostomy.

**Other sites**
- Procedures through surgically prepared skin, e.g. liver or kidney biopsy, dermatological procedures.
- Cardiac catheterization including balloon angioplasty.
- Implantation of cardiac pacemakers, defibrillators and coronary stents.

**Table 13: Antibacterial Recommendations for Dental, Oral, Respiratory Tract or Oesophageal Procedures**

<table>
<thead>
<tr>
<th></th>
<th><strong>Moderate cardiac risk</strong>&lt;sup&gt;a&lt;/sup&gt;</th>
<th><strong>High cardiac risk</strong>&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td><strong>Oral amoxicillin 2g one hour before procedure PLUS</strong>&lt;br&gt;‘o’ amoxicillin 1g six hours later.</td>
<td><strong>Oral/intravenous ampicillin 2g PLUS</strong>&lt;br&gt;<strong>IMI/IV gentamicin (2mg/kg, not&gt;120mg) within 30 minutes of procedure</strong>. No subsequent dose recommended.</td>
</tr>
<tr>
<td><strong>Penicillin allergy</strong>&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td><strong>Oral cephalexin 2g one hour before procedure OR</strong>&lt;br&gt;‘o’ erythromycin 1.5g one hour before the</td>
<td><strong>Intravenous vancomycin 1g infused over 60-90 minutes ending within 30 minutes of procedure</strong>. No subsequent dose recommended.</td>
</tr>
</tbody>
</table>
Some international guidelines now recommend the same regimen for those with high and moderate cardiac risks. The options listed for high-risk cases are those with theoretically maximal preventative activity.

Those who have received a beta-lactam (either a penicillin or cephalosporin) within two weeks of the procedure, or are on long-term penicillin prophylaxis for rheumatic fever, need an erythromycin regimen from the moderate-risk category or any of the high-risk category options. In some of the latter, the synergistic killing of the combined beta-lactam plus aminoglycoside overrides the possible reduced beta-lactam susceptibility from prior beta-lactam treatment.

The 'o' cephalaxin and IV cefuroxime/gentamicin regimens are options for patients whose penicillin allergy was not anaphylaxis or a rapid-onset skin reaction.

<table>
<thead>
<tr>
<th>Moderate cardiac risk</th>
<th>High cardiac risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td><strong>IV ampicillin (or amoxicillin) 50mg/kg up to 2g just before the procedure or IMI 30 minutes before procedure, PLUS IMI gentamicin 2mg/kg, 30 minutes before procedure, or IV just before the procedure; followed by ampicillin (amoxicillin) at 25mg/kg up to 1g 'o’, IMI or IV six hours later.</strong></td>
</tr>
<tr>
<td><strong>Penicillin allergy</strong></td>
<td><strong>IV vancomycin 1g infused over 60-90 minutes ending within 30 minutes of procedure. No</strong></td>
</tr>
</tbody>
</table>

**Table 14: Antibacterial Recommendations for Genitourinary Tract and Gastrointestinal Tract (excluding oesophageal) procedures**

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**Notes**

a Some international guidelines now recommend the same regimen for those with high and moderate cardiac risks. The options listed for high-risk cases are those with theoretically maximal preventative activity.

b Those who have received a beta-lactam (either a penicillin or cephalosporin) within two weeks of the procedure, or are on long-term penicillin prophylaxis for rheumatic fever, need an erythromycin regimen from the moderate-risk category or any of the high-risk category options. In some of the latter, the synergistic killing of the combined beta-lactam plus aminoglycoside overrides the possible reduced beta-lactam susceptibility from prior beta-lactam treatment.

c The 'o’ cephalaxin and IV cefuroxime/gentamicin regimens are options for patients whose penicillin allergy was not anaphylaxis or a rapid-onset skin reaction.
<table>
<thead>
<tr>
<th>Notes</th>
<th>Subsequent dose</th>
<th>Subsequent dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>&gt;120mg. No subsequent dose</td>
<td>recommended.</td>
</tr>
<tr>
<td>b</td>
<td>Prior or continuing penicillin treatment does not affect these regimens.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There is no oral option for those with penicillin allergy</td>
<td></td>
</tr>
</tbody>
</table>
7. CENTRAL NERVOUS SYSTEM (CNS) CONDITIONS

7.1 Headache

Headache is a subjective symptom and placebo response rates may be high. However, one must be careful to consider potentially life-threatening conditions such as SAH or meningitis before issuing drug that may mask signs and symptoms and unnecessarily delay proper management.

There are warning symptoms in assessing a headache that should warn the clinician of a possible serious organic aetiology.

<table>
<thead>
<tr>
<th>Type of Headache</th>
<th>Possible Organic cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden onset; particularly with confusion, drowsiness, vomiting or with mild stroke-like signs such as mild hemiparesis, ataxia or Horner’s syndrome.</td>
<td>SAH or intracranial haemorrhage, carotid or vertebral artery dissection, cerebral venous thrombosis.</td>
</tr>
<tr>
<td>Recent onset; with confusion, drowsiness or fever.</td>
<td>Meningitis, encephalitis, intracranial abscess or severe hypertension.</td>
</tr>
<tr>
<td>Recent onset; In patients over 50 years of age</td>
<td>Brain tumor or temporal arteritis</td>
</tr>
<tr>
<td>After head injury; particularly with loss of consciousness or if severe or prolonged</td>
<td>Intracranial haemorrhage</td>
</tr>
</tbody>
</table>

A careful physical examination should precede any reassurance that a headache is not due to a serious disorder.

<table>
<thead>
<tr>
<th>Benign Headaches with symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Headaches</td>
</tr>
<tr>
<td>STG</td>
</tr>
</tbody>
</table>

Ministry of Health
<table>
<thead>
<tr>
<th>Disorder</th>
<th>Description</th>
</tr>
</thead>
</table>
| Tension | Recurrent attacks of headaches that are usually bilateral  
Feeling of pressure or tightness that may extend around the head  
There may be photophobia but nausea and vomiting are unusual  
Rarely severe enough to prevent activities such as brisk walking etc  
Commonest type of headache and it commonly occurs during late afternoon and evening |
| Migraine without aura | Recurrent episodes of throbbing head pain which are often unilateral (frontal, occipital or hemicranial) and may swap sides between attacks  
Attacks are often unpredictable  
Pain is severe and often limits activities and may be associated with photophobia, nausea and vomiting  
Untreated attacks may last from 4-6 hours to several days |
| Migraine with aura | Recurrent attacks of migraine headaches similar to the above but accompanied with focal neurological symptoms, mostly visual such as flickering lights, zigzag lines, loss of part or all vision.  
Other symptoms may be impaired speech, paraesthesiae, vertigo and weakness  
Symptoms typically last 15-30 minutes, occur at the start of some or all attacks and may mimic stroke |
| Tension-vascular headache | A mixture of tension and migrainous headache. Often it is just tension headache with a degree of migraine symptoms. |
| Rebound | A form of chronic daily headache perpetuated by daily or near daily use of drug such as ergotamine/caffeine (cafegot®) and analgesics. To avoid this headache, one must not use the medications for acute migraine for more than 3 times per week. Use the prophylaxis strategy, as noted below. |
| Cluster | Attacks are usually centred around the orbit with prominent autonomic symptoms (ptosis, tearing and redness of eye, nasal stuffiness) and headache does not swap side between attacks  
Shorter in duration than (untreated ) attacks of migraine. Typically lasting from 15minutes to 3 hours.  
Multiple attacks each day for weeks or months, often occurring predictably at the same time of the day. |
<table>
<thead>
<tr>
<th>Type of headaches</th>
<th>Non-pharmacological management</th>
<th>Pharmacological management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension Headache</td>
<td>Massage with or without liniment, stretching affected tight neck and scalp muscles and/or cervical joints. Take regular exercise and try to be in control of build up of tension by relaxation exercises.</td>
<td><em>Aspirin</em>® 600-900mg ‘o’stat then repeat in 4 hours if required. (avoid in children) OR <em>Paracetamol</em> 1g to 1.5g 4-hourly up to 4g daily. For frequent (maybe mixed migrainous) attacks and where patient is seeking stronger analgesics, give <em>amitriptyline</em> 10mg ‘o’ at night OR <em>Sodium valproate</em> 200mg ‘o’ bd up to 800mg bd. These can be continued for 3-6 months and gradually reduced in dosage</td>
</tr>
<tr>
<td>Migraine (Acute)</td>
<td>Rest patient in a quiet room and avoid activities such as reading or watching television.</td>
<td><em>Aspirin</em>® 600-900mg ‘o’ repeat in 4 hours when required (to be taken strictly after meals or with a glass of milk) OR <em>Paracetamol</em> 1-1.5g ‘o’ 4-hourly up to 4g daily. If this does not relieve the attack, ADD <em>metoclopramide</em> 10mg ‘o’. If nausea or vomiting, give</td>
</tr>
<tr>
<td>Persistant migraine (status migrainosus) - A migraine that fails to resolve after several days</td>
<td>Refer for admission to hospital for parenteral fluid and other relevant investigations and therapy.</td>
<td></td>
</tr>
<tr>
<td>---</td>
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<td></td>
</tr>
<tr>
<td>Prophylaxis of migraine attacks</td>
<td>Keep a diary of attacks and avoid trigger factors; such as: diet, hormonal changes, life events such as work related stress. When more than 3 attacks per month; give aspirin® 600mg ‘o’ bd OR A β-blocker such as propanolol 40mg 2 to 3 times daily (up to 320mg per day). If no response to the above, give amitriptyline 12.5mg ‘o’ at night (up to 150mg daily).</td>
<td></td>
</tr>
<tr>
<td>Cluster headache</td>
<td>Verapamil SR 160mg ‘o’ daily up to 320mg daily OR Lithium 250mg ‘o’ bd; titrate to sodium level and response. Refer if no response to this treatment.</td>
<td></td>
</tr>
<tr>
<td>Cough, exertional and sexual headache</td>
<td>New onset exertional headache should be referred for exclusion of SAH or tumor.</td>
<td></td>
</tr>
</tbody>
</table>

**7.2 Seizures**

*Please refer to Section 5.3.8.*
7.3 Meningitis
(See section 16.2)

7.4 Stroke
Stroke (CVA) is a focal neurological deficit of vascular origin which lasts >24 hours. Stroke may be due to cerebral infarction (80%) or haemorrhage (15%). Approximately 5% of patients who present with a stroke-like syndrome do not have any cerebrovascular pathology. The current approach to stroke therapy is aggressive primary and secondary prevention by the control of risk factors.

**Primary prevention of stroke:**
Main risk factors are smoking, hypertension, atrial fibrillation, diabetes and hypercholesterolaemia. They must be aggressively controlled.

**Hypertension:**
Studies have shown that reducing BP by 5-6mmHg reduces the risk of stroke by 40%. The following anti-hypertensives can be used: β-blocker, ACEI and diuretics.

**Atrial fibrillation:**
Warfarin treatment reduces the relative risk of stroke for AF patients by 70%. Acetyl salicyclic acid can be used if there is no structural cardiovascular defect, and especially if the patient is below 60 years of age.

**Diabetes**
Diabetes is associated with a 2-fold increase of stroke so optimal blood sugar control should be a target to prevent stroke.

**Hypercholesterolaemia**
The positive association with stroke is weak. However, for the sake of achieving a healthy cardiovascular system, cholesterol must be well controlled by sensible eating and lots of exercise.

**Acute stroke**
Cerebral infarction results from thrombosis, embolus or rarely, from an episode of hypoperfusion.
Cerebral haemorrhage is associated with hypertension, SAH, bleeding disorders and intracranial tumors.

Presented below are common well known signs and symptoms associated with disruption of blood flow leading to damages of specific areas of the brain.

**Hemisphere injury** is common following infarction in the internal capsule. It may present with some or all of the following: contralateral limb weakness, flaccidity, ↓ reflexes, sensory loss, receptive or expressive dysphasia, homonymous hemianopia.

**Pontine Injury** is caused by sudden occlusion of basilar circulation. It may cause quadriplegia and the “locked in” syndrome. Other features are pin point pupils and pyrexia.

**Midbrain injury** may produce coma, oculomotor nerve palsy, dilated pupils, hemi or quadriparesis.

**Cerebellar injury** may present with headache, vertigo, vomiting, nystagmus and ataxia.

**Lateral medullary Syndrome** is caused by sudden occlusion of posterior, inferior cerebellar artery resulting in the characteristic vertigo and vomiting. Ipsilaterally, there may be palatal paralysis, Horner’s syndrome, cerebellar signs, sensory loss in face. Contralaterally, there may be sensory loss in the body.

**Differential diagnosis for Acute Stroke:**
- hypo or hyperglycaemia
- head injury
- tumor
- infection
- migraine
- post-ictal states

**Investigation**

Try to exclude differential diagnosis as noted above, especially treatable causes. Do routine FBC/ESR, UEC, Blood glucose, blood culture, CXR etc.
Emergency CT if available, in suspected SAH, head injury, cerebellar haematoma and patients on anticoagulation therapy.

Management:
- Establish good ABC
- Adequate oxygenation and hydration.
- Avoid glucose containing IV solutions, and prevent DVT by wearing firm stockings and if not contraindicated; give SC heparin 5,000 units bd, for cases with lower limb paralysis and if cause of stroke was ischaemia.
- Stabilise patient
- Refer for further investigations in the Ward.

### 7.5 Involuntary Movement Disorders

Parkinson’s disease:
Diagnosis is based on the presence of tremor, rigidity and bradykinesia, either together or alone.
Decision to treat depends on degree of confidence on diagnosis, functional and social disability, age and psychological and neurological condition of patient. Depression and dementia must be excluded.
Treatment does not alter the progress of disease and individual response is variable.

Abrupt increases in anti-Parkinson’s drugs may produce neuropsychiatric complications and abrupt dose reduction may result in acute akinetic rigid syndrome and the risk of precipitating a neuroleptic malignant-like syndrome).

Non-pharmacological management:
- education about long term prognosis of disease
- encourage exercise, socialise and try to lead a normal life as possible

Pharmacological management
- No need to treat early mild disease if it does not cause any disability
Standard Treatment Guidelines

- **Levodopa+carbidopa**: 50mg/12.5mg ‘o’ 8-hourly, after meals; increase to 100/25mg 8-hourly over 1-2 weeks depending on response
- **In some young patients, tremors can be better controlled by the addition of benzotropine 1-2mg ‘o’ daily up to 2mg bd.**
- In advanced diseases, nausea and vomiting are common adverse reactions. It is best to consult physician for further management advice.

Essential tremor (includes familial and late life tremor)
- **Propanolol 10mg bd up to 240mg daily in divided doses.**

**Note:** propanolol is contraindicated in known asthmatics.

Drug induced dystonia (eg oculogyric crisis after neuroleptic dopamine antagonist drugs such as metoclopramide)
- **Benztropine 1-2mg ‘o’, IMI or IV**

### 7.6 Epilepsy

Epileptic seizures are classified into 1. Generalised seizures such as: absence, myoclonic, tonic-clonic, tonic and atonic; and 2. Partial seizures such as: simple, complex and secondary generalized.

The aim of pharmacotherapy is to prevent seizure recurrence preferably by monotherapy, and to prevent adverse effects.

**Common seizures and drugs of first choice**

**Absence seizure**
- **Ethosuximide** (absence seizure only) 250mg ‘o’ bd (child: 10-40mg/kg/day ‘o’ in two divided doses (if available)
  OR
- **Sodium valproate** (absence and tonic-clonic), 10mg/kg/day ‘o’ in 2 divided doses, increase to 30-40mg/kg/day until seizure cease or adverse effects occurs

**Myoclonic seizure**
- **Sodium valproate** 500mg ‘o’ daily for one week then 500mg bd for one week; increase up to 2.5g daily or until seizures cease or adverse effects occur
Tonic-clonic generalized

- Sodium valproate 500mg daily for one week, increased to 500mg ‘o’ bd for one week, increase up to 2.5g daily or until seizures cease or adverse effects occur. (child: 10mg/kg/day in two divided doses, increase to 20mg/kg/day after 5 days. Usual maintenance is 20-60mg/kg/day)

- Phenytoin 300mg (child: 4-8mg/kg/day) ‘o’daily in 1 or 2 divided doses

- Phenobarbitone 30mg ‘o’ daily; increase by 30-40mg every 3-4 weeks until seizures cease or if seizures are infrequent, until adverse effects limit further dose increase. (child: 3-5mg/kg/day orally, 1-2 times daily).

Tonic-clonic secondarily generalized

- Carbamazepine 100mg ‘o’ daily, increase by 100mg each week up to 200mg bd (child: 5mg/kg/day orally in two divided doses, increase after 5 days to 10mg/kg/day, usual maintenance is 10-20mg/kg/day)

Tonic-clonic undetermined if generalized or partial

- Carbamazepine (same dose as above)

- Sodium valproate (same dose as above)

Simple partial

- Carbamazepine (same dose as above)

Complex Partial

- Carbamazepine (same dose as above)

Status epilepticus (Refer to section 5.3.8)
A simple but systematic approach to ENT problems is presented to enable the health worker to make an accurate and timely diagnosis of these problems. A system of exclusion of possible causes is used to facilitate that approach. As an example: “OTALGIA” (pain in the ear); it is a symptom rather than a disease entity. However, many patients would present with ‘otalgia of unknown origin’. Such presentations often confuse health workers who do not have a lot of experience in this area.

In discussing the list of possible causes for common ENT presentations, emphasis is put on those conditions commonly seen in Tonga.

**Ear disorders**
- Deafness
- Facial Palsy
- Otalgia (pain in the ear)
- Otorrhoea
- Tinnitus
- Vertigo

**The nose & paranasal sinus disorders**
- Nasal obstruction
- Rhinorrhoea
- Rhinitis
- Epistaxis
- Acute & chronic sinusitis

**The larynx, pharynx & neck**
- Dysphasia
- ENT manifestations of HIV infection & AIDS
- Hoarseness
- Lump in the Neck
- Sore throat / throat infection
8.1 Ear Disorders

Otalgia (Pain in the ear)

Causes:

LOCAL CAUSES

I. EXTERNAL EAR
   a) Infective – Perichondritis
      - Otitis externa
      - Bullous myringitis
      - Herpes zoster
   b) Traumatic – Subperichondrial haematoma
      - Instrumentation
   c) Neoplastic – Benign Tumours. eg. Osteoma
      Malignant Tumours – eg. SCC
   d) Miscellaneous – Impacted wax

II. MIDDLE EAR, MASTOID & TEMPORAL BONE
   a) Infective: - Eustachian Tube obstruction
      - Acute suppurative otitis media
      - Serous otitis media (glue ear)
      - Acute Mastoiditis
      - Chronic suppurative otitis media
   b) Traumatic – Baro-trauma
      Head injury
   c) Neoplastic – Benign tumours – Acoustic neuroma
      Malignant tumours – SCC
   d) Miscellaneous – Bell’s palsy
I. ORAL CAVITY & OROPHARYNX
   a) Dental – Root – abscess
   b) Tongue – Carcinoma
   c) Tonsils – Acute tonsillitis

II. LARYNX & HYPOPHARYNX
   a) Carcinoma

III. NECK
   a) Cervical spine arthritis
   b) Post auricular lymphadenitis

IV. MEDIASTINUM – Oesophageal foreign body

V. MISCELLANEOUS
   a) Sinusitis
   b) Tempora-mandibular joint (TMJ) dysfunction.

The choice of investigation is determined by the clinical findings and the treatment is direct at the cause.

**Acute otitis externa:**

**Description:**
Acute inflammation of the external ear, either due to: diffuse inflammation secondary to infected dermatitis (commonest), or, furuncular infection caused by either one, or a mixture of these bacteria: *Staphylococcus, Streptococcus, Escherichia coli, Proteus species* or *pseudomonas*.

It is characterized by the following:
- Very painful ear with pain and tenderness in moving the pinna
- External ear canal swollen and there may be conductive hearing loss.
- May be associated fever with enlarged tender lymph nodes
- Ear drums may be difficult and painful to try and visualize

**Management objectives:**
- Provide relief for the pain
Standard Treatment Guidelines

- Treat infection
- Eliminate the cause
- Prevent complications especially the spread of infections
- Keep the ear dry using the wick as noted below.

Treatment:
- *Giver o’* paracetamol for pain and fever,
- *Give ‘o’* (flu)cloxacillin 25mg/kg/day in four divided doses for 7-10 days
- PLUS
- *Amoxicillin ‘o’* 25mg/kg/day in three divided doses for 7 days for infections.
- Use a daily ear “wick” and antibiotic ear drops four times a day. (“Ear wick” is a small gauze soaked in antibiotic and corticosteroid used to lightly pack the external meatus to reduce swelling and facilitate healing). Avoid antibiotic ointment.
- Refer cases that do not respond to this treatment to hospital and especially if there is suspicion of “malignant” otitis externa- the systemic ear infection caused by pseudomonas, which usually warrants the use of parenteral aminoglycosides.

Acute otitis media

Description:
Inflammation with fluid of the middle ear, characterized by:
- Pain (ear ache)
- Loss of normal light reflex of ear drum
- Hypomotility of the ear drum
- Bulging ear drum
- Fever in about half the cases
- Redness of the ear drum
- Conductive hearing loss
- Usually associated with an attack of the common colds or an upper respiratory tract infections.
- Ear discharge
- Advanced cases may have tenderness of mastoid.

Management objectives:
- Cure infection
- Manage complications
Non-drug treatment:
- Keep ears dry (no swimming)
- Use soft tissue to clean out any discharges (Do not use cotton buds)

Drug treatments:
- More than 50% of acute otitis media will resolve without antibiotics.
- **Amoxicillin** oral 8 to 12-hourly for 5-7 days. (40-80mg/kg/day in divided doses)
  - OR
- **Cotrimoxazole ‘o’ bd** (8/40mg/kg/day in divided doses)
  - OR
- Erythromycin if allergic to penicillin. Give treatment for 5-7 days.
- Apply antibiotic ear drops to the affected ear 3-4 times a day. (Use chloramphenicol or tetracycline ear drops)
- Use paracetamol for pain relief.

Refer if:
- Ear drums perforated
- No response after 3 days of treatment
- No pain relief
- Bulging ear drum not responding to treatment within 24 hours.

**Acute mastoiditis**

Description:
Inflammation and tenderness of the mastoid bone usually the sequelae of an inappropriately treated acute otitis media. There is breakdown of the thin partitions between mastoid air-cells, a process that takes about 2-3 weeks. A patient usually presents with a copious ear discharge with tenderness over the mastoid.

Management objectives:
- Establish the diagnosis if possible
- Refer case to the ENT consultant
Investigations:

- Pus swaps for culture & sensitivity.
- X-ray of mastoids may be helpful.

Management in hospital:

- Surgical intervention by the ENT surgeon
- Systemmic antibiotics to cover the common gram positive and gram negative bacteria usually associated with this condition

Chronic suppurative otitis media

Description:

Pus discharging from the ear for more than 2 weeks

- If the ear drum has been ruptured for $>2$ weeks, a secondary infection with multiple organisms usually occurs,
- Multiple organisms make oral antibiotic alone less effective and patients may need to be referred
- If the perforated ear drums have multiple sinuses, consider tuberculosis (rare)
- If there is pain, suspect other conditions or complications such as mastoiditis

Management objectives:

- Keep the ear dry
- Cure the condition
- Prevent complications
- Prevent hearing loss

Treatment:

- Dry mopping of the ear must be demonstrated to the child or caregiver.
- Roll a piece of absorbent material like tissue paper or cloth, into a wick
- Soak it in antibiotic ear drop or acetic acid in N/S solution,
- Insert carefully into child’s ear and leave it in place for one minute
- Remove and replace with a clean dry wick
Standard Treatment Guidelines

- Watch the care giver do this procedure and once competent, advise to do it at home 4 times daily.
- Continue dry mopping at home until the ear is dry and ready to heal.
- If bleeding, give oral antibiotics and temporarily stop dry mopping.
- Avoid getting the ear wet at all costs.

Refer if:
- Painful ear especially over the mastoid
- No improvement in 2 weeks

Serous otitis media (Glue-ear or otitis media with effusion: OME)

Description:
This is a sterile middle ear effusion characterized by niggly short-lasting pain in the ear especially at night. The drum may look dull & retracted and the colour may be yellowish or sometimes blue. Sometimes the drum may look injected with noticeable radial vessels running from the periphery to the umbo, and this may be misdiagnosed as otitis media. However, the child is well and afebrile, and the associated hearing loss has been recognized by parents and/or teacher for sometimes.

Management objectives:
- Recognise these cases
- Refer cases for ENT consultation

Treatment:
- Prolonged antibiotic may benefit a few patients (one month of antibiotics)-need ENT surgeon advice here.
- BSM (Bilateral suction myringotomy) & insertion of ventilation tubes (grommet) to be carried by the ENT consultant.

OTORRHOEA (DISCHARGE FROM THE EAR)
This is a very common complaint and the discharge may consist of pus, serous fluid, blood, CSF, or perilymph.

CAUSES:
1. INFECTIVE

- Otitis external (Diffused Otitis externa)
- Acute Suppurative Otitis media - See section 8.1
- Chronic “ “ “ - See section 8.1
- Chronic mastoiditis

2. TRAUMATIC

- Instrumentation-ear -puds on eczematous ear
- Foreign body
- Head injury
- Barotrauma
- Temporal bone fracture
- Cholesteotoma

3. NEOPLASTIC

- Ca. of middle ear
- Polypoid growth of ear canal

CSF OTORRHOEA

CAUSES:

- Temporal bone fracture
- Iatrogenic
- Cholesteotoma
- Tumour
- Congenital deficit

* A CSF leak from a deficit in the temporal bone may present as CSF rhinorrhoea confirmed by checking glucose level of fluid.
* The choice of investigations is determined by the clinical findings.
Give prophylactic penicillin.

Refer to hospital all cases suspected of CSF otorrhea.

Vertigo

Description:
A hallucination of movement. A sensation of rotation or movement of one’s self (subjective vertigo) or of one’s surroundings (objective vertigo), in any plane. The cause is usually peripheral but can be central. There may be nausea and vomiting. There must be nystagmus.
If nystagmus is absent in the sitting position, a provocative positional test must be done.

**CAUSES:**

**PERIPHERAL**

(i) Traumatic
- Iatrogenic
- Barotrauma
- Head injury
- Labyrinthine membrane rupture

(ii) Infective
- Labyrinthitis-Bacterial-viral
- Suppurative otitis media
- Herpes Zoster
- Vestibular neuritis (Neurolabyrinthitis)
- Syphilis

(iii) Neoplastic
- Benign-ascoustic neuroma
- Malignant tumor

(iv) Meniere’s disease

(v) Toxins
- Vestibulotoxic drugs
- Poisoning
- Alcoholism
- Uremia

(vi) Miscellaneous
- Benign paroxysmal positional vertigo (B.P.P.V): Common in the middle aged and the elderly.
- Otosclerosis
- Gastric vertigo

**CENTRAL**

Usually associated with other symptoms such as headache, ataxia, diplopia and hemiparesis.

(i) Traumatic – head injury
(ii) Infective
- Meningitis
- Brain abscess
III. Neoplastic

- meningioma
- Glioma
- Cerebral secondaries

IV. Vascular-vertebrobasilar insufficiency

V. Cerebellar infarction

VI. Miscellaneous

- epilepsy
- multiple sclerosis

Management objectives:
- Identify possible causes
- Treat benign ones such as the benign postural vertigo
- Refer those that do not respond to treatment for hospital investigations and treatment.

NOTE: Over 80% of the patients who present with vertigo have a peripheral cause.
- The choice of investigation is determined by the clinical findings, and the treatment is aimed at the cause.
- Most patients get better by treating infection, resting, antiemetic plus/minus sedation.

Example of an effective antiemetic commonly used is IMI prochlorperazine.

8.2 Disorders Of The Nose And Paranasal Sinuses

Epistaxis (Nose Bleeds)

Description:
This is a common condition caused by either damage to the veins behind the columella in children or from arteries at the caudal part of nasal-septum (Little’s area). They are usually due to trivial trauma after nosing picking or nose blowing.

In elderly patients, arterial bleeding is usually at the posterior area and is often associated with degenerative arterial disease and hypertension. Rarer causes include: coagulation defects in blood, local vascular malformations as in hereditary telangiectasia, raised venous blood pressure – either generalized as in congestive heart failure, or localized, as in superior mediastinal obstruction.
Management objectives:
- assess the effects of blood loss and if necessary replace blood by transfusion.
- identify the source/cause of bleeding within the nose or elsewhere,
- stop the bleeding.

CAUSES OF NOSE BLEEDS

Local causes
(I) Traumatic
- Nose picking
- Foreign bodies
- Nasal surgery
- Fractures: nasal bone, sinuses or base of skull.

(II) Inflammatory
- Infection rhinitis
- Atrophic rhinitis
- Sinusitis

(III) Neoplastic
- Nose – bleeding polyps of septum, SCC.
- Sinuses – SCC
- Nasopharynx – juvenile angiofibroma

General causes
- Systemic hypertension
- Venous congestion
- Superior Vena Cava obstruction
- Right heart failure
- Haematological & Vascular
  - atherosclerosis
  - vessel abnormalities
  - coagulation defects
  - thrombocytopenia
  - drugs
    - warfarin
    - salicylates

Treatment:
After the clinical assessment, if very mild epistaxis without any significant blood loss and no more bleeding, do full blood count and if normal, reassure patient and discharge.

If bleeding is moderately severe, do:
- Full Blood count/ blood coagulation screen/ Cross match blood where indicated
- If the patient is haemodynamically stable and there is no more bleeding after initial observation, and blood tests are normal, continuing rest and observation may be all that is required.
- Oral haematinics may be needed, before sending patient home. (Haematinics used are ferrous sulphate and folic acid tablets)

In severe cases:
- Intravenous fluid/blood replacement are usually indicated
- Stop the bleeding by nasal packing and using a Foley’s catheter
- Insert a size 14 Foley’s catheter in each nostril, inflate balloons and withdraw it gently until it sits snuggly against the posterior part of the nose, pack afterwards from outside.
- Remove it after 3 days.
- *Give parenteral penicillin or oral amoxicillin as prophylaxis."
- Refer all severe cases of epistaxis for hospital treatment.

**Allergic rhinitis (hay fever)**

**Description:**
Recurrent inflammation of the nasal mucosa due to hypersensitivity to allergens such as pollen, house dust, grasses, animal proteins and food. It is characterized by:
- Blocked stuffy nose with watery discharge
- Frequent sneezing accompanied by nasal itching and irritation
- Conjunctival itching and watering
- Oedematous pale grey nasal mucosa
- Mouth breathing and snoring at night.

Try to exclude other causes such as side effects of antihypertensives and antidepressants and overuse of decongestant drops.

**Management objectives:**
- Symptomatic relief
- Prevent recurrent attacks

**Non-drug treatment:**
Drug treatment:
- Promethazine ‘o’ (phenergan®)
- Short course of ‘o’ corticosteroids

Refer if symptoms are severe.

Sinusitis (Acute)
Description:
This is inflammation of one or more of the nasal sinuses, that most often occurs after a viral nasal infection or allergic rhinitis. It can become secondarily infected by bacteria resulting in the following presentations:
- Purulent nasal discharge (persistent or intermittent)
- Pain and tenderness over one or more sinuses
- Nasal obstruction
- Post-nasal discharge
- Headache and fever (occasional).

Non-drug treatment:
- Steam inhalation with a teaspoon of “vicks” ointment in the hot water.

Drug treatment:
- Amoxicillin 40-90mg/kg/day in divided doses, up to 1g ‘o’ 8-hourly for 5-7 days
  OR
- Cotrimoxazole 8/40mg/kg/day in divided doses, up to 160/800mg ‘o’ bd for 5-7 days OR
- Doxycycline 100mg ‘o’ 12-hourly for 5-7 days (Do not use in children).
- Give paracetamol for pain
- Antihistamine such as promethazine or pseudoephedrine orally may be helpful.

Choice of antibiotics may be determined by the microbiological sensitivity of the causative organisms.

Referral:
• Dental focus of infection causing sinusitis
• Complications such as periorbital cellulitis
• Oedema over sinuses
• Fever lasting more than 48 hours
• Poor response over 5 days.

8.3 Disorders Of The Pharynx, Larynx And Neck.

SORE THROAT

CAUSES:

INFLAMMATORY:

1. INFECTIVE
   • Tonsillitis
   • Pharyngitis
   • Secondary to sinusitis
   • Neck space abscess

   (i) Quinsy
   (ii) Parapharyngeal
   (iii) Retropharyngeal
   (iv) Ludwig’s angina

2. NON – INFECTIVE
   • Tobacco / Alcohol
   • Ulcer
   • Voice abuse
   • Acid reflux
   • Foreign body abrasions
   • Burns & Corrosives

NON-INFLAMMATORY
1. MALIGNANCY
   a) Oropharynx
   b) Hypopharynx

2. BLOOD DYSCRASIAS
   a) Agranulocytosis
3. NEURALGIA – Glossopharyngeal disorders.

**Acute Pharyngitis**

**Description:**
Acute pharyngitis is a painful red throat without pus. 90% of acute pharyngitis cases in infants and adults are caused by viruses. However, up to 40% cases of acute pharyngitis in school aged children may have *Streptococcus pyogenes* (Group A streptococcus). About 0.3-3% of untreated *Streptococcus* pharyngitis cases lead on to rheumatic heart disease.

**Non-drug treatment.**
Home-made salt mouthwash may help, eg half teaspoon of salt, a teaspoon of lemon juice, in a glass of warm water, gargle for one minute twice daily.

**Drug treatment:**
- ‘o’ paracetamol.
- Since this is a viral infection, no need for antibiotic therapy in infants and adults.
- However for school age children, give ‘o’ phenoxymethyl penicillin (10mg/kg up to) 500mg ‘o’ 12-hourly for 10 days OR
- Benzathine penicillin G at a dose of 0.6 megaunit IMI stat (if <27kg) OR 1.2 megaunits IMI stat (if >27kg). This should be given if *Streptococcal* Group A infection has been proven by laboratory test, or if there is strong suspicion on clinical grounds.

**Acute tonsillitis**

**Descriptions:**
Acute tonsillitis has so many things in common with acute pharyngitis as noted above. Clinical features suggestive of Streptococcal pyogenes infection include fever (>38 degrees C), tender cervical nodes, tonsillar swelling, exudates and no cough.

**Drug treatment**
Drug treatment is similar to acute pharyngitis.(see above)

Rare but important causes include diphtheria & gonococcal infection. Secondary syphilis can cause generalized pharyngitis. TB is a rare cause of pharyngeal infection, usually associated with open pulmonary disease.

In these cases, always refer to hospital for further investigations and managements.

**Treatment of oral moniliasis (ORAL THRUSH)**

- *Sipping nystatin suspension 1ml qid or apply genitian violet paint 1%.*

**Neck space abscesses:**

*Please note: All neck space abscesses should be referred to hospital urgently.*

**Quinsy (Peritonsillar abscess)**

- *IV penicillin every 6 hours*
- *Pain relief PR/oral (asprin® or paracetamol).*
- Oxygen and a clear airway is of paramount importance.
- Pus must be released by incision under LA with the patient in a sitting position, with a large bore suction for the doctor to clear the pus.
- Alternatively – an “abscess tonsillectomy” is done under (GA)

**Retropharyngeal abscesses.**

Diagnosis depends on examining a “Soft tissue lateral Neck” X-Ray which would show increased A.P diameter between the vertebral column and the airway.

**What happens if left untreated or referred late?**

Abscess could burst through the posterior pharyngeal wall and “drown” the patient by compromising the upper airways, potentially leading to complete asphyxia and death.

**Ludwig’s Angina**
Hoarseness and stridor

- STRIDOR: Noisy breathing due to narrowing of the lumen of larynx or trachea. The presence of stridor is usually a very clear warning that one needs to act quickly to ensure the upper airway patency is not compromised any further or it may become fatal.

CAUSES OF STRIDOR IN CHILDREN.

Common causes:
- Foreign body
- Acute laryngitis (croup)
- Epiglotitis
- Allergic reaction (anaphylaxis)
- Ingestion of corrosive agents

Other causes:

CONGENITAL
- Laryngomalacia
- Cysts
- Webs.
- Tumours
- Subglottic stenosis.
- Vocal cord paralysis

ACQUIRED
1. Infective
    - acute laryngo-tracheo –bronchitis
    - acute laryngitis (croup)
    - diphtheria.

2. Neoplastic-multible papillomatosis.
3. Trauma to anterior neck
4. Post-tracheostostenosis

CAUSES OF STRIDOR IN ADULTS.

1. Infective
Standard Treatment Guidelines  Tonga 2007

I.  Laryngotracheitis.
   b.  Neck space abscesses.
      • parapharyngeal
      • retropharyngeal
      • Ludwig’s
      • quinisy-bilateral(very rare)

2. Neoplastic
   i)  Larynx- SCC
   ii) Trachea
      • Intrinsic.– primary tumour(rare)
      • Extrinsic – Ca.bronchus & Oesophagus
         Thyroid lesions
         Metastasis to mediastinal nodes

3. Traumatic
   i)  Foreign body
   ii) Complications of Surgery & Intubation
      • Oedema
      • Glottic web
      • Intubation granuloma
      • Sub-glottic stenosis
      • Post-tracheostomy stenosis/collapse
      • Bilateral recurrent laryngeal nerve palsy
   iii) Trauma & Sport injuries to anterior neck

4. Allergic-Angioneurotic oedema

**Acute Laryngitis (Viral “croup”)**
*refer to section 19.3.4*

**Acute tracheobronchitis**
*refer to section 19.3.6*

**Acute epiglottitis**
*refer to section 19.3.3*

**Diphtheria**.
Infections with *Bordetella pertussis* is very rare now following the vaccinations of all children against this infection. However, clinicians are hereby reminded to keep an eye out for the typical appearance of adherant pharyngeal membrane which bleeds easily, in the background of a very sick patient. Suspected diphtheria cases should be referred to hospital for further investigations and managements.
First and foremost, if in doubt please contact the staff at the Eye Department.

The following Treatment Guideline has been designed, to be used throughout the country. It is not an exhaustive protocol and it should not take the place of a standard ophthalmology textbook, should there be a need to consult it or other sources of information.

9.1 Acute Conditions:

9.1.1 Stye (External hordeolum, ‘matafa’)

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).

9.1.2 Conjunctivitis (‘matakovi’)

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 Eye clinic.
Management objectives:
- Relieve symptoms
- Treat the cause
- Identify conditions for referral

Management - See below:
Table 18: Management of conjunctivitis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Viral Cause</th>
<th>Bacterial Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conunctiva</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 responds well to treatment.</td>
</tr>
<tr>
<td>Treatment</td>
<td>Advise on self-limiting nature of illness. Stress infectiousness to others.</td>
<td>Antibiotic drops or ointment. <em>Use chloramphenicol eye drops 6-hourly for 5 days OR Chloramphenicol ointment tds for 5 days OR Soframycin eye drops 6-hourly for 5 days.</em></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.

9.1.3 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.

9.1.4 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 19 Signs and symptoms of Iritis

<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 Eye Department for discussion before starting treatment.</td>
</tr>
</tbody>
</table>
9.1.5 Burns
Burns to the eye in our set up are most commonly due to radiation or chemical. The most important issue with these types of injuries is prevention. The public should be advised to wear appropriate goggles for protection when welding or spraying.

9.1.6 Radiation burns
Most common cause is arc welding. This is essentially a superficial burn of the cornea. There is usually a delay of six to ten hours after exposure before the burn becomes symptomatic. Symptoms vary from mild irritation and foreign body type sensation, to severe photophobia, pain and spasm of the eye lid. Because of the high absorption of radiation in the cornea, there is rarely any damage posterior to the cornea.

Treatment:
- **Amethocaine eye drop** (local anaesthetic drop) one or two drops stat ONLY.
- **Mydriacyl or cyclogyl (dilators) eye drop to relieve muscle spasm.** If these are not available, do not be alarmed.
- **Paracetamol orally for pain should be sufficient**

Warning: Topical anaesthetic drops if used often, causes erosion of the corneal epithelium and should NEVER be given to the patient to take home.

Patient should be reassured that damage is temporary and that symptoms will settle within 24 hours. They should always be reminded, to use protective goggles in future.

9.1.7 Chemical burns
Commonly due to fertilisers. When alkaline based, it can be severe as the chemicals penetrate the cornea rapidly. Burns from acids (car battery etc) are ‘less’ severe as they are less penetrative.

**Treatment.**
LOTS of irrigation with whatever is available on site eg. shower, water tap, hose etc.
Hold lid(s) apart and have continuous irrigation of the affected eye for several minutes.
If N/S is available, connect to a normal giving set and with lids held apart, irrigate for about an hour. At least 2L should be used. If available, a drop or two of a local anaesthetic drop in each eye before irrigating should be used.
Again patient should be advised on proper eye care protection in future.

9.1.8 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 fluoroscein 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.

Penetrating eye injury
Patient should be discussed with Eye Department staff and referred immediately to Vaiola Hospital.

Refer all suspected fractures especially with diplopia

9.1.9 Glaucoma
Descriptions:
Raised intraocular pressure, usually in one eye. Symptoms include blurred vision, unilateral or temporal headache, nausea and maybe vomiting. Affected eye is red and feels firm and the affected eye’s pupil may be dilated. (Although it is a serious condition, it is fortunately rare in Tonga).

Management objectives:
- Identify cases
- Initiate treatment to relieve pressure within 2-3 hours
- Refer all cases of glaucoma to the Eye clinic.

Drug Treatment: (Discuss with the Eye team first)
- Oral acetazolamide 500mg stat. followed by 250mg 6-hourly,
- Instill 1% pilocarpine eye drops into affected eye every 30 minutes (if available)
- Refer to the Eye clinic immediately.

9.2 Chronic Conditions

9.2.1 Pterygium (tu’utolo)
Is a growth originating from the conjunctiva which invades the cornea. It is common in hot climates and my represent a response to chronic dry eyes and exposure to the sun. The symptoms are mainly related to the dryness associated with its elevation. Symptoms are typically worse with sun and wind, because of the greater chance for the eye to become drier.
Prevention includes wearing protective sun-glasses.
Treatment is surgical excision and timing of surgery depends on how severe the pterygium is and how bad the symptoms are. It should be noted that recurrence can be as high as 100% depending on the technique used. Symptomatic relief can be offered by artificial tears.

9.2.2 Presbyopia
The conditions included here are short sightedness (myopia), long sightedness (hyperopia) and refractive error due to aging (presbyopia). Of these the most common in our set up is presbyopia. The other two are relatively uncommon.
It is normal with age to lose the ability to see up close as it is natural to lose the ability to accommodate with age. This happens around the age of 40 and is shown by the patient beginning to move the book away from them while reading before they can focus. The problem worsens with age and ultimately they will be unable to read. So long as the patient’s distance vision is normal, it is certain that they will need reading glasses.

What about the 90 years old lady who reads without glasses? Some people develop cataracts as they age. Cataracts can cause patients to become short sighted and therefore can read without glasses. Their distance vision will be poor.

So in the patient over 40 years old: If their distance vision is good, they will NEED reading glasses and if they can read without glasses, their distance vision is most likely poor.

9.2.3 **Cataracts (‘ufitea’)**
This is clouding of the lens and is a degenerative process. With time the condition worsens and eventually will cause blindness. The presentation is usually with deteriorating vision over a period of time. Treatment is surgery where the old lens is removed and a new one implanted. Patient should then have good vision.

Refer all cases

9.2.4 **Diabetic eye disease**
Patients with diabetes develop retinal damage as a result of damage to the small vessels. The three factors that determine the rate of development of retinopathy are: duration of being a diabetic, control of blood sugar and control of blood pressure. Prevention of diabetic eye disease is therefore focused on maximizing control of blood sugar and blood pressure.
Treatment available locally for diabetic eye disease is laser, but this only slows down the progression of the disease and does not stop it. Severe diabetic eye disease requires surgery overseas and costs around $10,000 per eye, so prevention is definitely cheaper than trying to get a cure. Despite the high cost this surgery usually does not fully restore sight and quite often does not improve vision.
Diabetic patients should be examined at least once a year for diabetic eye disease and if they are found to have problems, this period is reduced as required.
10 DENTAL AND ORAL CONDITIONS

10.1 Paediatric Problems

Teething
The eruption of the primary teeth (around 6 months old) usually accompanied by inflamed and sore gingiva. Consequently, there may be irritability, disturbed sleep and dripping. Teething does not cause high fever or convulsion.

Treatment:
- Analgesic/anti-inflammatory 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. Dirty lacerations need surgical debridement and antibiotic if infected.

Antibiotics used are:
- Phenoxymethyl penicillin 12.5mg/kg qid for 5-7 days OR
- Amoxicillin 25mg/kg tid for 5-7 days OR
- Benzylpenicillin, 15-30mg/kg IV every six hours.

If hypersensitive to penicillin, use:
- Erythromycin 10-20mg/kg ‘o’ bd OR
- Cephalexin 6.25mg/kg ‘o’ every 6 hours. OR
- Cephalothin 40mg/kg IV every 6 hours.

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, phenoxyethyl penicillin or amoxicillin for infection and referral for further dental treatment.*

10.2 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
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of the anaerobes: Borellia vincenti, Fusobacterium fusiform, Bacteroidis and Treponema species. The appearance of ANUG in an otherwise healthy individual may be the presenting sign of HIV infection.

Treatment:
- Advise adequate oral hygiene
- 0.2% chlorhexidine gluconate mouthwashes (if available), adjunct to toothbrushing
- Metronidazole (10mg/kg up to) 400mg tds for 5 days
- 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 and metronidazole 400mg ‘o’ 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:
- 0.2 % chlorhexidine gluconate mouthwash (if available) bd
- Doxycycline 100mg ‘o’ bd for 5 days
  OR
- Phenoxyethylpenicillin (child 12.5mg/kg) up to 500mg orally 6-hourly for 3 days,
  PLUS
- Metronidazole 400mg ‘o’ tds for 5 days (in moderately severe cases)

Use erythromycin in place of penicillin in penicillin allergy
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.

In the absence of systemic signs and symptoms, odontogenic causes can be usually 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 or cephalexin.

If progressive trismus arises and airway is compromised, admit case and give:

- Penicillin G 1.2-2.4g IV qid
- Ampicillin 1-2g IV qid
- Metronidazole 1-2g IV tds
- Gentamicin 3-5mg/kg/day IV

Pus must be drained surgically by the dentist.
Be careful of poorly controlled diabetic and hypertensive patients, who may need antibiotic cover.

Septicaemia
Septicaemia 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.

Patients hypersensitive to penicillin, give

- *Cephalothin 2g IV 4 to 6-hourly if available OR Vancomycin 1g bd IV*

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 100mg/kg (max. 2g/day) IV once daily*

Children hypersensitive to penicillins or cephalosporins, give *chloramphenicol 100mg/kg/day (max 3g/day) IV in 3 or 4 divided doses.*

**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.*
- *Aciclovir, 10mg/kg qid ‘o’ for 7-10 days.*

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. It is precipitated by sunlight, trauma, systemic disease or stress. Papules are followed by blisters then pustules.
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.  
(Also, please refer to section 23.1.3, on Skin HZV infections).

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 amphotericin B, 2 lozenges qid OR nystatin suspension 2ml ‘o’ qid.

10.3 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
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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
  OR
-  Indomethacin 50-200mg per day.

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

10.4 Antibiotic Prophylaxis
(Refer again to section 6.10)

10.5 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 debridemnt 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
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- **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.

**Osteomyelitis**

*(Please refer to Section 16.13)*

**10.6 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%.
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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.

10.7 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).

**Treatment:**

- *Metoclopramide 10mg qid PRN IV or IMI OR*
- *Prochlorperzine12.5 mg qid PRN IMI; or 5-10 mg ‘o’; or 25mg PR. (rectally); OR*
- *Promethazine 25-50mg bd IMI.*
11 ENDOCRINE CONDITIONS

11.1 Diabetes Mellitus:

(Please refer to the: “Guidelines for the prevention and management of diabetes in Tonga: a national consensus position; 2000” revised in 2005; and the “Global guidelines for Type 2 diabetes”, by the International Federation of Diabetes, 2005.)

**Diabetes Mellitus Type 1.**

**Description:**
Diabetes mellitus type 1, also known as Juvenile onset diabetes or Insulin Dependent Diabetes, is a metabolic condition characterized by chronic hyperglycaemia due to insulin deficiency. It usually presents with thirst, hunger, polyuria, lethargy, weight loss and/or ketoacidosis. It is normally managed with insulin injections with the dose tailored to each individual’s need.

All newly diagnosed type 1 diabetes case must be urgently referred to the diabetes centre for proper management.

**Management Objectives:**
- Control blood sugar level within acceptable limits (HbA1C < 6.5%).
- Prevent long term complications.
- Prevent acute complications (e.g. hyperglycaemic and hypoglycaemic coma)
- Improve and maintain the quality of life.
- Educate and counsel the patient to enable self-care.

**Diabetes Mellitus Type 2.**

**Description:**
Diabetes mellitus type 2, or adult onset diabetes is a chronic metabolic disorder characterized by chronic hyperglycaemia due to insulin resistance and relative insulin deficiency or both. Its late complications result in reduced life expectancy and considerable
uptake of health resources. Macrovascular disease leads to an increased prevalence of coronary artery disease, peripheral vascular disease and stroke; and microvascular disease lead to diabetic retinopathy, neuropathy and nephropathy.

Management Objectives:
- Keep the blood sugar level as close as possible to the non-diabetic level. (HbA1C <6.5%, and FBS <6mmol/L and 1-2 hours post-prandial sugar of <8mmol/L)
- Prevent long term complications such as retinopathy or nephropathy
- Prevent acute complications such as hypo/hyperglycaemia
- Improve and maintain quality of life
- Educate and counsel patient to enable self-care
- Control other risk factors to macrovascular disease such as smoking, hypertension, high cholesterol and heavy alcohol intake.

Primary Prevention
One cannot over-emphasize the need to prevent diabetes in the first place. The risk factors for diabetes include: inactivity, obesity (BMI >30, or increased waist circumference >100cm), family history especially of IGT (impaired glucose tolerance) and frequently indulging in the wrong food in large quantities, such as mutton, “kapapulu”, white bread and butter, “lusipi” and “lupulu”, “puaka tunu”, BBQ’s (babarques), ice-cream and cakes, the habit of frying food in lard etc. Primary prevention should be aimed at aggressively avoiding these risk factors.

Recommended preventive strategies:
- Aim for a BMI of 20-25
- Increased physical activity to 30-45 minutes exercise, daily for 5 days a week (accumulated to >150mins/week), plus adopt a more active life-style. Example: take every opportunity at work to do some physical work such as walking up a stair instead of an elevator, walk to shops, walk or cycle for recreation, avoid watching too much TV or using the computer/internet for too long etc.
• Healthy eating; by taking variety of food with low animal fat (<30% of the total energy content from fat). Eat the taro, fruits, yam, “lu”, “pele”, fish (local fish is best but tinned fish is better than “kapapulu”) and the traditional “lean moa Tonga”. Remember to take off the skin and fat before cooking imported chicken and meat, we find at the shops.

Diagnostic criteria:
• FBS >7mmol/L (in at least two different times)
• RBS >10mmol/L (in at least two different times)
• Usually associated with signs of symptoms such as: loss of weight, polyuria, polyphagia, susceptibility to infection and so on.

Where the Fasting blood sugar >5.6 mmol/L but <7mmol/L; or a random blood sugar >5.6mmol/L but <11.1mmol/L; do a glucose tolerance test to test for diabetes.

Treatment:
Non-drug treatment:
If the FBS is below 12mmol/L, start with:
• Lifestyle changes to decrease weight by healthy diet and increase in physical activities. Do this for about 8 weeks.
• If the HbA1C is <6.5% (or FBS is back to normal <6mmol/L), continue to encourage the life-style changes implemented.
• If the HbA1c is >6.5% (or FBS is not back to normal <6mmol/L), start oral medications.

Drug Treatment
• In overweight patients, start with metformin 500mg oral 12-hourly, in addition to the above non-drug treatment strategies. Increase dose to a max. of 3g/day in divided doses; depending on blood sugar level. Caution: Metformin may cause lactic acidosis, and it accumulates in renal impairment (GFR <60ml/min/1.73m²), and CCF. Stop it on the day of surgery, changing to insulin and resume only when there is good renal function and can be orally tolerated. Normally taken with food.
• In non-overweight patients; the first choice is glibenclamide 2.5mg oral daily, up to a max. of 10mg 12-hourly if needed. Take doses with or after meals.
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- A preferred short acting drug used in non-obese elderly is **glipizide 2.5-5mg oral daily up to a max. of 15mg daily, as a single daily dose.**
- If the above does not provide good control; **give insulin**

**Insulin Therapy**

- Starting of insulin therapy should ideally be done after consultations with the diabetes clinic.
- Initially, start with daily SC isophane insulin added to the oral medications; titrate dose to glucose level. Increase to a twice daily dose with 2/3 daily dose in the morning and 1/3 the dose in the evening. A premixed insulin like mixtard (70:30) can be used.
- Increase the insulin dose by 2 units every 3 days until the desired effect is achieved (FBS <6mmol/L and a 1-2 hours postprandial is <8mmol/L)
- Encourage the use of the abdominal wall as the site of injection to facilitate absorption of insulin.

**Other essential managements**

- Routinely, **give aspirin 150mg daily**
- Manage high blood pressure with an **ACEI like captopril/enalapril, or a thiazide, or a calcium channel blocker, or combination of them. Caution:** do not combine a β-blocker and a thiazide because of their adverse effects on diabetes control.
- **Give β-blocker like atenolol if there is ischaemic heart disease**
- **Give frusemide (lasix®) if there is heart failure**
- Check for lipid levels
- **Give a cholesterol lowering drug (statin) for all diabetics >40 years old**
- **Give a cholesterol lowering drug (statin) for all diabetics >20 years old with microalbuminaemia.**
- Do annual eye screening routinely and at every 3-6 months if retinopathy is worse
- Do more frequent eye checks in pregnancy
- Refer within one week for urgent eye check if sudden visual loss; retinal haemorrhage or new vascular formation.
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- Refer within 2 months for eye check if cataract, macular oedema or inability to visualize the fundus.
- Check annually for proteinuria; if positive check for urinary tract infection
- If urine is protein negative, check albumin creatinine ratio (ACR); if >2.3mg/mmol in males or >3.5mg/mmol in females: this is microalbuminuria.
- In microalbuminuria, intensify glucose control and give ACEI to control it. Also ensure aspirin® is given, lipid control is better and patient stops smoking.
- Foot care

Acute complications: (Hyper/hypoglycaemia)
(Please refer to “Diabetic Complications” at Section 5.3.4)

Perioperative management of diabetes: (recommended regimen)

- If on oral agents, omit drug. Restart when eating for at least 12 hours.
- If on insulin, omit morning subcutaneous insulin. Start infusion using pump, of 1 litre 5 % dextrose water, at 100ml/hr, plus insulin infusion at 1 unit/hour. Measure blood glucose 2 to 4-hourly pre and post operatively and every hour during surgery. Do not change infusion rate if glucose is between 6.5-10mmol/L. Increase infusion rate to 1.5 units/hr if glucose is >10mmol/L. Decrease infusion rate to 0.5units/hour if glucose is <6.5mmol/L.
- If there is any delay in the surgery or the patient does not resume oral normal intake promptly post-operatively, the Na⁺, K⁺ and creatinine need to be monitored closely, at least 12-hourly.
- Seek advice of the physician or the diabetes clinic in any difficult situation.

11.2 Thyrotoxicosis
Excessive production of thyroid hormones is a common condition affecting mostly females (sex ratio of 5:1). It presents with weight loss, fine tremors, increased appetite, restlessness, malaise, muscle weakness, exophthalmos, tachycardia, AF, tall stature in children and irritability, behavioural changes.
Diagnosis is confirmed by a Thyroid function test.

All cases should be referred to the physician for proper treatment.

11.3 Hypothyroidism
Low level of thyroid hormones can present as:

- Congenital hypothyroidism (frequency of 1:3500 live births). It is identified by high degree of clinical suspicion and confirmed by laboratory screening, during the neonatal period. Replacement therapy is ideally done before 2 weeks of age to prevent intellectual disability. Suspected babies should be referred to the paediatrician urgently for review.
- Children slow growth, poor school performance, arrest of pubertal development.
- Adults may have tiredness, weight gain, anorexia, cold intolerance, depression, psychosis, poor libido, puffy eyes, dry brittle hair, dry coarse skin, arthralgia, constipation, anaemia, ataxia, mental slowness, poverty of movement, slow relaxing tendon reflexes, heart failure, pericardial effusion and even coma and death.

Diagnosis is by thyroid function test
Refer all children to the paediatrician and all adult cases to the physician, for proper managements

11.4 Cushing’s Disease
Excessive production of glucocorticoids hormone. Presents with:

- Weight gain (central)
- Growth arrest in children
- Change in appearance
- Depression/psychosis
- Hair growth and acne
- Muscular weakness
- Amenorrhoea/Oligomenorrhoea
- Thin skin, bruising and hypertension
- Rib fractures
- Proximal myopathy
- Moon face and buffalo hump
- Skin striae
- Glycosuria
Confirmation of diagnosis is by testing the level of the glucocorticoids in urine or blood.

Refer all confirmed or suspected cases to physician for proper treatment.
12 FAMILY PLANNING AND CONTRACEPTIONS

For more details please refer to the “Tonga Evidence Based Guidelines in Family Planning, for Health Workers”, 2006.

12.1 The Use Of a Contraceptive Method
The decision by a man or woman to use a contraceptive method will depend on definite behavioural changes, acquired and sustained, after it had developed through several well-known stages:

- One hears of the contraceptive method to be used and is convinced that it will be very beneficial for him or her;
- One becomes motivated enough to take the first steps in using this method on a regular basis;
- This acquired new behaviour is sustained and one becomes a regular user of this new contraceptive method.

It is important for the health worker to realize that the client should be supported with regular, appropriate feedback communications, during the stages of the development of this new behaviour. Otherwise, it may not be sustained and the newly acquired contraception method will fail.

12.2 Natural Methods
There are natural ways of spacing out pregnancies such as:

- Rhythm method
- Abstinence from sex
- Coitus interruptus
- Prolonged breast feeding of babies by mothers to suppress ovulation

Rhythm method is having sexual intercourse during the “safe days” of the menstrual period and no sex during the “not safe” days. However, this method has a high failure rate. This failure rate may improve if the woman know how to use her basal body temperature to monitor the safe and unsafe days more accurately.
Abstinence from sex is a good method but it causes stress and unfaithfulness amongst partners.

Coitus interruptus: the withdrawal of the penis just before ejaculation has the following disadvantages:
- high failure rate;
- decreases sexual satisfaction in some partners;
- often fails when partners are regular alcohol consumers.

12.3 Barrier Methods
Condoms of varying makes eg: rubber latex, lubricated smooth surface and so forth.
Diaphragms with spermicide

Indications of condoms for men:
- Used to prevent pregnancy and STI.

Contraindications:
- Rubber allergy

For the use of the diaphragm and female condom, please refer to the “Tonga Evidence Based Guidelines in Family Planning for Health workers”.

12.4 Oral Contraceptives
- Ethinylestradiol and levonorgesterel
- Ethinylestradiol and norethisterone
- Levonorgesterel

The policies for giving oral contraceptive pills (OCP) must be strictly observed:
- all new pill users (except post-partum cases) must use the combined OCP;
- start with the pill with the lowest content of oestrogen (example, microgynon 30: oestrogen 30mcg and progestogen 150mg);
- breast-feeding women should not take OCP until 6 months post-partum or after the baby is weaned.

Combined OCP.
Acts by preventing ovulation, thickens cervical mucous, prevents implantation and accelerates expulsion of the ovum.

Indicated in women who are:
- sexually active from menarche to 40 years of age,
- non-lactating post partum,
- nulliparous woman
- in need for short or long-term birth control
- having acne,
- dysmenorrhoea and menorrhagia,
- history of PID or depression etc.

OCP’s are contraindicated in the following conditions:
- Pregnancy
- < six weeks post-partum and breast feeding
- Thrombophlebitis or thromboembolic disorder,
- History of CVA, IHD or complicated cardiac valvular disease,
- Severe headache or hypertension.
- Over 40 years especially if accompanied by diabetes or hypertension,
- Liver disease,
- Undiagnosed abnormal genital bleeding,
- Over 35 years and heavy smoker.

How to take the combined OCP:
- First pill at first day of period, then take one pill a day.
- Can also start on any other day but must abstain from sex or use other added contraception method for five days, for added protection.
- If she misses a pill for 1-2 days, its alright, jus take one immediately and continue taking one every day.
- If she misses a pill for more than 3 days, take one pill immediately but she must abstain from sex or use an additional contraceptive method, for 3 days for added protection.

Progestogen only pills (POP’s)
These pills act by preventing ovulation and thickening the cervical mucous.

Indications:
- for women where combined OCP are contraindicated;
- people with headache or increased BP on combined OCP;
- lactating mothers who want to use pills;
- women of any age.

Contraindications:
- women with breast cancer
- pregnancy.

How to take the POP’s
- within 5 days of the onset of the menstrual period;
- can be started at any time if not pregnant, if taken >5 days after menstrual period, abstain from sex or use another added contraceptive method for 5 days, for added protection.

12.5 Intrauterine Contraceptive Devices
Standard copper containing IUD inserted at the ANC clinics or by midwives

Acts in preventing fertilization of the egg by simulating a foreign body type reaction, in the endometrium.

Indicated in women who:
- cannot take OCP’s especially smokers, hypertensive, those with IHD, cerebrovascular disease, diabetes, migraine, liver and breast diseases; prefer to use IUCD
- prefer to space children after the first one or two,
- >4 weeks post-partum,
- >21 years old and parous.

IUCD is contraindicated in the following:
- known or suspected pregnancy
- cancer of genital tract
• congenital uterine abnormality that distorts normal structure of uterus,
• PID
• STI
• Undiagnosed abnormal genital bleeding
• Endometriosis
• Copper allergy
• Puerpueral sepsis
• Post-septic abortion
• History of ectopic pregnancy

Please refer to the appropriate manual for proper method of insertion of the IUD.

12.6 Injectable Contraceptives
Acts by suppressing ovulation and thickens the cervical mucous secretion to prevent sperm from entering the cervix.

In Tonga, we have :
• medroxyprogesterone acetate 150mg long-acting given IMI once a month.

Indications:
• women who do not wish to keep supplies of OCP at home;
• women who breast feed and are more than 6 weeks post-partum
• post-partum women who are not breast feeding;
• women who cannot take OCP
• mentally retarded women;
• women who are obese and/or smokers.

Contraindications:
• pregnant or suspected pregnant women;
• women with breast cancer;
• women with abnormal uterine bleeding;
• liver disease.

Timing of injection:
• First injection within first 7 days of menstruation. It can be given in any other time but she must not be pregnant and she
Standard Treatment Guidelines Tonga 2007

must abstain from sex or use additional contraception method for 7 days, for added safety.
- Dose is 150mg IMI every months (At 150mg/ml, it is 1ml per month)

12.7 Post-coital Emergency Contraception
(Refer to the Tonga Evidence Based Guidelines in Family Planning for Health Workers)
13 GASTRO-INTESTINAL CONDITIONS

13.1 Abdominal Pain/Dyspepsia/Heartburn/Indigestion

Description
Abdominal pain/dyspepsia/heartburn/indigestion are common conditions which often present with non-specific abdominal discomfort. The pain is **not** associated with the following:

- Meal
- Weight loss
- Blood in stool
- Stress or psychogenic conditions
- Minimal change in bowel habits

Any abdominal pain or discomfort must be assessed for the following features:

- duration
- severity
- location
- type
- accompanying clinical features eg nausea, vomiting, constipation, diarrhea, tenderness, fever, tachycardia, distension
- activity level of patient with severe pain, eg restlessness or inability to lie still
- perform a thorough physical examination.

Differential diagnosis includes:

- peptic ulcer,
- reflux oesophagitis,
- gastric cancer, pancreatitis,
- pancreatic carcinoma, gall bladder disease,
- worm infestations,
- abuse purgatives.
- It may be associated with spicy food, alcohol, excessive smoking, carbonated drinks, use of NSAIDs like ibuprofen and aspirin®.
Management objectives:
- Remove the cause
- Relieve the pain
- Modify lifestyle
- Identify causes that needs further referral

Non-drug treatment:
- Stop smoking
- Limit alcohol intake
- Eat small frequent meals
- Check haemoglobin
- Check drugs that may be associated with it
- Educate patient on normal bowel functions

Drug treatment:
- Give antacids e.g. magnesium trisilicate mixture (MMT®)
- Ranitidine 150mg ‘o’ at night especially for the older age group. OR
- Omeprazole 20mg ‘o’, daily.

Referral:
- suspected appendicitis (right iliac fossa pain)
- failure of treatment
- uncertain of diagnosis
- blood in stool
- mass in abdomen
- signs of peritonitis
- distended abdomen

13.2 Haematemesis
Causes
- Oesophagitis.
- Upper gastrointestinal tract cancer.
- Mallory Weiss tear (after retching).
- Varices including gastric ulcer (note: high mortality).
- Peptic ulceration (ask about NSAIDs + aspirin® use).
- Acute stress erosions (shock, sepsis, NSAIDs).
Management
Resuscitation takes precedence over diagnostic investigations. Gastroscopy should normally be performed within the first 24 hours. Early consultation, if therapeutic procedures such as banding are likely to be required. A patient who continues to bleed heavily may require immediate surgery without other investigation unless varices suspected.

- Assess degree of blood loss (see Section on Shock):
- History often unreliable.
- Useful signs include:
  - Resting tachycardia.
  - Hypotension.
  - Postural BP drop >15mmHg.
- Stabilize patient and monitor:
- Give N/S IV, then blood when available.
- Use Group O Rh negative blood in an emergency.
- Initial investigations:
  - Crossmatch 6 units of resuspended red cells.
  - FBC and diff.
  - Coagulation profile.
  - Na⁺, K⁺, creatinine.

Urgent surgical consultation if:
- More than 3 units of blood need to be transfused.
- Continuing or prolonged bleeding.
- Perforation suspected.

Gastroenterology consultation
- Urgent consultation in all patients over 60 as they tolerate bleeding poorly. Endoscopic therapy may improve outcome in this group.
- Gastroscopy should be considered and done urgently if varices are suspected as they may require ligation. Otherwise it should be done within 24 hours.
Therapy

- **Varices:**
  - Urgent variceal ligation.
  - Sengstaken-Blakemore tube and transfer to ICU. (Consider endotracheal intubation first to reduce the risk of aspiration if level of consciousness is impaired).
- **Acute stress ulceration:**
  - Liquid antacids (30ml magnesium trisilicate ‘o’ 1 to 2-hourly).
  - IV infusion H₂ receptor blockers (e.g. cimetidine 50-100mg/hr for 2 hours and repeat 6 to 8-hourly).
- **Peptic Ulceration**
  - Acute bleeding from a peptic ulcer.
  - Eradication therapy for *Helicobacter pylori* when this has been identified.
  - The following is recommended:
    - Either ranitidine 300mg bd, amoxicillin 1g bd, and metronidazole 400mg bd for 2 weeks OR bismuth subnitrate, metronidazole and tetracycline.

Other regimens are available for treatment failures. Consult Physician.

13.3 Nausea And Vomiting

**Causes**

- **Visceral:**
  - Organic disease of oesophagus/stomach/bowel.
  - Pseudo-obstruction.
  - Mechanical – bowel obstruction/gastric stasis.
  - Acute abdomen.
  - Liver metastases.
- **Toxic/metabolites:**
  - Acute febrile illness/sepsis.
  - Ketoacidosis/uraemia/hepatic failure etc.
  - Drugs (e.g. digoxin, theophyllines, cytotoxics).
- **Neurological:**
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- Vestibular/middle ear.
- Increased intracranial pressure.
- Cerebrovascular accident (especially brainstem).
- Other:
  - Pregnancy.
  - Excess smoking, alcohol and other addictive drugs.

Complications
- Aspiration pneumonia.
- Haematemesis (Mallory Weiss tear).
- Oesophageal perforation (pain is a prominent feature).
- Malnutrition/dehydration.
- Electrolyte/volume depletion.
- Hypochloraemic alkalosis.

Management objectives:
- Symptomatic relief
- Prevent dehydration
- Identify cause/s for referral

Non-drug treatment:
- Withhold food for a period
- Give clear fluid in frequent small quantities rather than big volumes at one go
- Maintain adequate hydration

Drug Treatment
Give oral rehydration solution or intravenous fluid where indicated. Determine and treat the underlying cause. If antiemetics are indicated:
- Dopamine antagonists:
  - Metoclopramide 10mg every 8 hours ‘o’, IMI, IV but higher doses may be required.
- Phenothiazines:
  - Prochlorperazine 12.5mg every 8 hours ‘o’, IMI.
- Sedatives and hypnotics may be used.
13.4 Acute Diarrhoea (<2 weeks duration)

**History**
- Try and assess whether this has an infectious basis.
- Initial history is important. Include severity of diarrhoea, fever, passage of bloody stool, any upper GI symptoms, history of recent surgery, radiation, drugs (especially antibiotics) and overseas travel or infectious contacts. Also record the food eaten and occupation. Ask about similar symptoms in relatives or friends.

**Examinations**
- Look for signs of dehydration, sepsis, abdominal tenderness and rigidity.
- Digital rectal examination and sigmoidoscopy (biopsy may be required).

**Investigations**
- An urgent erect and supine abdominal x-rays may be required.
- FBC + diff, urea, creatinine, Na\(^+\), K\(^+\).
- Blood cultures if patient is febrile or has been abroad.
- Stool examination – a freshly collected stool specimen should be examined and the specific requests should reflect the clinical setting:
  
  **Microscopy:**
  - Parasites (Microsporidia, cryptosporidia in immunosuppressed).
  - Bacteria: *Salmonella, Shigella, Yersinia, Aeromonas, Campylobacter* and Plesiomonas are routinely cultured. (Toxic forms of *E. coli* can be cultured on request).
  - Viruses: Rotavirus is looked for in paediatric samples and other viruses will be tested on request.
  - *Cl. difficile*: Available on liquid stool if appropriate. Culture not routinely done.
  - Toxin assay
  - Parasites: 3 faecal samples on separate days in PVA fixative for parasite examination.
Management

- **General**
  - Enteric isolation procedures required if infection suspected – (follow Hospital Protocol).
  - IV fluids may be required. Remember faecal losses of electrolytes may be very high. 100-120mmol Na$^+$ and 5-15mmol K$^+$ may be lost per litre of stool. An adult may lose more than 2-3L of fluid per day.
  - Avoid constipating drugs (especially in children) as these may prolong symptoms.
  - Antimicrobials are not indicated for the majority of infective diarrhoeas.

- **Specific infections:**
  - *Salmonella/Shigella/Campylobacter* are usually self-limiting and antibiotics should only be used when illness is severe with systemic upset/septicaemia. These are notifiable diseases.
  - Pseudomembranous colitis; always suspect when antibiotics have been taken within last few weeks. Sigmoidoscopy may sometimes be diagnostic but often is not necessary. If suspected check for *Clostridium difficile* toxin and treat. *Treatment of choice metronidazole 400mg every 8 hours ‘o’ or IV 7-10 days. Is effective for relapse or recurrence.*
  - HIV – always suspect in at risk population. Almost all have some gut manifestation either directly due to HIV or secondary to CMV, Cryptosporidia, Giardia, Mycobacterium avium intracellulare, Kaposi’s sarcoma, lymphoma etc.
  - Amoebic dysentery – *metronidazole 800mg ‘o’, tds for 10 days.*

- **Acute inflammatory bowel disease is suspected.**
  - Toxic megacolon (diameter >5.5cm) should be considered in any person with inflammatory bowel disease, systemic toxicity and increasing diarrhoea. Requires daily plain
abdominal x-ray and review with early medical and surgical referral.

- Steroids are drugs of choice in acute situation. *Give IV hydrocortisone 100mg every 6 hours then prednisone 30-60mg/day o’.*
- Medical/Surgical consult if not responding in 48-72 hours.
- *Sulphasalazine 1g qid daily, ‘o’ may be of benefit pending diagnosis in less severe attacks.*
- IV fluids, nutrition and antibiotics may be needed. Always consider other causes of diarrhoea/and or bleeding.

**Notes:** Other causes diarrhoeas include carcinoma, ischaemic colitis, diverticulitis, and constipation with overflow. Laxative abuse may cause dehydration, muscular weakness and hypokalaemia. Consider this in chronic diarrhoea.

### 13.5 Constipation

**Descriptions:**
A condition of decrease frequency of bowel action for the individual. There may be dry hard stools. Causes include: incorrect diet (low fiber), lack of exercise, pregnancy, old age, certain drugs, metabolic or endocrine causes, neurogenic, psychogenic, bowel cancer, ignoring nature’s call.

**Management objectives:**
- Symptomatic relief
- Advise on diet and lifestyle
- Identify causes for referral

**General Measures**
- PR examination (a plain abdominal x-ray may be required).
- Look for treatable causes – pregnancy, cancer, hypothyroidism, hypercalcaemic.
- Avoid constipating drugs (e.g. codeine, opiates, tricyclics, anticholinergics, calcium channel blockers, aluminium hydroxide).
- Dietary control e.g. increase fluid, fibre, fruit.
Specific Measures

- Increase fluid intake.
- Bulking agents. If no response then consider:
  - *Lactulose has an osmotic effect but may cause excess flatulence.*
  - *Faecal softeners (e.g. docusate sodium).*
  - *Colonic stimulants (e.g. bisacodyl, senna) useful in acute constipation. Side effects include cramps, electrolyte imbalance, melanosis coli, and “cathartic colon” and should not be used long term.*
  - *Glycerine suppositories/ manual evacuation for faecal impaction.*

13.6 Jaundice

- If bilirubin unconjugated consider Gilbert’s or haemolysis.
- If bilirubin increase in both conjugated and unconjugated – liver disease, cholestasis.

Obstructive Jaundice (Cholestasis)

- Ultrasound is investigation of choice to exclude duct dilatation.
- Check coagulation and if necessary correct with vitamin K.
- If intrahepatic cholestasis, i.e. no duct dilatation, consider drug toxicity, primary biliary cirrhosis, or primary sclerosing cholangitis.
- If extra-hepatic cholestasis (dilated ducts), consider common bile duct stones, stricture and tumours. Consult a surgeon.

Hepatic Jaundice

- Infectious causes – hepatitis A, B, C, EBV, CMV, and rarely other viruses including Hepatitis D and E.
- Acute alcoholic hepatitis.
- Chronic live disease – alcohol, autoimmune hepatitis, primary biliary cirrhosis, sclerosing cholangitis, Wilson’s disease.
- Drugs, toxins.
13.7 Ascites

In general ascitic fluid should be tested for the following:
- WBC and differential.
- Albumin.
- Culture – fluid placed in blood culture bottles.
- Amylase.
- Cytology.
- Request TB culture if this infection is suspected.

The serum albumin/ascitic gradient (the serum albumin minus the albumin level in the ascitic fluid) is very useful. If >11 this makes portal hypertension the likely cause.

Spontaneous bacterial peritonitis is likely with a white count of >500 x 10^6/L with neutrophils predominant. The initial treatment of proven or suspected peritonitis is cefuroxime 750mg every 8 hours.

Management of ascites should consist of a low salt diet, spironolactone 50-200mg daily with or without frusemide aiming for a weight loss of 0.5-1kg/day. Remove ascitic fluid by peritoneal tap, if necessary combined with IV albumin infusion. Give 8g albumin for every litre of ascitic fluid removed.

13.8 Liver Failure
Where this is suspected commence treatment early.

Clinical and Biochemical Features
- Jaundice.
- Coagulation defects (check prothrombin ratio).
- Hypoalbuminaemia.
- Encephalopathy.
- Ascites.

Causes/Precipitants
- Acute severe hepatic necrosis:
- Drugs – paracetamol.
- Alcohol.
- Autoimmune – submassive necrosis.
• Fatty liver of pregnancy.
• Viral – hepatitis B + Delta superinfection.
• Idiopathic.
• **Chronic liver diseased with acute deterioration:**
  • GI haemorrhage.
  • Sepsis (especially Gram -ve).
  • Spontaneous bacterial peritonitis.
  • Drugs (especially alcohol, benzodiazepines).
  • Electrolyte disturbance and volume depletion (diuretics, hypokalaemia).
  • Hepatocellular carcinoma. (Check α fetoprotein and/or ultrasound).

**Investigations**
• Na, K, urea, creatinine (hepatorenal syndrome).
• Glucose (may require IV dextrose infusion).
• Albumin, bili, alk. phos., AST, GGT.
• FBC+diff, coagulation profile.
• Drug screen.
• Viral hepatitis testing (assume infectious until result available).
• Blood cultures.
• If cause not obvious consider smooth muscle and antinuclear antibodies.

**Treatment**
• Treat any underlying cause (e.g. bleeding varices, sepsis).
• Stop all offending drugs.
• Correct hypokalaemia, hypotension, hypoglycaemia.
• If ascites present aspirate for diagnostic purposes.
• *Correct coagulation defects with vitamin K 10mg IV slowly and fresh frozen plasma as indicated.*

**If encephalopathy suspected**
• Give high carbohydrate/low protein diet.
• *Gut sterilisation with neomycin 1g every 4 hours orally.*
• Purge with lactulose 10-30ml tds adjusted to produce three loose stools per day.
• Watch for alcohol withdrawal.
• Consult physician promptly.

13.9 Acute Pancreatitis

Clinical Features
• Pain is the dominant symptom and may range from mild to excruciating and may radiate to back.
• Fever, tachycardia, hypotension, abdominal distension and rigidity may occur.
• Shock.
• Hypoxia.
• Hypocalcaemia.

Note: Bacterial sepsis may also be present.

Diagnosis
• Serum amylase is usually elevated at least x 5 above normal range in appropriate clinical setting. Other abdominal diseases may cause a lesser elevation of amylase.

Aetiology
• Biliary tract disease (especially gallstones).
• Alcohol.
• Idiopathic.
• Drugs.
• Types I and V hyperlipidaemia.

Investigations
• Serum amylase
• FBC+diff.
• Na⁺, K⁺, Ca⁺⁺, PO₄, creatinine, glucose, LDH, Bili, alk. phos., AST, GGT.
• Blood cultures.
• Abdominal ultrasound.
• Arterial blood gases.
• Lipid analysis if types I and V hyperlipidaemia.
• CXR.
Management

- Treatment of shock.
- Pain relief – *pethidine is the first choice*.
- Bowel rest – nasogastric tube and aspirate gastric contents.
- Oxygen therapy – serial blood gases (ARDS, acidosis).
- Correct electrolyte and calcium disturbances.
- Antibiotics – if sepsis likely.
- Consider surgical consult.

The following are associated with a poor prognosis:

<table>
<thead>
<tr>
<th>Table 20</th>
<th>Prognostic Factors in Acute Pancreatitis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On Admission</strong></td>
<td><strong>At 48 Hours</strong></td>
</tr>
<tr>
<td>Age &gt;55 years</td>
<td>Haematocrit decreased &gt;10%</td>
</tr>
<tr>
<td>WBC &gt;16 x 10⁹/L</td>
<td>Urea increased &gt;15mmol/L</td>
</tr>
<tr>
<td>Glucose &gt;7.5 mmol/L</td>
<td>Calcium &lt;2mmol/L</td>
</tr>
<tr>
<td>LDH &gt;350 U/L</td>
<td>PaO₂ &lt;60mmHg</td>
</tr>
<tr>
<td>AST &gt;250 U/L</td>
<td>Fluid retention &gt;6L</td>
</tr>
</tbody>
</table>

13.10 Acute Hepatocellular Dysfunction (Hepatitis)

**History**

- Ask about recent medicines and other drugs and alcohol history, IV drug use, previous Hepatitis, blood transfusions, tattoos, and recent overseas travel.

**Investigations**

- U/S scan of the liver and biliary tract.
- INR.
- Tissue auto-antibodies, included AND. Serum protein electrophoresis.
- IgM anti-hepatitis A serology.
- HBsAg.
- Anti-hepatitis C serology.
- Hepatitis C PCR if indicated.
- EBV & CMV serology in selected cases.
Non-drug Treatment

- Need to avoid taking unnecessary drugs that may adversely affect the liver
- Maintain oral rehydration
- Avoid alcohol
- Counsel patient of infectivity of hepatitis B, C and A viruses

Referral:
- Severe symptoms
- Deteriorating liver functions
14.1 Obstetrics Conditions

14.1.1 Abortion (Incomplete/spontaneous)

Spontaneous termination of pregnancy before 28 weeks gestation after the last normal menstrual period.

Management objectives:
- Ensure the complete removal of the products of conception
- Control of bleeding
- Prevent bleeding
- In Rh negative mothers, to prevent iso-immunisation
- Anti-D immunoglobulin (<12 weeks: 100mcg, 12-20 weeks: 250mcg, >20 weeks: 500mcg; on average- 300mcg IMI within 24 hours of abortion and definitely not after 72 hours).
- Give psychological support

Non-drug treatment:
- Monitor vital parameters such as Haemoglobin, pulse and BP.
- Treat for shock if indicated
- Give counseling and support to patients.

Drug treatment:
- IMI ergometrine 0.5mg every 4 hours, 3 to 5 doses,
- Oxytocin 5-10 units IMI or oxytocin 20-40 units diluted in 1L of N/S or Hartman’s solution, run at 5 drops per minute, increasing every 30 minutes by 5dpm, up to 40dpm; depending on the frequency of the contractions; which should not exceed 5 contractions in 10 minutes. (Give only in inevitable or incomplete abortion)
- If bleeding continues, repeat treatment after 30 minutes.
- In Rh negative mothers, give anti-D immunoglobulin IMI, 100mcg if <12 weeks gestation. If more than 12 weeks, give 300mcg within 72 hours of delivery.
- Refer all patients to hospital.
14.1.2 Anaemia and Antepartum Haemorrhage

Anaemia in pregnancy
Anaemia is pallor plus a haemoglobin of less than 11g/dL, commonly due to iron deficiency, folate deficiency or both.

Prevention:
At the antenatal clinic, patients should have their haemoglobins checked and given routine daily folate and iron, especially in multiple pregnancies.

Example of preventive regimes:
- 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
- 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.
- Any low Hb with an obstetric complication or high risk 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 of sudden onset.

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 with food for one month, then continue the preventive regime as noted above.

Antepartum Haemorrhage
This is vaginal bleeding in pregnancy after 27 weeks of gestation to the end of the second stage of labour.
Ensure that the patient is resuscitated and stabilized properly before referral. (IV line, cross match blood and so forth). Refer all cases for proper hospital management.

14.1.3 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 from the breast before suction is broken are causes of cracked nipples, which may lead to infection and mastitis.

Management objectives:
- prevent cracked nipples
- 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 using a hair dryer at low temperature; to be washed off later at before next feed.

14.1.4 Diabetes in pregnancy (GDM)

Gestational diabetes is diagnosed by a FBS >6.1mmol/L or 2 hours glucose (after 75g glucose load of a 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. GTT is best done at 28 weeks gestation. Please note that all GDM should be managed in hospital.
Management of GDM at antenatal:

- Diet and exercise
- Monitor blood sugar twice a week
- If not controlled on diet alone, admit and give insulin 7 units preprandial or 9 units postprandial.
- Use separate doses of intermediate acting (isophane insulin 2/3 of the dose) and short acting (soluble insulin 1/3 of the dose) twice daily, rather than the combined formulation. Two third of doses to be given in the morning and 1/3 in the evening. Only give the premixed insulin if dose matches the fixed premixed combination.
- Management is intensive and must be done on a weekly basis followup at Antenatal clinic, after 34 weeks gestation and onward.
- Aim blood sugar level to be at 4-6mmol/L while avoiding hypoglycaemia.

Management at labour

- Must be supervised by obstetrician
- Hourly check of blood sugar, aiming at 4-8mmol/L
- Avoid hypoglycaemia by giving IV 5% (1L) dextrose infusion and KCl (10mmol); run each litre every 8 hours. PLUS, give in 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.
- Induce by ARM with sytocinon where required
- If elective caesarean section is indicated then follow usual protocol as directed by obstetrician.

Post-natal care

- Stop insulin after delivery
- Test sugar level regularly.
- Arrange for a repeated GTT after 6 weeks and refer for followup at diabetes clinic.

Diabetics who are pregnant are treated in the same way.
Hypertension in pregnancy

Pregnancy induced hypertension (PIH) is also known as pre-eclampsia, eclampsia or pre-eclampsia toxaemia (PET). It is described as hypertension at 20 weeks pregnancy or more with:

- either proteinuria or oedema or both
- BP is 140/90mmHg or more, on two occasions about 6 hours apart
- Eclampsia is the presence of seizure in patients with hypertension

### Table 21: Levels of severity of hypertension in pregnancy

<table>
<thead>
<tr>
<th>Level</th>
<th>BP mmHg</th>
<th>Proteinuria</th>
<th>Oedema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Systolic 140-150 OR Diastolic 90-100</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Moderate</td>
<td>Systolic 150-160 OR Diastolic 100-110</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Severe</td>
<td>Systolic above 160 OR Diastolic above 100</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Management objectives

- reduce maternal and fetal morbidity and mortality
- refer patients according to level of severity of hypertension

### Table 22: Treatment of hypertension in pregnancy

<table>
<thead>
<tr>
<th>Severity</th>
<th>Non-drug treatment</th>
<th>Drug treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>- May be managed without admission 38 weeks of gestation and weekly review of BP, weight, urine analysis, fetal heart rate, fetal size. - Bed rest - Education of signs requiring followup</td>
<td>None</td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines

<table>
<thead>
<tr>
<th></th>
<th>Moderate</th>
<th>Severe (Eclampsia)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Admit at 38 weeks for delivery</td>
<td>Oxygen</td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td>Stabilise prior to urgent referral and admission</td>
</tr>
</tbody>
</table>

- **Moderate**
  - **Methyldopa** 250-500mg tds max. of 500mg qid
  - **Nifedipine SR** 10mg bd or tds ‘o’ (max. dose 40mg bd)
  - **Labetalol** 100mg ‘o’ bd with max. dose of 2g per day *(contraindicated in asthma)*.

- **Severe (Eclampsia)**
  - Oxygen
  - N/S IV.
  - Give magnesium sulphate by diluting 4g in 500ml of N/S, run it at 35dpm.
  - Alternatively, give MgSO₄ IMI 10g as 5g into each alternate buttock.
  - If blood pressure remains high, EITHER give hydralazine IV 6.25mg over two minutes OR Labetalol infusion.

**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 severe PIH and eclampsia, after patient has been stabilized

### 14.1.6 Eclampsia
This is the presence of seizure in a patient with severe PIH.

**Treatment includes:**
- Airway
- Oxygen
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- **IV magnesium sulphate 4g IV stat over 15 minutes** (dilute 4g in 200ml 5% dextrose water and run it over 15-20 minutes); at 1-2g/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.** (Please refer to section 5.3.8)
- **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.**
- 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.

14.1.7 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 precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analgesics</td>
<td><em>Pethidine IMI 75-100mg immediately PLUS</em>&lt;br&gt;<em>Metoclopramide 10mg OR</em>&lt;br&gt;<em>Promethazine 12.5-25mg</em></td>
<td>Maternal pain (not to be given if cervical dilatation &gt;5cm), first stage</td>
</tr>
<tr>
<td></td>
<td><em>Lignocaine</em></td>
<td>Local anaesthetic for episiotomy at second stage do not exceed 20ml.</td>
</tr>
<tr>
<td>Inadequate or incoordinated uterine contractions</td>
<td><em>Oxytocin IV 5-10 units in 1000ml of 5% dextrose water.</em>&lt;br&gt;Initiate at 5-10 dpm then increase by 10dpm every 30 minute 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><em>Anti-D immunoglobulin IMI 100 micrograms for &lt;12 weeks and 300mcg for &gt;12 weeks as single dose ideally within first 24 hours and preferably not after 72 weeks.</em></td>
<td>Must be given whenever required for Rh- negative mothers</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><em>Vitamin K IMI 1mg, immediately after birth</em></td>
<td>Can be used routinely to prevent hypoprothrombinaemia</td>
</tr>
</tbody>
</table>
Standard Treatment Guidelines Tonga 2007

Referral (usually urgent)

- Prolonged labour
- Post-partum haemorrhage
- Incomplete delivery of placenta
- Other complications of mother and baby.

14.1.8 Prelabour 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 of 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 confirm diagnosis
- Do a high vaginal swab for bacteriological examination
- 80% will proceed to labour with conservative management
- if no uterine activity in 24-36 hours, augmentation with syntocinon or prostin E₂ gel 1mg should be started, to induce labour.
- Prophylactic erythromycin 500mg ‘o’ qid.

Preterm PROM

- Give a course of dexamethasone at 28-36 weeks
- Daily maternal temperature
- Weekly low vaginal swab without speculum
- Induce delivery and give antibiotics at first sign of chorioamnionitis

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.
- Amoxicillin/clavulanic acid (augmentin®) has been used but is associated with a higher incidence of necrotizing enterocolitis.
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- Antibiotic regime should follow microbiological findings on vaginal swabs.
- Induce labour where indicated
- Delayed labour needs to be delivered by Caesarean section.

14.1.9  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, repeat after 30 minutes, then 3-8 hourly thereafter for 48-72 hours, as long as BP does not drop significantly (max. dose is 160mg/day).
- **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
- Indomethacin is effective but cannot be used before 32 weeks since it may cause premature closure of ductus arteriosus.

14.1.10  Puerperal Sepsis
This is an infection of genital tract at any time between the onset of rupture of membranes or labour and the 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
Standard Treatment Guidelines

- 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
- Gentamicin 5mg/kg IV every 24 hours (max dose of 240mg/day)
- Metronidazole 500mg IV tds, then change to oral 400mg tds
- Treat for 1-2 weeks.

14.2 Gynaecology Conditions

14.2.1 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
- 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®
Standard Treatment Guidelines

- Medroxyprogesterone or norethisterone 10mg bd for 5-7 days beginning on day 19
- This should continue for at least 3 months before discontinuing.

Reproductive years:
- As above or
- 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 tds after food 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

14.2.2 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:
Standard Treatment Guidelines

- Mostly for primary dysmenorrhea
- Reassure woman with dysmenorrhea of nature of condition
- Encourage patient to carry on with normal everyday activities
- Exercise, massage and heating pad to lower abdomen
- Accupuncture and hypnosis do work

Drug treatment:
Two main group 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 dysmenorrhea; give ibuprofen 200-400mg tds after food when needed, for 2-3 days.
- For secondary dysmenorrhea, 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.

Refer all cases of suspected ectopic pregnancies after initial shock is treated appropriately.

**14.2.3 Post menopausal bleeding**
Bleeding at two years or more after menstruation had normally ceased.

Refer all cases to exclude underlying malignancy and other pathology.

**14.2.4 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:
Patient usually presents with one or more of the following symptoms:

- 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 OR clindamycin ‘o’ or PV
- **Trichomoniasis**: treated with metronidazole orally either 2g once or 400mg 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. (See section 24)

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
Standard Treatment Guidelines Tonga 2007

- **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
15 IMMUNISATIONS

15.1 Vaccines Given To Children in Tonga

Table 24 Vaccination of children in Tonga

<table>
<thead>
<tr>
<th>Age given</th>
<th>BCG</th>
<th>Hep B</th>
<th>OP V</th>
<th>DTP /Hib</th>
<th>DTP</th>
<th>MR</th>
<th>Td</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>✓</td>
<td>✓*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 weeks</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 weeks</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 weeks</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 months</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 months</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School entry (5-6 yrs)</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School leaving (15-19 yrs)</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where given</th>
<th>Left upper arm</th>
<th>Right upper thigh</th>
<th>Oral</th>
<th>Left upper thigh</th>
<th>Right upper arm</th>
<th>Left upper arm</th>
<th>Left upper arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>How given</td>
<td>Intradermal</td>
<td>IMI</td>
<td>Oral</td>
<td>IMI</td>
<td>IMI</td>
<td>SC</td>
<td>IMI</td>
</tr>
<tr>
<td>Dose</td>
<td>0.05ml</td>
<td>0.5 ml</td>
<td>2 drops</td>
<td>0.5 ml</td>
<td>0.5 ml</td>
<td>0.5 ml</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>Type</td>
<td>Live virus powder + diluent</td>
<td>Liquid ready to use</td>
<td>Live virus vial with dropper</td>
<td>Powder Hib + liquid DTP</td>
<td>Liquid ready to use</td>
<td>Live virus powder + diluent</td>
<td>Liquid ready-to-use</td>
</tr>
<tr>
<td>Appearance</td>
<td>White cloudy liquid</td>
<td>White cloudy liquid</td>
<td>Clear, pink or orange liquid</td>
<td>White cloudy liquid</td>
<td>White cloudy liquid</td>
<td>Clear, slightly yellow liquid</td>
<td>White cloudy liquid</td>
</tr>
</tbody>
</table>

*Hepatitis B vaccine should be given within 24 hours of birth. If not given at this time of birth, it should be given as soon as possible in the first week of life.
15.2 Tetanus Vaccine For Pregnant Women:

Women who have received 5 or more doses of tetanus containing vaccines (DTP, DT, TT or Td) during her lifetime, should have one dose of tetanus vaccine during pregnancy, if last dose was >10 years ago.

For women who have received 1-4 doses of tetanus containing vaccines, in her lifetime, but not in previous pregnancy, or has never been pregnant: give the regime below, until she has a total of five doses. (Example, if she has had 1 dose already, then give 4 more, if she has had 3 – give just 2 more doses and so forth.)

Those with no history of any form of tetanus vaccine, give this regime:
- first dose- at first contact (at early pregnancy)
- second dose- at least 4 weeks after first dose;
- third dose- at least 6 months after second dose;
- fourth dose- at least 1 year after third dose (or at subsequent pregnancy);
- fifth dose- at least one year after fourth dose (or at subsequent pregnancy).

Please refer to section 5.4 for the treatment of some common infections

16.1 Cardiovascular System Infections

Endocarditis – Please refer to section 6.9.

16.2 Central Nervous System Infections

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 meningitides, 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, lateralizing signs and cranial nerve lesions indicate complication such as venous sinus thrombosis, 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 in Hib vaccinated children where Listeria monocytogenes takes over Haemophilus influenza’s 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 hypersensitive 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 up to) 1.8g 4-hourly IV for 7-10 days
  OR
- *Amoxicillin* (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 dexamethosone shortly before antibiotics has been shown to improve the prognosis of bacterial meningitis.
- *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 *Neisseria Meningitidis* cases are treated with *rifampicin* (neonate <1 month: 5mg/kg; 10mg/kg up to) 600mg bd for 2 days.
Standard Treatment Guidelines  Tonga 2007

- Alternatively, give IMI ceftriaxone 250mg (child: 125mg) as a single dose.

Specific causes of meningitis or encephalitis:

Herpes simplex encephalitis:
- *Aciclovir 10mg/kg IV 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
- 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. influenzae* 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. influenza* 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.

16.3 Dengue Fever
Please refer to the Guidelines for the management and control of dengue fever, produced by the Epidemic Taskforce of the MOH.
**Descriptions:**
Dengue fever is a viral 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 extremities, leukopenia.

- It can present as dengue haemorrhagic fever where the following laboratory findings are added to the above presentations: low platelet count (<100 x 10⁹/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 extremities, 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 evenings 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 haematocrit and platelet counts.

In dengue shock syndrome, one needs urgent admission, and immediate IV fluid therapy, using either N/S or Hartman’s solution. Infuse 10-20ml/kg bolus fast; this may be repeated 2-3 times, in profound shock. Once vital signs improve, maintain IV fluid at 7ml/kg/hour. Monitor haematocrit 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 gelofusion® 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.

16.4 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
Standard Treatment Guidelines

- **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.

16.5 **Eye Infections**

*Please refer to section 9.*

16.6 **Gastrointestinal Infections**

**Acute diarrhea of unknown cause**
No antibiotic is indicated unless there is evidence to suggest invasion by a pathogen; such as persistent fever and bloody diarrhea. In the absence of these signs, loperamide can be used as anti-diarrhoeal.

**Diverticulitis**
For mild infections:
- **Amoxicillin+clavulanate** (875/125mg) ‘o’ bd for 5-7 days
  **OR**
- **Metronidazole** 400mg bd ‘o’ for 5-7 days
  **PLUS**
- **Cephalexin** 500mg ’o’ qid for 5-7 days.

For severe infections, treat as for acute peritonitis due to perforated viscus.

**Acute peritonitis**
- **Amoxicillin (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**
**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 to) 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.

**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®) as a single dose instead.

**16.7 Genital Tract Infections**
**Epididymo-orchitis from an Urinary tract source:**
- Use trimethoprim (child: 6mg/kg up to) 300mg ‘o’ daily for 14 days,
  OR
- Amoxicillin + 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 clinical improvement then change to an appropriate oral medication to complete 14 days course.

**Epididymo-orchitis sexually acquired**

- **Amoxicillin 500mg ‘o’ tds for 10-14 days PLUS**
- **Doxycycline 100mg bd ‘o’ for 10-14 days.**

**Sexually transmitted infections: Please refer to section 24.**

**HIV**

- Please refer to appropriate publications on HIV treatment.

**16.8 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 (multi-bacillary) 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, anaesthetic and asymmetrical. Peripheral nerve involvement in the later is common and severe. The nerve involvement are manifested as 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 in 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 Health.**
For the 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.

16.9 Malaria
Malaria cases in Tonga 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 diarrhea. 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 (<45 kg: 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.

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.

Malaria prophylaxis
• Avoid the vector when traveling to endemic areas using insect repellents, wear light coloured long sleeved 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.

16.10 Mycobacterial 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 to the infectious diseases section for treatment, as soon as possible
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- For the treatment to utilize the recommended DOTS (Directly Observed Treatment Strategy)
- To ensure contacts are traced, for the possibility of 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 that 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 other drugs.

Daily course:

- **Rifampicin (child: 10mg/kg up to) 600mg (<50 kg: 450mg) ‘o’ daily for 6 months**
  - PLUS.
- **Isoniazid (child: 10mg/kg up to) 300mg ‘o’ daily for 6 months**
  - PLUS
- **Pyrazinamide 2g (<50 kg 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
16.11 Prophylactic Antibiotic Treatment
refer to section 6.10 and 25.8

16.12 Respiratory Tract Infections
refer to sections 19.3 and 22.6-22.7.

16.13 Skin, Muscle And Bone Infections

Osteomyelitis
Usually caused by Staphylococcus aureus.
- Give IV cloxacinil 2g 6-8 hourly until patient is afebrile and then substitute to ‘o’ (flu)cloxacinil 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 (meticillin resistant staph aureus).

Pyomyositis
- Relatively rare form of muscle infection with abscess formation; may need surgical drainage if localized pus develops.
- Give cloxacinil 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 cloxacinil 2g IV 6-hourly for at least 7 days followed by ‘o’ (flu)cloxacinil 500mg-1g; 6-hourly for a further 3-4 weeks.
- Surgical drainage is usually needed if pus develops in the joint space.

16.14 Staphylococcal Infections
Staph. aureus can cause impetigo, scalded skin syndrome, toxic shock syndrome, septicaemia, joint/bone/soft tissue infections, endocarditis, and meningitis.
16.15 Streptococcal Infections

- *Streptococcus pyogenes* and other strep. species may be present without symptoms, but can cause pharyngitis, tonsillitis (sore throat), cellulitis, 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 with 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 phenoxymethyl penicillin or benzathine penicillin: one dose.

16.16 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-fecal route especially from “carriers” of the typhoid bacilli, through poor hygienic practices during food preparation. (About 3% of untreated patients with typhoid fever 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 of 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:

- *Amoxicillin (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
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- 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. This treatment is carried out by the Public Health infectious disease section staff.

16.17 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 five days, OR
- Nitrofurantoin 50mg qid ‘o’ for 5 days, OR
- Amoxicillin/clavulanate 500/125mg ‘o’ bd for 5 days

Fluoroquinolones should not 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
- Amoxicillin + clavulanate 500/125mg ‘o’ bd for 10 to 14 days.
- Amoxicillin 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
- Amoxicillin+clavulanate 22.5mg/kg up to 500/125mg ‘o’ bd for 5-10 days,
  OR
- Cotrimoxazole 4/20mg/kg up to 160/800 mg ‘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
- **Amoxicillin + 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, ≥10 years; 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.

16.18 Worms (Intestinal Helminthes)
Ascaris, trichuris and hookworm are all found in Tonga.

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.**
17 MUSCULOSKELETAL CONDITIONS

17.1 Arthritis

17.1.1 Osteoarthritis

A very common condition affecting about 20% of whole population or 50% of those over 60 years of age. It is a disease of the cartilage which becomes progressively thinned as the disease progresses. Fortunately, it progresses very slowly affecting the weight bearing joints first such as hips and knees. Presents with pain, worst in the evenings, aggravated by movement and relieved by rest. There is commonly morning stiffness lasting half an hour and stiffness after sitting. Disability depends on the joint affected. Signs include swollen painful joint with crepitus on movement. Deformity of the joint especially of the knees is common too. Diagnosis is by clinical and X-Ray. ESR and other blood tests are normal.

Management:
- Reduce weight
- Non-weight bearing exercise to improve muscle power
- NSAIDS to control symptoms
- Intra-articular corticosteroids preceeded by aspiration of any fluid in the joint
- Surgery (joint replacement) if available.

NSAID’s used
- Aspirin®: 300-600mg ‘o’ 4-hourly up to a max. of 3.6g a day.
- Indomethacin: 50-100mg ‘o’ 6 to 12- hourly up to a max. daily dose of 200mg.
- Ibuprofen: 200-400mg ‘o’ at 6 to 8-hourly intervals up to a max. of 1.6g a day.
- Paracetamol: 500-1000mg ‘o’ at 4 to 6- hourly intervals up to a max. of 4g a day.
- Naproxen: 250-500mg ‘o’ bd up to a max. dose of 1g per day

Precautions:
Apart from paracetamol, all the above NSAID’s are contraindicated in people with peptic ulcer disease. Indomethacin in particular is well known for causing significant upper GI bleeding. NSAIDs should not be used in people with renal and heart diseases. They should all be taken after meals or with milk.

17.1.2 Rheumatoid Arthritis
A symmetrical inflammatory polyarthritis with extra-articular involvements of other organs. There is considerable progressive joint damage causing severe disability in young people, demanding considerable resources in their managements. It affects 2% of the population worldwide and can begin at any age from 10-70, commonly 30-40. It is associated with HLA-DR4 (70%), and 5-10% have a family history. Cause is unknown.

It usually presents with insidious onset of pain and stiffness in the small joints of hands and feet and later other joints; bilaterally. Pain is worst in the morning and stiffness may be for several hours. Joints are swollen, tender, deformed and have limited movements. Skin nodules are common and surrounding joint tissues are also inflamed, causing bursitis, tenosynovitis and muscle wasting. The eyes may be dry and scleritis present. Polyneuropathy, anaemia, splenomegaly and pleural effusion can also be seen.

Diagnosis is by clinical picture, X-Ray and blood tests (Rheumatoid factor, ANA, high ESR).

Management:
- Counselling the patient after confirmation of diagnosis
- Symptomatic treatment using NSAIDs
- Control of disease with long term suppressive therapy, such as corticosteroids given orally or by intra-articular injections and sulphasalazine
- Regular supervision and management of complications
- Rehabilitation of the disabled patients.

Drug treatment
The NSAIDs can be used in treating rheumatoid arthritis, similar to their use for osteoarthritis as noted above. There are available disease modifying antirheumatic drugs (DMARDs) which can also be used in
this condition, to reduce the regular usage of the potentially harmful NSAID’s.

The DMARDs include:

- Methotrexate tab given at a dose of 5-15mg ‘o’ once a week. PLUS
- Folic acid at 1mg ‘o’ for 3 to 7 days each week may be added to reduce gastrointestinal toxicity and mouth ulcers. The FBC, platelet and LFT’s must be monitored carefully while taking this medication. OR
- Prednisone tab given at 5-7.5mg ‘o’ daily, OR
- Sulphasalazine tab given at a dose of 1g orally, 2-3 times a day can be used. Again, FBC, platelet and LFT should be monitored on a regular basis.

Consult physician for further management advice.

17.1.3 The spondyloarthropathies
Conditions characterized by inflammatory back pain, synovitis (lower limbs asymmetrical), sacroiliitis (X-ray), Absence of Rheumatoid laboratory findings, Anteriour uveitis. Commonest one is ankylosing spondylitis, which can progress to cause “bamboo spine”. Management is with NSAIDs, exercise programme, and sulphasalazine to suppress inflammation.

Reiter’s syndrome and psoriatic arthritis are other examples of this group.

Refer to physician for further advice.

17.1.4 Infective arthritis
Infection of the joint is commonly caused by Staphylococcus aureus. It can also be caused by Streptococci, Neissaeria or gram negative bacilli.

It presents with a dramatic, single inflamed joint and fever. Aspiration of the joint would confirm turbid (pus) fluid which usually confirms an infective cause by microbiological tests.
Treatment should be started immediately with IV antibiotics, initially with cloxacillin and later, guided by the microbiological sensitivity. Surgical drainage of the joint effusion is frequently indicated.

Refer to section 16.13

17.1.5 Gout

Gout is the abnormality in uric acid metabolism that results in the deposition of sodium urate crystals in joints causing arthritis, soft tissue causing tophi (and tenosynovitis), and in the urinary tract causing uric stones. It is most commonly seen in men and post—menopausal women. Typical presentation is an acutely inflamed joint (usually the first metatarsophalangeal joint), with a tophi seen in the ear lobes. Diagnosis is made by the identification of uric crystals in aspirated joint fluid and a high uric acid level in the blood. On the other hand, a normal uric acid level does not exclude gout.

Potential contributing factors include drugs such as thiazides, low dose aspirin®; excessive alcohol intake and diet high in purines and its precursors such as shell fish and so forth.

Management of an acute attack involves an initial high dose of a NSAID’s. This dose is gradually reduced over a one-week period.

Usual initial doses of commonly used NSAIDs:

- **Naprosyn at 750mg 'o' stat, followed by 500mg ‘o’ bd,**
  
  OR

- **Indomethacin at a dose of 75mg ‘o’ stat, then 50mg 6-hourly for two to three days,**
  
  OR

- **Colchicine given at 1.2mg ‘o’ stat followed by 0.6mg every 6 hours, up to 2.4mg daily or as tolerated.**

- In patients with renal impairment or where NSAIDs are contraindicated, use prednisolone at 20-40 mg ‘o’ daily until the acute attack subsides. Taper the dose over 7-14 days. Intra-articular injection of corticosteroids can be given (eg: methylprednisolone acetate 40-80mg intra-articularly).

Avoid aspirin since it may exacerbate the attack. All NSAIDs should be taken after meals.
In some patients, preventing attacks of gout can be achieved by using oral allopurinol when:

- Frequent acute attacks;
- Tophi or chronic gouty arthritis;
- Renal stones;
- Very high serum uric acid level (>0.55mmol/l)
- Prophylaxis when treating malignant disease.

Allopurinol may precipitate an acute attack and it must not be given within 3 weeks of an acute attack. However, if an acute attack occurs while one is on allopurinol, it is advisable not to stop taking the allopurinol.

Dose is 300mg oral daily but reduced to 100mg daily, in people with renal disease.

Concurrent with the introduction of allopurinol, it is advisable to give colchicines 0.5mg daily (max. 0.5mg bd), to prevent an acute attack of gout. This colchicine is given for three months only.

17.1.6 Other arthropathies

Pyrophosphate arthropathy (pseudogout) is a disease of older people (>60 years old with male = female incidence). It is more difficult to control compared to gouty arthritis. NSAIDS is used for symptomatic relief and intra-articular corticosteroid injection may be helpful.

Paracetamol at 0.5mg-1g ‘o’ every 4-6 hours as necessary up to 4g a day.

Arthritis may also be associated with chronic active hepatitis, haemochromatosis, primary biliary cirrhosis, Whipple’s disease, psoriasis and haemophilia. Less common causes include avascular necrosis, amyloidosis, sarcoidosis, pigmented villonodular synovitis and a few others.

17.2 Back Pain

Back pain is such a common problem that when one presents with it, a clinician’s role is to identify the potentially serious ones before treating the symptoms. The potentially serious conditions which can present as a back pain include infection, neoplasm, Paget’s disease of
bone and a possible vertebral fracture especially in an osteoporotic bone. Back pain due to these conditions are usually:

- localized
- uninfluenced by posture or movement.
- spinal mobility may be normal or very limited hypomobility.
- no diurnal variation.
- patient may have other constitutional symptoms such as fever and feeling ill.

When these conditions are suspected, the patient must be urgently referred, for further evaluation by a clinician in a hospital setting.

On the other hand, the more common mechanically caused back pain usually have the following characteristics:

- pain is generalized
- pain is worse at the end of the day
- pain is worse on sitting and movement and least when lying down.
- patient is otherwise well
- tenderness is diffuse

Once the potentially serious conditions have been excluded, adequate analgesics using NSAIDs should be given.

Non-pharmacological treatment such as rest, physiotherapy and graded mobilization should also be carried out. If symptoms deteriorate or fail to significantly improve by 10-14 days, the case must be referred for further investigation and treatment.

17.3 Soft Tissue Rheumatism
This is a group of conditions with similar features. They cause musculoskeletal or joint pain that arises from structures surrounding joints, such as tendon sheaths, bursa and so forth. These conditions include bursitis, tenosynovitis, frozen shoulder, fibromyalgia etc. Many are treated preferably by local corticosteroid injections rather than by anti-inflammatory drugs. However, if these injections are not available, then the NSAID’s should be used.
17.4 Bone Diseases
Bone disorders such as osteomalacia, rickets, Pagets, osteomyelitis and neoplasia of bone; should all be referred to a clinician in a hospital setting for proper investigation and managements.
18.1 Nutritional Disorders

18.1.1 Overweight and Obesity

Overweight and obesity must be treated because they are associated with the following:

- increases the risk of developing diabetes, ischaemic heart disease and cerebrovascular disease;
- associated with the development of osteoarthritis, hernia, varicose veins, gall stones, breathlessness, hyperlipidaemia, back pain and proneness to accidents.

Obesity is defined as increased BMI (males >30 and females >28.6) and a waist circumference of >102cm for men and 88cm for women. However, to simplify the definition, we use BMI of 30 as the cut-off point for both males and females.

BMI (Body mass index) = weight kg/ (height meters)^2

Table 25 Interpretation of BMI results:

<table>
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<th>Height (cm)</th>
<th>Weight (kg at which BMI reaches 30kg/m^2)</th>
</tr>
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<tbody>
<tr>
<td>150</td>
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<td>155</td>
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<tr>
<td>200</td>
<td>120</td>
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</tbody>
</table>
“Ten points” guideline to the management of obesity:
Presented below is a ten point guideline to help clinicians with the management of people with obesity. (based on the National Health and Medical Research Council recommendations).

1. Discuss weight with patient and whether measurements should be taken at this stage (ie BMI and waist circumference).
2. Assess and treat co-morbidities associated with weight and determine the patient’s need to loose weight.
3. Ascertain the patient’s readiness and motivation to loose weight.
4. Assess why energy imbalance has occurred.
5. Assess how energy imbalance has occurred.
6. Determine the level of clinical intervention required.
7. Devise goals and treatment strategies with patient.
8. Prescribe or refer for dietary or physical activitiy advise.
9. Prescribe medication or refer for obesity surgery, and/or conduct or refer for behavioural modification as determined appropriate.
10. Review, assist and change programme as required.

Step one:
In discussing the ideal weight and waist circumference with the patient, it is important to communicate in a non-judgemental manner to encourage the patient to follow any weight loss strategy that may be implemented.

Step two:
As noted above, obesity is associated with many diseases. It greatly increases the risk of getting diabetes, gall stone, hypertension, ischaemic heart disease, fatty liver, sleep apnoea, breathlessness, social isolation, daytime sleepiness, gout, hernia, osteoarthritis and stroke. At the same time it causes slight increase in the risk of developing breast cancer, colon cancer and endometrial cancer. It also increases the risks of getting bad back, varicose veins, cataract and infertility.
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Step three:
Ensure that the patient understands why he needs to lose weight and he is prepared and motivated to take the necessary actions needed to do so.

Step four:
Obesity is caused by energy imbalance where energy intake is higher than energy expenditure. The “why one is obese”, question needs to be answered to make the weight loss strategy effective. Factors such as being Tongan; genetically predisposes one to be obese. At the same time, there are certain cultures, such as the habit of feasting on Sundays and sleeping at noon is very conducive to weight gain. Eating a lot at the evening meal, again makes weight gain more common. There are drugs that cause weight gain such as the benzodiazepines, corticosteroids, anti-psychotics, anti-epileptics, tricyclic anti-depressants, sulphonylureas, insulin and so forth. Conditions such as hypothyroidism causes weight gain.

All these issues need to be addressed when one is planning a weight-loss strategy for a specific patient, since one cannot be successful without addressing these why questions first.

Step five:
In order to be able to measure the energy imbalance that causes obesity, one must agree on ways of measuring physical activities (energy expenditure) and eating habits (energy inputs). In this way, one can easily increase or decrease the energy inputs and expenditures, by increasing the associated activities that produce them, so that there is a consistent negative energy balance so that weight loss could be achieved.

Example, avoid binge eating, unhealthy diet, increase physical activities, cut down the television time, increase outdoor activities, use a pedometer if available to measure activities etc.

Step six:
Level of intervention depends on the need of each specific patient, but generally speaking, all obese patients must try to lose some weight or
at least, increase the level of physical activity even if weight loss is difficult to achieve.

Step seven:
The goals and treatment strategy must be agreed upon with the patient. The main goal will be improvement in health. Ultimately, a measurable indicator would be a waist circumference of <102cm for males and <88cm for females, or BMI <30 for males and <28.6 for females. However, achieving even 5-10% reduction of body weight result in significant improvements in metabolic health.

It is important to realize that there is no single best treatment strategy. Rather it involves lifestyle modification on the part of the patient to ensure there is sustainable negative energy balance resulting in a fitter and slimmer individual.

Steps eight and nine:
It is important to remember that there are people who can help with devising a dietary and physical activity plan to help one loose those extra kilograms of weight. The level of physical activity should be graded according to the ability of the patient but any movement is better than none, and more is better than little. An example of adequate physical activity is a moderately intense activity like brisk walking, for over 30 minutes daily for most days of the week. Dietary intake should be habitually include carefully reading food labels and eating a balanced, low calorie, low fat diet as frequently as possible. Certain food items commonly eaten in Tonga such as corned beef, pork, fried food, chips, cake, chocolate and so on, must be strictly restricted to say once a month or only during annual special events. Certain drugs can be used to fight obesity such as orlistat, sibutramine, phentermine and diethylpropion. However, they are not in our essential drugs list. Surgery (Stomach banding) for obesity is available overseas but cannot be done in Tonga.

Step ten:
It has been shown that people who are regularly followed up are usually the ones who are motivated enough to sustain loss of weight.
Usually, they eat healthy sensible diet and undertake moderate to high level of physical activity/exercise for 60-80 minutes a day, for most days of the week.

### 18.1.2 Vitamin deficiencies

**Table 26: Vitamin deficiencies**

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Signs and symptoms of deficiency</th>
<th>Prevention of vitamin deficiency</th>
<th>Treatment of vitamin deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fat soluble vitamins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Night blindness, dryness of conjunctiva and cornea (xerophthalmia), Bitot’s spots and blindness especially in children.</td>
<td>Take adequate green leafy vegetables and dairy products.</td>
<td>‘o’ retinol palmitate, 50,000 units for two days or Vitamin A – 50,000 units, IMI stat</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Osteomalacia in adults or Ricket’s in children</td>
<td>Adequate sunlight exposure and a balanced diet.</td>
<td>‘o’ vitamin D₂ supplements; 250 mcg daily. (monitored by regular calcium level).</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>Severe cases result in anaemia and neurological problems</td>
<td>Vegetable oils and fish.</td>
<td></td>
</tr>
<tr>
<td>Vitamin K</td>
<td>Bleeding tendencies</td>
<td>Leafy vegetables and avoid antibiotics that destroys intestinal bacterial flora. In newborns, vitamin K 1mg IMI.</td>
<td>Vitamin K (phytomenadione) 10mg IMI.</td>
</tr>
<tr>
<td>Water</td>
<td>Beriberi (wet and dry)</td>
<td>Balanced</td>
<td>Thiamine 50mg</td>
</tr>
</tbody>
</table>
**Thiamine**

Wernicke-Korsakoff syndrome especially in alcoholics (dementia, ataxia and nystagmus).

**Riboflavin**

Angular stomatitis of mouth, red inflamed tongue and seborrhoeic dermatitis around nose and genitals.

**Niacin**

Dermatitis, dementia and diarrhea (pellagra)

**Vitamin C**

Scurvy and anaemia

**Vitamin B12 and folate**

Megaloblastic anaemia

---

**18.2 Blood Conditions**

**18.2.1 Anaemia**

Anaemia is defined as reduced haemoglobin of <13g/dL for males and <11.5g/dL for females. Symptoms include fatigue, headache, faintness, shortness of breath on exertion, palpitation and sometimes angina on effort. Common signs include pallor, tachycardia, systolic flow murmur and cardiac failure.

Common causes include blood loss, iron deficiency, B₁₂ and folate deficiency, bone marrow failure and haemolytic diseases.

Diagnosis of these causes can only be done by laboratory investigations. Consequently, all cases of suspected anaemia should be referred for proper management in the hospital. Treatment usually involves the treatment of the cause of anaemia.
Iron deficiency anaemia:
- Treated by oral iron (ferrous sulphate) 300mg tds for 3 weeks. Folate 5mg daily should also be given to help production of more blood.
- Treat the cause of the iron deficiency (eg menorrhagia or GIT bleeding etc),

18.2.2 Myeloproliferative disorders
This is uncontrolled clonal proliferation of one or more of the cell lines in the bone marrow, namely erythroid, myeloid and/or megakaryocyte lines. Examples include polycythaemia rubra vera (PRV), essential thrombocythaemia, myelofibrosis or chronic myeloid leukaemia.

All these cases should be referred to the physician for hospital treatment.

PRV is usually treated by regular venesection and/or oral hydroxyurea.

18.2.3 Leukaemia
Acute leukaemia usually presents with signs and symptoms of anaemia, bleeding tendencies and bruising, lymphadenopathy, infections and hypertrophied gums.

All suspected and confirmed leukaemia cases must be admitted to the hospital for further managements.

18.2.4 Bleeding disorders
Bleeding tendencies can be due to any of the following:
- Vitamin K deficiency (eg too much warfarn)
- Liver disease
- Deficiency in coagulation factors such as haemophillia
- DIC
- Low platelets or abnormal platelet function

In all cases, they should referred to a physician for hospital management.
18.2.5 Warfarin therapy

Warfarin is used to prevent thromboembolism in the following conditions:

- Atrial fibrillation
- Prosthetic cardiac valves
- Deep vein thrombosis (recurrent)
- Mitral stenosis
- Transient ischaemic attacks
- Arterial disease
- Pulmonary embolism (history)

Warfarin anticoagulant action begins in hours to days, in relation to the half lives of coagulation factors 2, 7, 9 and 10. Antithrombotic action takes some days to achieve.

**Management objectives:**

- Start warfarin 5 days before it is planned to stop heparin (which was initially given)
- To take precaution in patients who may be more sensitive to warfarin, especially the >65 years old, low body weight, altered liver function and on drugs known to increase sensitivity to warfarin
- Monitor the warfarin effect using regular INR (coagulation test).

**Recommended first 5 days of treatment:**

**Table 27: Warfarin; first five days of treatment**

<table>
<thead>
<tr>
<th>Day</th>
<th>INR</th>
<th>Warfarin dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Within normal range</td>
<td>5mg (except for relatively young, patients with no co-morbidities: they can be started on 10mg for days 1 and 2)</td>
</tr>
<tr>
<td>2</td>
<td>&lt;1.5</td>
<td>5mg or 10mg for the above</td>
</tr>
<tr>
<td></td>
<td>1.5-1.9</td>
<td>3mg</td>
</tr>
<tr>
<td></td>
<td>2.0-2.5</td>
<td>1mg</td>
</tr>
<tr>
<td></td>
<td>&gt;2.5</td>
<td>seek advice</td>
</tr>
<tr>
<td>3</td>
<td>&lt;1.5</td>
<td>5mg</td>
</tr>
<tr>
<td></td>
<td>1.5-1.9</td>
<td>3mg</td>
</tr>
<tr>
<td></td>
<td>2.0-2.5</td>
<td>2mg</td>
</tr>
<tr>
<td></td>
<td>2.5-3.0</td>
<td>1mg</td>
</tr>
<tr>
<td></td>
<td>&gt;3.0</td>
<td>seek advice</td>
</tr>
</tbody>
</table>
Once the warfarin dose is stabilized, the patient can be regularly followed ensuring that the INR is in the recommended levels (see below). Patients should not be seen at more than 1 month apart.

**Table 28: Recommended INR levels for warfarin treatment**

<table>
<thead>
<tr>
<th>Recommended INR levels</th>
<th>INR ratio</th>
<th>(prothrombin ratio)</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre and perioperative anticoagulation</td>
<td>1.5-2</td>
<td></td>
<td>Days</td>
</tr>
<tr>
<td>Treatment of DVT</td>
<td>2-3</td>
<td></td>
<td>12-26 weeks</td>
</tr>
<tr>
<td>Treatment of PE or massive DVT</td>
<td>2-3</td>
<td></td>
<td>26-52 weeks</td>
</tr>
<tr>
<td>Treatment of recurrent DVT or PE</td>
<td>3-4</td>
<td></td>
<td>Life long</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>2-3</td>
<td></td>
<td>Life long</td>
</tr>
<tr>
<td>Prosthetic valve</td>
<td>2-4</td>
<td></td>
<td>Life long</td>
</tr>
<tr>
<td>Arterial disease</td>
<td>3-4</td>
<td></td>
<td>Life long</td>
</tr>
</tbody>
</table>

**Drugs that potentiate warfarin effect:**

- Antibacterials (cephalosporins, cotrimoxazole, isoniazid, macrolides, metronidazole, penicillins, quinolones, tetracycline.
- Antifungals (ketoconazole, fluconazole and miconazole)
- Cardiovascular (amiodarone, antilipid drugs, propanolol, quinidine, verapamil)
- Central nervous system (antidepressants: tricyclics and serotonin selective reuptake inhibitors)
- Gastrointestinal (cimetidine, omeprazole)

**Drugs expected to decrease warfarin effect:**

- Antibacterials (rifampacin)
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- Cardiovascular (colestipol)
- Central Nervous system (carbamazepine, phenytoin, barbiturates)
- Others (cholestyramine, vitamin K, vitamin rich foods eg avocado, broccoli)

Some herbal medicines may interact with warfarin too (refer to appropriate literatures)

Management of patients on warfarin therapy undergoing surgery

The following is a suggested management plan for patients having elective surgery. However, the final decision on what prophylaxis to use (if any) is taken by the surgeon and anaesthetist, caring for the patient.

Before surgery:
- Withhold warfarin for 4 days prior to operation day. Aim is for INR to drop to <1.5 on day of surgery
- Commence low molecular weight heparin (e.g. enoxaparin 1mg/kg 12-hourly) at treatment dose when INR is <2. Last dose prior to surgery given in morning, the day before surgery (i.e. no low molecular weight heparin on the day of surgery)
- Test INR on day of surgery, if >1.5, discuss with surgeon and anaesthetist.

After surgery
- Restart warfarin (patient’s) usual daily dosing and low molecular weight heparin, commencing 12-24 hours after surgery. Discuss with surgeon and anaesthetist before restarting the therapy.
- Continue with heparin until the INR is >2.
19.1 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.

19.2 Problems Of Neonates And Young Infants.

19.2.1 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)*
19.2.2. 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.
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; reposition 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.

Call for help

Yes

Routine Care

Pink and Breathing

Routine Care and Observe Carefully.

Not breathing & cyanosed.

Breathing

Observe Carefully.

HR <60/min

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 ⅓ the A-P diameter of the chest.

HR >60/min.
19.2.3.  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.

19.2.4.  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.

19.2.5.  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:
Standard Treatment Guidelines

- 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.

19.2.6. 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.
19.2.7. 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;
- Syphilis 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.
19.3. 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.

19.3.1 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 vommitting every time;
- Convulsion, lethargy or unconciousness;
- 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;
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 \( \geq 60/\text{min} \)
2-11 months age \( \geq 50/\text{min} \)
1-5 years age \( \geq 40/\text{min} \)
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.

19.3.2. Pleural effusion and empyema.
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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).

19.3.3. **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 *Heamophilus 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 cluture 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.

19.3.4. 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.)

19.3.5. 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;
genral danger signs.

Wheezing 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 (≥39ºC) 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.

19.3.6. 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.
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**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 bronchodilators

**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
19.4. 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 vavular 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 phenoxyethyl 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 phenoxyethyl 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 phenoxyethyl penicillin ‘o’ 250-500mg bd.

19.5. Diarrhoea.
(See section 5.3.9)

(See sections 25.1, 25.2)
20.1 Psychotic or Manic Patient
Adult patient with dangerous behaviour to himself or to others. This also includes “Pukefakamahaki” such as “Avanga-tahi”, “Avanga-‘uta” and “avanga leke” (please refer to the “Keulikamai” by Dr. Mapa Puloka for definition). Not in medically ill patients.

- Seclusion/ secluded according to the provisions of the MHA 2001.
- **IMI chlorpromazine 400-800mg/day, in divided doses.** Increasing dose until symptoms controlled, then gradually reducing to a dose of (orally) 100-400mg daily. It is seldom necessary or beneficial to exceed 2000mg (2g) daily. Monitor BP since chlorpromazine usually cause postural hypotension
- **IMI haloperidol 5-10mg** is given and repeated hourly until control of psychotic symptoms is achieved. Maximum dose is 60mg. Can be given in medically ill patients. Then gradually reducing to a maintenance dose of (orally) 5-30mg daily, in divided doses.

**Note:** Withhold medication if the patient is feverish. Contact Psychiatrist. To rule out Neuroleptic Malignant Syndrome (NMS).

If extrapyramidal side-effects (EPS) is manifested especially dystonia then, give **IMI benztrapine 2mg one every 40 minutes within 2 hours (i.e 3 doses only)**. If the patients fails to respond then report immediately to the psychiatrist.

20.2. Antidepressants
For Depression with suicidal behaviour.

- Admit the patient according to the provisions of the MHA 2001
- **Give ‘o’ amitriptylline tab 25mg qid; increasing if necessary to a daily dose of 300mg.** If the patient is excited then, give **IMI chlorpromazine is indicated as above-mentioned in Psychosis and Mania.**

**Contra-indication for Amitriptylline:**

- Patient with prostatic hypertrophy as acute retention may be induced.
Patient with cardiac disease because of the Amitriptylline tendency to either produce or aggravate arrhythmias that may lead to sudden death. Other side-effects of Amitriptylline – Postural Hypotension: Common in the first few weeks of treatment and blood pressure usually returns to normal in a month. The patient should be advised to get slowly out of bed or up from chairs and avoid standing via one position for too long. Paralytic ileus: This is rare but serious. The drug should, be stopped. Refer the patient to hospital.

20.3. Antianxiety

For Anxious patients:
Patients present with attack: *Diazepam tabs 2-10mg qid then refer the patient to the psychiatrist.*

Mixed Depression and Anxiety.

- *Give amitriptylline as already mentioned above.*

Note: For detail information on management of mental illness ‘dissociative disorder’ or ‘Avanga musiku’ please refer to “Keulikamai” 1997 by Dr. Mapa Puloka
Renal disease is suspected if there are:
- symptoms referable to the urinary tract;
- elevated blood urea or creatinine;
- abnormalities in the urinalysis;
- generalized oedema;
- hypertension.

21.1 Glomerulonephritis

This refers to a group of renal disorders in which there is immunologically mediated injury to the glomeruli; kidneys are symmetrically involved; secondary mechanisms of glomerular injury come into play following immune insult, or the renal lesion may be part of generalized disease.

The pathogenesis usually involves either deposition of in situ immune complexes (most cases), or deposition of anti-basement membrane antibody (<5% cases). Both mechanisms activate secondary inflammatory reactions which lead to the glomerular damage causing the signs such as proteinuria and so forth.

All suspected cases of glomerulonephritis must be referred to the physician for hospital management.

21.2. Nephrotic Syndrome

A syndrome characterized by heavy proteinuria, hypo-albuminaemia and generalized oedema. Hypercholesterolaemia is also a common feature.

Any of the glomerulonephritides can cause nephrotic syndrome, however, in children it is commonly caused by the minimal change one. This last one usually responds to management with high dose corticosteroid.
All cases should be referred to the paediatrician or physician for hospital management.

21.3. Urinary Tract Infection

*Please refer to section 16.17*

21.4. Calculi

Stone in the urinary system is a common problem which affects about 1-2% of a population at any given time. It affects male > females (2:1). About 50% of patients with stones will form another calculi within ten years period. Most stones are made up of calcium oxalate and this is the type, commonly seen in males. However, the mixed infective ones are more common in females. (ratio of 2:1 compared to males).

It is important to recognize the risk factors to stone formation, such as: dehydration, hypercalcaemia/hypercalcaeuria, hyperoxalouria, hyperuricaemia/hyperuricosuria, infection, cystinuria, renal tubular acidosis, primary renal disease etc.

Most patients are asymptomatic. When symptomatic, pain is the commonest one. It is a sharp or dull pain, colicky or constant. The pain is associated with increased urinary volume, especially when taking lots of fluid or alcohol. Stone in the renal pelvis causes pain on movement. Stone in the ureter is severe and colicky, starts at the flank and it radiates to the groin (genital area). Stone in the bladder is usually associated with UTI and it presents with frequency and dysuria. When it obstructs the urethra, it causes painful distension of the bladder. All stones can cause haematuria.

Diagnosis is confirmed by plain abdominal X-Ray and Intravenous pyelogram (IVP).

*Management includes adequate analgesia, such as morphine 15mg-30mg IMI; repeated as necessary.* Stones less than 0.5cm in diameter usually pass through but those >1cm, usually needs intervention.
All cases with severe pain indicating obstruction to urinary flow should be urgently referred to the surgical team for further management.

**Prophylaxis**

Where no metabolic abnormality is present (such as hyperuricaemia etc), patients are advised to take a lot of oral fluid, aimed at producing at least 2-3 liters of urine a day. Obviously, to achieve this goal, one must drink at least 5 liters of fluid (water) a day. It is wise to reduce the intake of food fortified with calcium and vitamin D. For cases with uric stones, give ‘o’ allopurinol (300mg daily if renal function is normal).

### 21.5. Urinary Tract Obstruction

Common causes include: calculus, blood clot, sloughed papillae, tumor, prostatic obstruction, accidental ligation of ureter during surgery etc.

Symptoms include loin pain radiating to the groin which may be aggravated by increased fluid intake or after drinking an alcoholic beverage.

Investigations should include plain abdominal X-Rays and excretion urography.

Management should follow the following steps:
- treat symptoms
- relieve the obstruction
- treat the cause
- prevent/treat infection

Prognosis depends on the extent of the obstruction (partial or complete), duration of the obstruction (longer the worse), presence of infection (presence of it worsens prognosis) and site of obstruction. As an example, complete obstruction of one ureter for several days to weeks will cause irreversible kidney damage.
21.6. Benign Prostate Enlargement

Descriptions:
A very common condition which commonly affects males over 60 years of age. Enlargement of the prostate causes obstruction to the outflow of urine. Symptoms include frequency of urination, difficulty in initiating urination, post-void dripping and reduced forcefulness of the urinary stream. Acute retention causes suprapubic and flank pain from distended bladder and ureters. Eventually, outflow incontinence may occur. Rectal examination should reveal a smooth, enlarged prostate gland.

Management objectives:
- Relieve obstruction
- Make a clinical diagnosis and refer

Non-drug treatment:
- Insert an indwelling bladder catheter to relieve obstruction

Drug treatment:
- Alpha blocker
- Antibiotics if there is associated urinary tract infection or suspected prostatitis.

Referral
Refer all cases for surgical followup

21.7. Prostate Cancer

Descriptions:
Prostate cancer is one of the most common cancers in men (especially the older ones). Approximately 80% of men at age 80 years old have a foci of prostate cancer in their prostates. However, most appear to lie dormant. Symptoms may be similar to a benign enlargement of
prostate. However, on rectal examination, one feels a hard, irregular prostate. Some cases may even present with bone pain due to metastatic disease.

Management:
All suspected cases must be referred for further hospital investigations and treatment.
Investigations include blood test for prostate specific antigen and prostate biopsy for histology.
Treatment options include oral flutamide and/or orchitectomy.

21.8. Renal Failure
Renal failure is impairment in the kidney’s excretory function due to reduced GFR. This is accompanied to a variable extent by failure of other kidney functions such as erythropoietin production, vitamin D hydroxylation, disruption of acid-base and electrolyte balance.

It is classified as either acute (days to weeks) or chronic renal failure (months to years).

Acute renal failure:
Causes of acute renal failure is conveniently classified into pre-renal, renal and post-renal. However, it may be a combination of these broad classifications.
Pre-renal causes include: hypovolaemia, hypotension or reduced cardiac output.
Renal causes include acute tubular necrosis which can either be the consequence of the pre-renal causes or the following: endotoxic shock, renal vasoconstriction, sepsis, NSAIDs, etc.

Post-renal cause include all those factors that can cause urinary tract obstruction. (please refer to section 21.5)

Chronic renal failure:
In Tonga, the commonest cause of chronic renal failure is diabetes mellitus. Other causes include glomerulonephritis, pyelonephritis, renal vascular disease, polycystic disease, multisystem disease such as SLE etc. A significant percentage of chronic renal failure do not have any identified cause (approximately 15%).
Symptoms include malaise, loss of energy, insomnia, loss of appetite, nocturia and polyuria, itching, nausea/vomiting, parasthesiae, bone pain, shortness of breath on exertion, mental clouding, myoclonic twitching and seizures.

Signs include short stature (if CRF occurred as childhood), pallour, increase photosensitivity, scratch marks, hypertension, flow murmur, signs of fluid overload (oedema), pericardial friction rub and there may be signs of the underlying disease. (such as diabetic retinopathy)

All cases of suspected or confirmed acute and chronic renal failures, should be initially referred to the medical team for management and further advice, regarding clinic followup.

Prevention of chronic renal failure
Since we cannot offer treatments such as dialysis and kidney transplant, here in Tonga, it is important to implement prevention strategies to stop/delay the onset of chronic renal failure. The following strategies is recommended:

- Detect and treat ascending urinary tract infection in children
- Tight metabolic control of diabetes
- Early detection and treatment of causes of urinary tract obstruction
- Avoid unnecessary nephrotoxic drugs
- Care with the use of NSAIDs and ACEI in people with renal impairment
- Prevent, detect and treat essential hypertension adequately
- Early detection and treat multisystem disease such as SLE
- Manage pre-renal causes aggressively

21.9. Drugs And The Kidney
Drug-effects on the kidney is classified into pre-renal and renal effects.

Pre-renal effects:
This is when drugs cause impairment in kidney perfusion, by causing the following:
• hypovolaemia (as caused by potent loop diuretics such as frusemide)
• decreased cardiac output (as seen in β-blockers)
• decreased renal blood flow (as seen with ACE Inhibitors)
• renal salt and water loss (as seen in hypercalcaemia induced by vitamin D therapy).

Renal effects:
Drugs can affect the kidney by causing either acute tubular necrosis, acute tubulo-interstitial nephritis or chronic tubulo-interstitial nephritis. Drugs that cause acute tubular necrosis include aminoglycosides (prolonged use), amphotericin B and so forth.

In acute tubulo-interstitial nephritis, patients frequently present with fever, arthralgia, skin rash and oliguria. The disease is caused by a cell mediated hypersensitivity reaction to drugs such as: penicillins, sulphonamides, NSAIDs etc. Treatment include withdrawal of the offending drug and high dose corticosteroid (such as ‘o’ prednisolone 60mg daily).

In chronic tubulo-interstitial nephritis, common causes include chronic pyelonephritis and consumption of large amount of NSAIDs.

All cases should be referred to the medical team for proper treatment and followup.

21.10. Renal Disease In The Elderly
Renal failure in the elderly is usually caused by renal vascular disease or urinary tract obstruction. It may be aggravated by the progressive glomerular sclerosis seen in this age group.

UTI is common in the old age especially if bladder emptying is impaired. In males, this impairment is commonly caused by obstruction due to enlargement of the prostate, but in females, it is due to a neuropathic bladder. UTI should be treated in all cases.

Another common problem seen in the elderly is urinary incontinence. After treating any associated UTI, a case with established
incontinence is not easy to manage. Usually, the only management that can be provided is to ensure that the patient has adequate facilities to allow adequate nursing care, (example toilet, commode and so forth). If necessary, the patient may need to be catheterized.
22. RESPIRATORY CONDITIONS

22.1 Respiratory Failure

Definition
Respiratory failure is defined as either a PaO$_2$ <60mmHg or PaCO$_2$ >50mmHg, occurring in a patient breathing air, at rest. Respiratory failure is not a disease but reflects the inability of the lungs to maintain normal gas exchange.

Classification
- Type I Respiratory Failure (gas exchange/hypoxaemic) – causes include pulmonary oedema, infections, inflammatory lung disease and pulmonary embolism.
- Type II Respiratory Failure (ventilatory/hypercapnic) – causes include COPD, asthma, massive obesity, kyphoscoliosis, CNS depression due to drugs, neuromuscular disease and pneumothorax.

Both types of respiratory failure may be acute or chronic.

Patient assessment
The underlying cause for the respiratory failure must be determined to enable appropriate treatment in each case.

Management
Consider each of the following:
- **Airway Protection**
  - This is an important consideration in all cases where the upper airway defense mechanisms are compromised in some way, e.g. coma, profound sedation, bulbar palsy. Unless prompt recovery is anticipated, such patients should be managed in ICU. An oropharyngeal airway should be used pending recovery or intubation.
- **Reversal of Precipitating Cause**
  - Always consider the possible contribution of infection, cardiac failure and bronchospasm. These may not be the primary cause of the respiratory failure but are readily treatable.
• Drug induced – *opiates may be reversed with naloxone 0.2-0.4mg IV. As naloxone has a short half life respiration should be monitored frequently and naloxone repeated as necessary. May need to be hourly.*

• *Benzodiazepine induced respiratory failure may be reversed by giving flumazenil (dose 0.3-2mg IV). Precautions as for naloxone.*

• CPAP may be useful in LVF, COPD and some other pulmonary conditions. Patients who need CPAP should be managed in ICU. Discuss with ICU Intensivist.

• **Clearance of endobronchial secretions**
  This may improve ventilation and help prevent atelectasis and infection. Patients may require regular chest physiotherapy to:
  • Encourage effective coughing.
  • Maximize inspiratory effort.
  • Facilitate postural drainage.

• **Oxygen Therapy** *(refer to section 22.3).*

• **Mechanical Ventilation**
  • Indicated on the basis of the overall clinical condition rather than blood gases alone. Evidence of deterioration or lack of clinical improvement is strong indication for intervention.
  • Inform ICU Team and Physician on call that you have a patient with ventilatory impairment and ask for an early assessment since they may be able to assist in the detection of subsequent changes in the patient’s clinical status.
  • Indications for mechanical ventilation:
    • Severe hypoxia (<50mmHg) despite high (>50%) inspired oxygen concentration.
    • Significant hypoxia (<60mmHg) and or hypercapnia (>45mmHg) along with
      o Diminished/ing level of consciousness.
      o Diminished/ing chest expansion.
      o Evidence of respiratory muscle fatigue.
      o Sputum retention.
      o Thoracic cage trauma/ lung contusion.
22.2. Obstructive Sleep Apnoea (OSA)
Classically presents with daytime hypersomnolence, and nocturnal snoring and/or apnoea(s). It is a common and frequently missed diagnosis. Consider OSA in patients who have:
- Unexplained respiratory or right sided heart failure.
- Motor vehicle or industrial accidents related to sleepiness.
- Hypertension.
- Impotence.
- Morning headaches.
- Lethargy and depression.
- Acromegaly, hypothyroidism, Marfan’s syndrome, retrognathia.

If OSA is suspected, refer to Physician for full evaluation.

22.3. Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD)
Definition
COPD is not a disease process but a clinical syndrome and consists of various admixtures of:
- Chronic bronchitis.
- Emphysema.
- Small airway disease.
- Bronchial hypersensitivity/asthma.
Identification of the relevant contribution of each of these components allows rational management and minimizes the possibility of misdiagnosis.

Aetiology
- Smoking.
- Asthma.
- Bronchiectasis.
- Occupational exposures (cadmium, silica dusts).
- Cystic fibrosis.
- Alpha-1 antitrypsin deficiency.

Causes of acute deterioration
- Bronchitis (viral or bacterial).
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- Increased bronchial irritability.
- Pneumonia.
- Pneumothorax.
- Pulmonary embolism.
- Left ventricular failure.
- Sepsis.
- Drugs (e.g. β-blockers, NSAIDs).
- Acute abdomen.
- Chest pain (e.g. trauma, osteoporosis).
- Post-operative sedation/retention of secretions.

Investigations
- FBC, Na⁺, K⁺, creatinine.
- Peak expiratory flow rate (PEFR/spirometry).
- Arterial blood gases (not oximetry alone).
- Sputum culture.
- CXR.
- ECG.
- Theophylline concentration.
- BNP (brain natriuretic peptide) – to assess possible contribution of LVF.

Severity Assessment in COPD
Make an immediate assessment of severity (see table) and initiate treatment accordingly. Confirm the diagnosis, identifying precipitating factor(s) and estimate the degree of functional impairment, referring to the old case notes for information about previous functional status, spirometry and blood gas analyses.

Table 29: Severity Assessment in COPD

<table>
<thead>
<tr>
<th>Emergency: respiratory arrest, unconscious patient, upper airway compromise</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other categories:-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech</td>
<td>Sentences</td>
<td>Phrases</td>
<td>Words only</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Normal</td>
<td>18-25</td>
<td>&gt;25 or &lt;12</td>
</tr>
<tr>
<td>Pulse rate (per minute)</td>
<td>&lt;100</td>
<td>100-120</td>
<td>&gt;120</td>
</tr>
</tbody>
</table>

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| PaO₂ (related to steady state level) | Normal | <60 (on air) | <60 (on O₂) |
| PaCO₂* (related to steady state level) | Normal or reduced | >45 (on air) | >50 |
| pH | Normal | Close to normal | Falling (<7.3) |

*If the HCO₃ level is raised and pH normal this suggests chronic CO₂ retention.

### Management

#### Emergency Action
- Call ICU immediately.
- Prepare for emergency intubation and assisted ventilation.
- Initiate ‘urgent action’ (see below).
- Notify Physician on call.

#### Severe exacerbation
- Commence controlled oxygen therapy, aiming to maintain a PaO₂ >60mmHg or SpO₂ (haemoglobin oxygen saturation) >90% (see section on Oxygen Therapy).
- Monitor for rising PaCO₂ (see section on Oxygen Therapy). If pH <7.3 or failure to respond to initial therapy, notify Physician on call.
- Nebulized salbutamol + ipratropium 0.5mg stat and 2-6 hours according to clinical response. Use compressed air if PaCO₂ elevated.
- Insert IV line for either salbutamol infusion (refer to section on Asthma) or theophylline (refer to table below).
- Consider hydrocortisone 200mg IV every six hours.
- Consider use of CPAP if intubation inappropriate.
- Consider IV antibiotics if the patient has two out of three of the following:
  - Purulent sputum.
  - Increase sputum production.
  - Increasing dyspnoea.
The choice of antibiotics is essentially the same as recommended for Community Acquired Pneumonia. (refer to section 22.6).

Consider chest physiotherapy if concerns about sputum retention.

### Table 30: Theophylline Therapy

**General Comments**

- Therapeutic range (55-100µmol/L)
- Some patients respond at lower concentrations.
- Factors that ↑ [theophylline]:
  - hepatic dysfunction, severe cardiac failure, older age, febrile illness, drugs inhibiting CYP1A2 (e.g. erythromycin, clarithromycin, ciprofloxacin, cimetidine, amiodarone).
- Factors that ↓ [theophylline]:
  - cigarette smoke (↓ theophylline by 50%), cystic fibrosis, high carbohydrate diet, CYP1A2 inducers (e.g. carbamazepine, phenytoin, rifampicin, charbroiled foods).
- IV aminophylline dose = oral theophylline dose ÷ 0.8.
- Measure concentrations 8-12 hours after initiation of infusion, then 12-24 hours after any modification of the dose. When taken orally, measure concentration 12 hours after the last dose.
- Haemoperfusion useful in severe toxicity.

### Intravenous Aminophylline Therapy

**Loading Dose**
- 5 mg/kg based on ideal body weight. Mix with 100ml of N/S and give over 20 minutes. **Omit loading dose if on oral theophylline.**

**Maintenance Dose**

Add 500mg aminophylline to 500 ml of N/S (1mg/ml). Infuse at between 0.3 and 0.9mg/kg per hour. Monitor concentration daily aiming for 55-100µmol/L. Doses recommended for intravenous aminophylline:

<table>
<thead>
<tr>
<th></th>
<th>Calculated (mg/kg/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonsmoker</td>
<td>0.5-0.7</td>
</tr>
<tr>
<td>Smoker</td>
<td>0.9</td>
</tr>
<tr>
<td>Macrolide/ciprofloxacin/rifampicin/SSRI</td>
<td>0.3-0.4</td>
</tr>
<tr>
<td>Cor pulmonale or hepatic insufficiency</td>
<td>0.25</td>
</tr>
</tbody>
</table>

**Mild or Moderate exacerbation**

- Oxygen (see section on Oxygen Therapy).
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**Nebulized salbutamol 5mg + ipratropium 0.5mg. Repeat 4-6 hourly according to clinical response. Use compressed air if PaCO₂ elevated.**

- Oral prednisone 40mg stat; then 40mg mane until clinical response adequate; then 20mg mane for an equal number of days; then stop or reduce to usual maintenance dose.
- Oral antibiotic may be appropriate.
- Consider chest physiotherapy.

**Monitor Progress**

**Oxygen therapy:**
- Monitor SpO₂ and aim to maintain SpO₂ >90%.
- Monitor for hypercapnia (symptoms of drowsiness and/or confusion).
- Perform ABG if evidence of falling SpO₂ or clinical deterioration.

**Clinical Monitoring:**
- Check for fatigue – beware respiratory paradox.
- Pulse rate.
- Sputum volume and appearance.
- PEFR/spirometry.
  - Adjustment of treatment:- individual patient needs may change during the course of treatment including the frequency and dose of nebulized bronchodilator, intravenous therapy (particularly aminophylline according to blood concentration), fluid and electrolyte requirements and bronchial secretions (chest physiotherapy for retained bronchial secretions). Commence oral therapy as soon as condition stabilizes. Bronchodilators should be given as Metered Dose Inhaler (MDI) and spacer.

**Discharge Planning/Rehabilitation**
- Most patients will be ready for discharge when their functional status has returned to near their pre exacerbation state. When this has been achieved, contact should be made with the patient’s usual family practitioner and other health professionals as appropriate (see below).
- It is helpful to obtain PEFR/spirometry and ABG at discharge.
A COPD Action Plan should be considered for all patients.

Outpatient Management

Support services:
- Health Centres.
- Medical Clinics.

Preventive measures:
- COPD education and Action Plan.
- Smoking cessation.
- Nutritional advice and supplements.
- Influenza vaccine each “autumn” season.
- Pneumococcal vaccine (revaccinate every 5 years).

Medical surveillance:
- Family practitioner regular follow up.
- Specialist review, as required, with spirometry/PEFR. Recommended for those with severe disease (FEV₁ <30% predicted or PaO₂ <55mmHg).

22.4. Oxygen Therapy
AIM – to prevent important tissue hypoxia and thereby reduce morbidity and mortality. There is virtually no evidence based data on the therapeutic use of oxygen in most acute clinical situations.

Background
Tissue oxygenation depends on two factors:
- Tissue perfusion – affected by cardiac output and peripheral vascular resistance.
- Arterial oxygen content – this is determined by the haemoglobin content and haemoglobin oxygen saturation. The latter is the only factor affected by oxygen administration.

Indications
- PaO₂ less than 60mmHg or SpO₂ <90%.
- Conditions such as myocardial infarction, carbon monoxide (CO) poisoning, acute/severe anaemia where marginal increases in arterial oxygen content may be beneficial.
- At risk of hypoxia such as post-op, LVF etc.

Pulse Oximetry
This is very useful for determining haemoglobin oxygen saturation (SpO₂) i.e. oxygenation. However, it does not assess haemoglobin level, ventilation (CO₂) problems, cardiac output or tissue perfusion. It is useful for monitoring but is not a substitute for arterial blood gases. Remember that changes in PaO₂ above 100mmHg will not change the haemoglobin oxygen saturation. Oxygen therapy is indicated primarily to relieve hypoxia not dyspnoea.

Administration

- Oxygen is a drug and must be prescribed on the drug administration chart indicating flow rate and device.
- Do not withhold oxygen in severely hypoxaemic patients merely to get a “baseline blood gas estimation”.
- Do monitor oxygen administration carefully according to the clinical circumstances.
- Nasal cannulae: 0.5-4L/min. provide an inspired oxygen concentration of 24% to 40% depending on the flow. Remember that this is uncontrolled oxygen therapy and it is not possible to accurately predict the inspired oxygen concentration (FiO₂). Most patients can be treated with oxygen using nasal cannulae. This mode is most comfortable for the patient and is the absence of profound gas exchange problems, will provide more than adequate oxygen saturation levels. They allow oral intake, communication and the easy use of nebulizers. They do not cause the sense of suffocation some patients have with a face mask. For a flow rate of 0.5L/min. you will need a low flow oxygen meter.
- Variable concentration mask:
  - Use initially in COPD patients during the acute phase.
  - Use 24% initially when there is a possibility of CO₂ retention (check previous case notes).
- Standard mask
  - This is also uncontrolled oxygen therapy. 6-10L/min. provides about 50% oxygen therapy depending on the patient’s ventilation levels. The initial method of choice in acutely hypoxic patients i.e. acute asthma, pneumonia, LVF and pulmonary embolism. Do not use
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these at flow rates less than 6L/min. as CO₂ retention can occur through rebreathing. A reservoir bag can further increase the percentage oxygen.

- High flow humidified
  - Used for long term therapy where drying of the bronchial secretions needs to be avoided. It is only indicated in special circumstances but can provide more accurate inspired oxygen concentrations rather than other methods.

Adjusting the Dose
- Do the ABGs show evidence of chronic CO₂ retention? i.e. a compensated respiratory acidosis (elevated HCO₃ level), together with chronic hypoxaemia. If so, take care to avoid CO₂ retention.
- Using a pulse oximeter as a monitor, adjust flow rates:
  - For nasal cannulae in 0.5-1L/min. steps.
  - For variable concentration masks in percentage increments.
  - For standard masks in 2L/min. steps.
- Get the haemoglobin oxygen saturation (SpO₂) to about 90%, wait about five minutes at each step for those with COPD.
- Once stable, if there is any risk of CO₂ retention, check the blood gases about 30 minutes later.

The predicted oxygen percentages supplied by masks and nasal cannulae are not precise.

Monitoring
- **Pulse monitoring provides an estimate of capillary haemoglobin oxygen saturation. It does not assess the adequacy of ventilation nor the gas exchange status.**
- Arterial blood gas analysis must be performed on admission and in many cases at regular intervals to assess response to treatment.
- Hyperoxia can induce hypercapnia by a combination of worsening ventilation perfusion mismatch and to a lesser extent depression of respiratory drive. It is unpredictable and emphasizes the importance of arterial blood gas
monitoring. If the patient is at risk, monitor blood gases every 30 minutes until stable. Sometimes, following the initiation of oxygen therapy, the PaCO₂ may rise by 10-15% then stabilize. This may be the cost of adequate oxygenation and is acceptable as long as there are no adverse clinical events.

22.5. Asthma
Asthma is a clinical syndrome characterised by variable airflow obstruction secondary to inflammation of the airways. An acute asthmatic episode is usually the result to a trigger agent which may be either (pollen, animal dander, viral infection) or non-specific. Typical symptoms include dyspnoea, wheeze, chest tightness and cough. They vary from being almost undetectable to severe, unremitting and sometimes life threatening.

The aims of hospital management are:
- To prevent death.
- To restore the patient’s clinical condition and lung function.
- To maintain optimum lung function and prevent early relapse.

The assessment of the severity of an acute attack of asthma and the immediate treatment occur in parallel.

Figure 6  Acute Asthma Management

The severity of asthmatic episodes is frequently underestimated by both the patient and doctor. It is therefore essential to measure severity objectively so that rational decisions regarding investigation and immediate treatment can be made.
All patients should have the following measured:

- PEFR/spirometry.
- Respiratory rate.
- Pulse, blood pressure, temperature.
- Pulse oximetry/arterial blood gases.

**Guidelines for Assessing the Severity of Acute Asthma**

Individual features should not be interpreted in isolation. An overall assessment of the severity should be made using clinical judgement and the following guidelines:

**Table 31: Severity Assessment in Acute Asthma**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech</td>
<td>Sentences</td>
<td>Phrases</td>
<td>Words</td>
</tr>
<tr>
<td>PEFR (% of predicted or previous best)</td>
<td>&gt;60%</td>
<td>40-60%</td>
<td>Less than 40% or less than 150 L/min. if best peak flow unknown</td>
</tr>
<tr>
<td>FEV₁ (% predicted)</td>
<td>&gt;60%</td>
<td>40-60%</td>
<td>&lt;40% or absolute value less than 1.0L</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Normal</td>
<td>18-25</td>
<td>&gt;25, &lt;10</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>&lt;100</td>
<td>100-120</td>
<td>&gt;120</td>
</tr>
<tr>
<td>Oximetry</td>
<td>&gt;94%</td>
<td>90-94%</td>
<td>&lt;90%</td>
</tr>
<tr>
<td>PaO₂</td>
<td>Test not necessary</td>
<td>&lt;80mmHg</td>
<td>&lt;60mmHg</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>Test not necessary</td>
<td>&lt;40mmHg</td>
<td>≥40mmHg</td>
</tr>
</tbody>
</table>

**DANGER SIGNS:**

Exhaustion, confusion, bradycardia, unconsciousness, silent chest on auscultation, signs of respiratory muscle fatigue (indrawing of lower costal margin, abdominal paradox).

**Immediate Management**

Specific treatment is dependent on severity. All patients should be treated with nebulized bronchodilator in the first instance. Other
therapy is added depending on the response and reassessment of severity. Table 9 gives guidelines for the management of patients with asthma according to severity.

Table 32: Management of Asthma

<table>
<thead>
<tr>
<th>Severity</th>
<th>Management</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td><em>Nebulized salbutamol 5mg every 4 hours + prn</em>&lt;br&gt;<em>Prednisone 40mg ‘o’ stat then daily</em></td>
<td>PEFR after initial treatment qid. Pulse, respiratory rate qid</td>
</tr>
<tr>
<td>Moderate</td>
<td><em>Nebulized salbutamol 5mg every 4 hours + prn</em>&lt;br&gt;<em>Prednisone 40mg ‘o’ stat then daily</em>&lt;br&gt;<strong>Add</strong>&lt;br&gt;<strong>Contact</strong>&lt;br&gt;<strong>Perform</strong></td>
<td>PEFR 2 to 4-hourly. Pulse oximetry**. Pulse, respiratory rate, BP qid. Monitor for hypokalaemia which may exacerbated by β-agonist therapy</td>
</tr>
<tr>
<td></td>
<td><em>Oxygen to maintain O₂ sat &gt;95% (usually 2L/min. by nasal cannulae)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Physician if not improving</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>CXR if condition deteriorates or evidence of a complication†</em></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Increase</td>
<td>Nebulized salbutamol 5mg up to 2-hourly. Ipratropium 0.5mg every 4 hours. Oxygen 8L/min. by Hudson mask. Adjust to maintain O₂ sat. &gt;95%</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Add</td>
<td>Intravenous access. IV hydrocortisone 200mg stat then every 6 hours (for 24 hours). Fluids N/S 1L 6-hourly initially. IV bronchodilator if not responding to nebulized bronchodilator††</td>
</tr>
<tr>
<td></td>
<td>Contact</td>
<td>Physician</td>
</tr>
<tr>
<td></td>
<td>Perform</td>
<td>CXR in all cases‡</td>
</tr>
<tr>
<td>Danger Signs Present</td>
<td>Increase</td>
<td>Oxygen to high flow system</td>
</tr>
<tr>
<td></td>
<td>Contact</td>
<td>ICU Team + Physician</td>
</tr>
<tr>
<td></td>
<td>Add</td>
<td>IV salbutamol 250mcg loading dose then salbutamol infusion (5mg/100ml) at 10-30ml/hr. See††</td>
</tr>
</tbody>
</table>

**Notes:**

* It is essential that all nebulized bronchodilators are given with oxygen 6-8L/min.

** Pulse oximetry is very useful in assessing the adequacy of tissue oxygenation in patients with asthma. It does not reflect the adequacy of ventilation. An initial arterial blood gases measurement should be made in all patients admitted to hospital unless severity assessed as mild.

† Patients with life threatening asthma, or severe asthma not responding to initial treatment, and patients in whom there is any suspicion of a complication require a CXR. Complications which might be identified include pneumothorax, surgical empyema, atelectasis and...
consolidation. All CXRs should be done at the bedside unless the patient is accompanied to X-ray by a nurse or doctor.

†† - Intravenous bronchodilators:
• Salbutamol: Loading dose 250mcg IV or IMI. Prepare intravenous infusion by adding salbutamol 5mg/mL and make up to 100ml with 5% dextrose. Infuse at 10-30ml/hr. OR
• Aminophylline (refer to table 30).

Table 33: Key Points – Acute Severe Asthma in Adults

<table>
<thead>
<tr>
<th>Life Threatening Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>• FEV₁ or PEFR &lt;33% predicted (or of usual best).</td>
</tr>
<tr>
<td>• Silent chest, cyanosis, or feeble respiratory effort.</td>
</tr>
<tr>
<td>• Bradycardia or hypotension.</td>
</tr>
<tr>
<td>• Exhaustion, confusion or coma.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High Flow Oxygen (40-60%).</td>
</tr>
<tr>
<td>• Salbutamol + ipratropium via oxygen driven nebulizer (initially continuous).</td>
</tr>
<tr>
<td>• Loading dose IV salbutamol 250mcg with subsequent infusion (5mg/ml salbutamol made up to 100ml with dextrose 5%, infuse at 10-30ml/hr).</td>
</tr>
<tr>
<td>• CXR to exclude pneumothorax.</td>
</tr>
<tr>
<td>• ICU or Medical Team review.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pulse oximetry does not assess adequacy of ventilation – ABG must be measured.</td>
</tr>
<tr>
<td>• Patients with life threatening asthma may not be distressed.</td>
</tr>
<tr>
<td>• A normal CO₂ in an asthma attack is a marker of severe disease.</td>
</tr>
</tbody>
</table>

Subsequent Management
Depends on the severity of the attack and the patient’s response to initial treatment.

General Measures
• Observation: Close observation should continue in patients with severe asthma until there is an objective evidence of sustained improvement.
Standard Treatment Guidelines

- Positioning: Recommend sitting upright and/or leaning forward.
- Continue Treatment
  - Oxygen – according to arterial blood gases/oximetry.
  - β₂-agonist – if condition improving continue to give 4-hourly.
- Monitoring: Repeat PEFR (or FEV₁) 15-30 minutes after starting treatment then as required depending on severity. Arterial blood gases should be repeated within two hours of starting treatment in the following circumstances:
  - The initial PaO₂ <60mmHg.
  - The initial PaCO₂ high normal or raised.
  - The patient’s condition deteriorates.
  - Measure and record heart rate and respiratory rate, at least qid. Theophylline concentration should be measured daily if IV aminophylline is continues for more than 24 hours. Serum K⁺ and glucose daily.

Investigation in Hospital

All patients admitted to hospital should have:
- FBC + diff.
- Na, K, glucose, creatinine.
- ECG – in patients over 40 years of age.
- Indications for CXR
  - Severe or life threatening asthma attack – during resuscitation.
  - Severe/moderately severe attack not responding to initial treatment.
  - Patient suspected of having developed a complication or in whom another condition/diagnosis is suspected (see below).

Failure to Improve

- WORSENING ASTHMA – check the adequacy of treatment e.g. check drugs given, dosage and adequacy of drug delivery.

Therapeutic options:
Standard Treatment Guidelines

- Increase the dose/frequency of $\beta_2$-agonist.
- Add ipratropium bromide 0.5mg every six hours.
- Consider using an intravenous bronchodilator.
- Consider the possibility of a complication or an alternative diagnosis:
  - Pneumothorax.
  - Cardiac arrhythmia.
  - Left ventricular failure.
  - Laryngeal or tracheal obstruction.
  - ARDS.
  - Pulmonary embolism.

All patients who fail to improve or deteriorate despite initial treatment must be monitored closely and discussed with the appropriate consultant or the Physician on call.

Unhelpful Treatments
- Sedatives are usually contra-indicated.
- Antibiotics are not indicated unless there is evidence of bacterial infection (fever, purulent sputum, CXR opacity).
- Percussive physiotherapy.

Indications for Intensive Care
Patients with the following features usually require observation and management in ICU:
- Hypoxia: $\text{PaO}_2 < 60\text{mmHg}$ despite receiving high flow oxygen.
- Hypercapnia: $\text{PaCO}_2 > 50\text{mmHg}$ or rising.
- Increasing fatigue.
- Confusion, drowsiness, impaired level of consciousness.
- Respiratory arrest.

Management During Recovery and Following Discharge
Once the acute episode has been brought under control, attention must be directed towards:
- Interval asthma control.
- Severity assessment – what is the risk of severe asthma recurring?
- Self-management skills.
Interval asthma control should be assessed by specific questioning directed at the following features:

- Nocturnal waking and morning chest tightness.
- Interference with exercise.
- Use of rescue bronchodilator.
- Peak flow values.
- Days off work or school.
- Use of corticosteroids and nebulizer for exacerbations.
- Compliance with preventer therapy.

**Note:**
Patients with unstable feature or poor compliance should be referred to the Physician.

**Severity Assessment**

- The risk of a severe or fatal asthma attack is associated with:
  - Hospital admission for asthma in the last 12 months.
  - Previous severe asthma requiring ventilation or ICU admission.
  - Frequent attendances to the emergency department.
  - Nocturnal symptoms.
  - Precipitous asthma episodes in the past – severe episodes coming on over less than 3 hours.
  - Frequent requirement for courses of oral steroids.
  - Poor self-management skills.
  - Poor social circumstances.
  - Psychological impairment.

**Self Management Skills**

- The circumstances surrounding admission to hospital should be reviewed carefully:
  - Was there an avoidable precipitant?
  - How did the patient react to worsening asthma?
  - Did the patient follow an Asthma Self-Management Plan?
  - Was there any delay in seeking help?
- The key to asthma control is education and good self-management skills. Admission to hospital does not necessarily mean a failure of self-management but may provide an important learning opportunity. All patients
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should have the following while recovering from an acute attack:

- Assessment of education needs – refer if appropriate to nurse or physiotherapist.
- Check inhaler technique and instruction on the use and interpretation of readings from a peak flow meter.
- Introduction to the Asthma Self-Management Plan and basic self-management skills.
- An arrangement for ongoing follow-up and education as an outpatient.

Options for Ongoing Education as an Outpatient

- Physician.
- Clinic Nurse/Nurse Practitioner.
- General Practitioner/Health Officer.

Treatment on Discharge

- This will obviously vary from case to case but usually the patient will receive:
  - *Inhaled corticosteroid* – beclomethasone 400-800mcg daily.
  - *Prednisone* 40mg mane for 1 week then 20mg mane for 1 week (longer course may be required for chronic severe asthma).
  - A long-acting β₂-agonist may be appropriate in some patients, but is best started once they have recovered from an acute attack. It should be considered in patients with frequent daytime and nocturnal symptoms.
  - β₂-agonist inhaler to use as required (NOT regularly).
  - Advice regarding common side effects of these medications:
    o β₂-agonists: palpitations, anxiety, cramps.
    o Inhaled steroids: dysphonia, thrush – use mouth rinsing and a spacer.
    o Prednisone (short course): euphoria or dysphoria, hypertension, hyperglycaemia, mild indigestion, insomnia.
    o Theophylline indigestion, insomnia.
Note: For patient prescribed theophylline arrangements will need to be made for a theophylline concentration to be measured following discharge. Patients prescribed inhaled corticosteroids in higher doses (>800mcg) should be encouraged to use a large volume spacer device.

Table 34: Asthma Self-Management Plan

<table>
<thead>
<tr>
<th>STEP</th>
<th>PEAK FLOW</th>
<th>SYMPTOMS</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80-100% of best</td>
<td>Intermittent/few</td>
<td>Continue regular inhaled corticosteroid; take bronchodilator for relief of symptoms.</td>
</tr>
<tr>
<td>2</td>
<td>60-80% of best</td>
<td>Waking at night with asthma or coughing</td>
<td>Double the dose of inhaled corticosteroid.</td>
</tr>
<tr>
<td>3</td>
<td>40-60% of best</td>
<td>Increasing breathelessness or poor response to bronchodilator</td>
<td>Start oral steroids and contact a doctor.</td>
</tr>
<tr>
<td>4</td>
<td>&lt;40% of best</td>
<td>Severe attack</td>
<td>Call emergency doctor or ambulance immediately</td>
</tr>
</tbody>
</table>

22.6. Community Acquired Pneumonia (CAP)

General Points
- The clinical features and initial investigations do not provide a reliable guide as to the causative organism.
- The initial treatment is therefore usually empiric and based upon assessment of the severity of the pneumonia.

Diagnosis
- Differential diagnosis includes – lung carcinoma, lung infarction, cardiac failure, ARDS and chronic interstitial lung diseases. Don’t forget that acute intra-abdominal conditions can mimic pneumonia. e.g. acute pyelonephritis.
- The diagnosis is easily missed in the elderly who may present with non specific signs and symptoms.

Assessing the Microbiological Causes
• Gram stain of sputum sometimes provides a guide to initial therapy.
• Streptococcus pneumoniae causes 50-70% of cases.
• With advancing age (>65 years) gram negative and staphylococcal pneumonia become relatively more common.
• Patients with chronic lung disease often develop Haemophilus influenzae and Moraxella catarrhalis pneumonia.
• Consider HIV related infections (pneumocystic carinii) in those patients in recognized risk groups (homosexuals, prostitutes, intravenous drug users and haemophiliacs).
• Mycoplasma often occurs in “epidemics” among young people every 3-4 years.

**Note:**
• Abnormal liver function tests and gastrointestinal symptoms may occur with any type of pneumonia.
• Patients with Mycoplasma pneumonia have often had symptoms for 2-3 weeks and have failed to respond to β-lactam therapy prior to admission. Myalgias are common.
• Pneumococci are showing increasing penicillin resistance, however, these can still be adequately treated in the respiratory tract with high dose penicillin.

**Assessing Severity**
• This is essential as it directly influences initial management and patients with severe pneumonia can deteriorate rapidly.
• Indicators of severe pneumonia at or during admission
  • Respiratory rate >30/min.
  • Diastolic BP <60mmHg.
  • Confusion (MSQ <8).
  • Blood urea >7.0mmol/L.

The presence of two or more of these criteria indicates an increased risk of death. Such patients must be monitored carefully and receive dual or triple antibiotic therapy.

**Additional severity indicators include:**
• Age >60 years.
• Pre-existing medical condition (especially cardiorespiratory and neurological).
• PaO₂ <55mmHg on air or oxygen.
• WBC <4 x 10⁹/L or 30 x 10⁹/L.
• CXR evidence of multiple or spreading infiltrates.

Patients with these features should also be carefully monitored for signs of deterioration.

Investigations
• The number of investigations depends on clinical circumstances:
  • CXR – PA and lateral.
  • FBC + diff.
  • Na⁺, K⁺, urea, creatinine, glucose.
  • Sputum sample for Gram stain:
  • Rinse mouth out with water prior to collection.
  • Prior antibiotic usage must be recorded.
  • Sputum may be refrigerated (4°C) for up to 24 hours but must reach the lab within 4 hours of warming to room temperature.
  • Consider whether specific tests are indicated:
    • ZN stain and culture for TB.
    • Stains for Pneumocystic carinii (induced sputum).
      • Blood cultures – 2 sets prior to antibiotics (10mL in each bottle).
      • Oximetry (or ABGs for severe cases or where there is chronic respiratory or cardiac disease).
      • Serology – acute specimen for the following:
        • Respiratory viruses.
        • Legionella species.
        • Mycoplasma pneumoniae (IgM and IgG).
      • Throat and nasopharyngeal swabs for viral antigen detection and culture especially if influenza is suspected.
      • Urine and serum for Legionella PCR (contact laboratory).
Additional Investigations

Pleurocentesis:

- Should be performed when a significant (>1cm on lateral decubitus CXR) parapneumonic effusion is present on CXR. Inexperienced staff must be supervised.
- Send for Gram stain, culture, total and differential WBC, pH, total protein, glucose, LDH.

**Note:** For pH estimation the fluid must be sent in a **capped** ABG syringe. Transfer 2mL from the specimen bottle as soon as possible after taking.
- Contact Physician *early* if empyema or complicated parapneumonic effusion suspected.

Bronchoscopy Indications include:

- Immunocompromised patient.
- Life threatening pneumonia.
- Mutilple CXR changes.
- Deterioration despite appropriate initial treatment.

Contact Physician on call.

Management

- Assess severity.
- Resuscitate.
- Choose antibiotics:
  - Usually empiric.
  - Depends on:
- Clues as to likely pathogen.
- Severity.
- Initial Gram stain.
  - Antibiotics **must be** administered without delay in patients with pneumonia.
  - Initial antibiotic MUST cover Streptococcus pneumoniae.
  - Obtain blood cultures prior to giving antibiotics. Obtain sputum sample as soon as possible – involve a physiotherapist if necessary but do not delay giving antibiotics while awaiting sputum sample.
Recommendations for Initial Antibiotic Treatment

- Mild-Moderate Community Acquired Pneumonia
- Those patients without any of the major risk factors for increased mortality.

Table 35: Antibiotic Treatment for Community Acquired Pneumonia (mild-moderate)

<table>
<thead>
<tr>
<th>Targets</th>
<th>First choice</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majority – young, non-smoking, no underlying lung disease</td>
<td>Must cover <em>streptococcal pneumonia</em></td>
<td><em>Benzylpenicillin</em> 1.2g 6-hourly IV</td>
</tr>
<tr>
<td>Older patient COPD, Smoker</td>
<td>Must cover <em>H. influenzae</em> and <em>M. catarrhalis</em></td>
<td><em>Benzylpenicillin</em> 1.2g 6-hourly PLUS <em>Gentamicin</em> 240mg every hour</td>
</tr>
<tr>
<td>Mycoplasma or Legionella suspected</td>
<td></td>
<td><em>Benzylpenicillin</em> 1.2g 6-hourly IV PLUS <em>Erythromycin</em> 500mg 6-hourly ‘o’</td>
</tr>
<tr>
<td>Little improvement with initial therapy</td>
<td><em>Chlamydia</em> species <em>Legionella</em> species</td>
<td><em>Benzylpenicillin</em> 1.2g 6-hourly IV PLUS <em>Erythromycin</em> 500mg 6-hourly ‘o’</td>
</tr>
<tr>
<td>Resistant Pneumococci Isolated</td>
<td><em>Benzylpencillin</em> &gt;9.6g over 24 hours – either continuous infusion or divided doses</td>
<td></td>
</tr>
</tbody>
</table>

*No IV preparation available
Change to oral therapy once patient afebrile for 48 hours and clinically improving.

Severe Community Acquired Pneumonia
Antibiotic choice is generally empiric and should cover most bacterial causes.
Standard Treatment Guidelines

- Benzylpenicillin 7.2-10.8g over 24 hours in divided doses IV PLUS erythromycin 500mg q6h ‘o’ PLUS gentamicin 240mg qh IV.
- If mild penicillin allergy suspected, give cefuroxime 1.5g IV q8h instead of benzylpenicillin.
- If staphylococcal pneumonia suspected – ADD cloxacillin 2g q4h IV.
- If strongly suspect Legionella infection and patient’s condition is deteriorating, ADD rifampicin 600mg ‘o’ q12h or ciprofloxacin 500mg ‘o’ q12h and contact Physician.

Life Threatening Pneumonia – Use ceftriaxine 2g every 12 hours IV, gentamicin (see page) and erythromycin 500mg q6h IV.

Initial General Management

- Controlled oxygen therapy – prescribed on basis of arterial blood gases/oximetry (see page).
- Insert intravenous line.
- Fluids:
  - Use N/S.
  - Treat septic shock aggressively.
  - Monitor response to fluid challenge by measuring pulse rate, BP, peripheral perfusion and urine output.
- Antibiotics (see above).
- Recordings:
  - The first 24 to 48 hours is the time for particular vigilance (monitor temp., pulse rate, BP, respiratory rate, urinary output, initially 1 to 4-hourly). Ensure that nursing staff report any change promptly to medical staff.
- Physiotherapy – indications:
  - May be useful to assist in obtaining a sputum sample.
  - May help with sputum clearance, especially in patients with underlying COPD.

Subsequent Management

- Patients must be reviewed regularly to ensure that they are not deteriorating. Beware of tachycardia, tachypnoea, hypotension and SpO2 <92%.
- All cases of severe CAP should be discussed with:
Physician.
- Microbiologist.
- ICU Intensivist.

Patients should be monitored in the ICU or similar high dependency area if:
- Deteriorating despite fluid resuscitation, oxygen and antibiotics.
- In respiratory failure – with deteriorating arterial blood gases.
- Looking tired or exhausted.
- In patients who remain unwell despite appropriate antibiotic therapy, the possibility of vasculitic disorder should considered.
- CXR – according to clinical progress. Mild cases usually don’t need a repeat until reviewed as an outpatient or by the GP.

At Discharge
- Appropriate oral antibiotic:
- Total duration of 7-10 days in uncomplicated pneumonia.
- Longer (14-21 days) course required for complicated disease (e.g. COPD, severe pneumonia or Legionella).
- Stop smoking – refer for smoking cessation programme.
- Check spirometry in all smokers and alert GP or refer Physician if significantly impaired.
- Instruct patient to contact their GP if they develop fever, chest pain or increasing dyspnoea.
- Follow up appointment wither with GP or hospital team at 6 weeks to include:
  - CXR – this could be arranged by the hospital team prior to discharge.
  - Convalescent serology if considered relevant.

Note:
- CXR may take up to 3 months to clear especially in older patients and those with COPD.
- Physiotherapy may be needed if sputum retention likely.

Common Complications
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• Parapneumonic effusion – seen in up to 40% of cases. Should always be aspirated to exclude empyema and complicated para pneumonic effusions.
• Large simple parapneumonic effusions (>1/3 of hemi thorax), all complicated parapneumonic effusions and all empyema should be immediately referred to the Physician.

Other Considerations
• Any pneumonia that doesn’t resolve at usual rate – consider endobronchial obstruction, tuberculosis, or other diagnoses.
• Recurrent pneumonia in same pageant – consider endobronchial obstruction, bronchiectasis, foreign body.
• Recurrent chest infections – consider immune status:
  • IgG/IgA deficiency.
  • Acquired Immunodeficiency Syndrome.
  • HIV.
  • Cystic fibrosis.
• Consider referral to Physician.

22.7. Hospital Acquired Pneumonia (HAP)
• The incidence of HAP is around 0.7%.
• In most post-operative patients presentation is usually with fever, deteriorating gas exchange and CXR infiltration.
• Medical patients may become more unwell very quickly – the diagnosis should be suspected in any medical patient developing a fever.

Investigations
• Sputum sample – involve a physiotherapist if necessary.
• Blood cultures – 2 sets. 10ml in each bottle.
• WBC + diff.
• CXR.

Management
• Physiotherapy – especially if patient has underlying lung disease.
• Oxygen if indicated.
• Bronchodilators if history of airflow obstruction.
• Antibiotics:
Mild/moderate:
- *Ampicillin 1g q6h IV.*
- *Erythromycin 500mg q6h* if patient immunocompromised (alcoholics, diabetics, steroids, cytotoxics) or failing to respond to initial therapy.

Severe:
(Criteria include tachypnoea >30/min., urea >7.0mmol/L, hypotension, PaO₂ <55mmHg on oxygen, anyone in ICU).
- *Ceftriaxone 2g IV q12h*
- *Gentamicin*
- *Erythromycin 1g q6h IV.*

22.8. Aspiration Pneumonia

- Chronic occult microaspiration of gastric contents is an important cause of respiratory disease and should always be considered in patients with unexplained cough, wheezing bronchospasm, nocturnal attacks of coughing/choking, “morning dip” pattern of asthma, diffuse pulmonary shadowing and chronic/recurrent pneumonia.
- Macroaspiration of gastric contents usually occurs following a clearly identifiable episode such as trauma, anaesthetic induction, epilepsy, unconsciousness, drug overdose etc. It may lead to a mechanical airway obstruction (medium-large particles), a chemical endobronchitis and pneumonitis, and can cause severe ventilatory impairment and disturbance of gas exchange.

Clinical Diagnosis
- The right upper lobe and the upper segments of both lower lobes are the pulmonary segments most commonly affected. Patients may present with indolent, multi-segmental pneumonia and a low grade fever. Others may present in respiratory failure.
Macroaspiration pneumonia:

- Assisted ventilation – the early use of ventilatory support may substantially reduce mortality. Seek immediate advice from ICU team.
- Fluid replacement – this requires careful management and assessment, and if large volumes are required this is best done in ICU with appropriate monitoring.
- Antibiotics – routine administration of antibiotics has not been demonstrated to reduce mortality or the incidence of bacterial pneumonia. Some patients deteriorate after 1-3 days associated with development of bacterial pneumonia, and antibiotic therapy will then be required. Mixed infections +/- anaerobic organisms are common. Antibiotic therapy must be guided by culture results. There is no recognized standard regimen and pulmonary isolates that are antibiotic resistant are common.
- Steroids are not helpful.

Microaspiration pneumonia

- Antibiotics to consider include: Augmentin, penicillin and metronidazole or gentamicin. Attention must be directed towards underlying gastro-oesophageal reflux, and gingival disease.

22.9. Acute Pulmonary-Renal Syndrome

Patients with pulmonary infiltrates and deteriorating renal functions require urgent investigation. The possibility of a vasculitis must be considered. Check the urine for active sediment, undertake screening test as indicated below and consult early with Physician.

Table 36: Acute Pulmonary-Renal Syndrome

<table>
<thead>
<tr>
<th>Suspected diagnosis</th>
<th>Screening tests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Idiopathic Vasculitis</strong></td>
<td></td>
</tr>
<tr>
<td>- Wegener’s Granulomatosis</td>
<td>c-ANCA</td>
</tr>
<tr>
<td>- Microscopic Polyangiitis</td>
<td>p-ANCA</td>
</tr>
<tr>
<td>- Anti GBM Disease</td>
<td>Anti-GBM</td>
</tr>
<tr>
<td>- SLE</td>
<td>ANA</td>
</tr>
<tr>
<td>- Mixed Cryoglobulinaemia</td>
<td>Cryoglobulins</td>
</tr>
</tbody>
</table>
22.10. Pleural Effusion

Classification
The differentiation between exudates and transudates is the essential first step in the diagnostic evaluation.

Investigations
- Diagnostic pleurocentesis may be undertaken by medical staff with appropriate experience. A lateral decubitus CXR will allow identification of free fluid. Pleurocentesis may be performed safely if 10mm width free fluid is identified on a lateral decubitus CXR or if loculated fluid is identified and can be reached with ultrasound guidance. Use a 20ml syringe with a 22G needle under sterile conditions.
- Measure plasma total protein, glucose and LDH levels for comparison with pleural fluid.

Contraindications
- Unwilling or uncooperative patient.
- Abnormal bleeding tendency. Check history, examination, PC, APTT, and platelets. If in doubt, discuss with Physician before proceeding.
- Insufficient pleural fluid.
- Chest pyoderma or herpes zoster.

Tests that should be performed on Pleural Fluid
- pH. Accurate pH measurement requires about 2 ml of fresh sample in a capped ABG syringe.
- Glucose.
- LDH.
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- Total protein.
- Total and differential WBC.
- Gram stain and culture.
- Cytology.

Exudate/Transudate
- 99% of exudates meet one or more of the following criteria:
  - Pleural fluid total protein >30g/L.
  - Pleural fluid total protein/serum total protein ratio >0.5.
  - Pleural fluid LDH/serum LDH >0.6.
- If transudate – further tests are usually not needed – seek cause, e.g. heart failure, cirrhosis, nephrotic syndrome, acute glomerulonephritis, peritoneal dialysis, myxoedema (but 5% malignant effusions are transudates).
- If exudate – assess the differential white cell count (total WBC is of limited diagnostic value).
  - If lymphocytes predominate consider malignancy, tuberculosis, connective tissue disease.
  - If neutrophils predominate consider parapneumonic effusion, empyema, pulmonary embolus, pancreatitis, subphrenic abscess, early tuberculosis.
- Criteria for parapneumonic effusion and empyema.
  - Simple parapneumonic effusion.
    - pH ≥7.3, glucose >2.5, LDH <1000.
  - Complicated parapneumonic effusion.
    - pH ≤7.2, glucose <2.5, LDH >1000.

Note: pH 7.2-7.3 – observe closely. Repeat CXR and pleural tap if not clinically improving.

Empyema.
- Organisms seen on Gram stain or frank.
  - Pseudoexudate. Remember – a fluid/serum cholesterol ratio of <0.3 may be seen in patients with LVF treated with diuretics.
  - The diagnosis and management of anything but a simple parapneumonic effusion usually requires referral to a Physician.
• Tests which may help elucidate the cause of an exudate.
  • Cytology – carcinoma, lymphoma.
  • Cell surface markers – to distinguish between reactive and malignant lymphoid proliferation.
  • ZN stain and culture – tuberculosis (consider sending fluid for PCR).
  • Haematocrit – if >50% of peripheral blood haematocrit = haemothorax.
  • Rheumatoid factor.
  • Triglyceride – chylothorax.
  • Amylase – pancreatitis.

• Other investigation and treatment options include:
  • Close pleural biopsy.
  • Diagnostic thoracoscopy.
  • CT scan.
  • Bronchoscopy.
  • Intercostal tube drainage.
  • Thoracostomy.

Notes:
• Do not drain the pleural fluid until the diagnosis is established, unless the patient is very dyspnoeic. The presence of some pleural fluid is necessary to perform a closed pleural biopsy.
• If complicated parapneumonic effusion or empyema suspected, do not delay seeking help. Early treatment may prevent a thoracotomy.

22.11. Pneumothorax

Causes
• Traumatic – usually after chest trauma with rib fracture.
• Spontaneous.
• Chronic obstructive pulmonary disease.
• Acute severe asthma – often with pneumomediastinum.
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- Iatrogenic – usually after cannulation of the neck/subclavian veins, lung biopsy (FNA or transbronchial) and occasionally after an anaesthetic.

Clinical Signs
- Symptoms vary from mild dyspnoea with or without pleuritic chest pain to tension pneumothorax with cardiovascular compromise.
- Signs include:
  - Reduced chest wall movement on the affected side.
  - Diminished breath sounds on the affected side.
  - Surgical empyema in the neck or over chest wall.
  - Deviation of the trachea – may be deviated towards the affected side or in tension pneumothorax towards the opposite side.

Investigations
- CXR – at the bedside if the patient unwell.

**Note:** The CXR tends to underestimate the size of the pneumothorax.
- Arterial blood gases.

Treatment
- Discuss case with Physician.
- Treatment is not always required. A small pneumothorax in the absence of underlying lung disease may resolve on its own over 3-10 days.
- Simple aspiration is recommended for a larger spontaneous pneumothorax without underlying lung disease.
- **Intercostal tube drainage is recommended in the following circumstances:**
  - Tension pneumothorax (if life threatening use a 14G IV cannula in the 2nd intercostal space anteriorly and place an intercostal tube thereafter).
  - Respiratory compromise:
  - Traumatic pneumothorax or haemopneumothorax.
  - Failed simple aspiration.
  - Tube placement – usually in anterior axillary line, through 5th or 6th intercostal space, directed upwards and posteriorly.
Inpatient cases with pneumothorax should be managed by either the Physician on the Medical Ward or by the Surgical team if traumatic.

Follow-Up
All patients must have a follow up CXR at 10-14 days to ensure that the pneumothorax has resolved. Recurrent pneumothorax may be an indication for pleurodesis – referral to the Physician or Surgeon is recommended. Advice should be given about air travel (not advised within 6 weeks) and scuba diving (contra-indicated).

Intercostal Tubes
The insertion and management of intercostal tubes is a complex and specialised area. Patients requiring chest tube management should normally be cared for by physician or surgical teams.

Unless it is an emergency, intercostal tubes are best inserted or supervised by experienced staff from the Medical Unit. In selected cases tubes may be best inserted by Radiologist under ultrasound guidance. Respiratory medicine has guidelines to follow.

Indications
- Pneumothorax.
- Pleural effusion.
- Parapneumonic effusion/empyema.
- Haemopneumothorax.

Contraindications
- Bronchial obstruction on the affected side.
- Thickening of the visceral pleura.
- Loculated pleural effusion. CT scan advised in this setting.
- Coagulopathy.
- Chest wall infection.

Care of Chest Tubes
Duty medical staffs are often asked to assess patients with chest tubes for potential or actual problem. Solving these problems is dependent on knowledge of the patient plus the type of chest drain and water seal chamber being used. At the Vaiola Hospital, the nursing staffs from
the Medical Ward have information and knowledge which may be helpful. After hours, contact Physician on call.

- Assessment should include the following:
  - Check the insertion site, all tubes and connections.
  - Check for swinging (movement of the water column during deep breathing).

**Note:** A tube on suction will not swing.

- Check for air leak – air bubbling through the water seal chamber, especially on coughing.
- Obtain CXR if there is any concern about the patient.

**Emergencies**

- Acute deterioration in the patient’s condition:
  - Check all tube connections and underwater seal system.
  - Administer oxygen.
  - Bedside CXR.
  - Notify the Physician on call.
- Development of subcutaneous emphysema:
  - This is most likely to occur in the setting of COPD with an air leak and is precipitated by temporary blockage of the tube.
  - Check all tubes for kinks/blockages.
  - Administer oxygen.
  - Urgent beside CXR.
  - Notify the Physician on call.
23. SKIN CONDITIONS

23.1 Skin Infections

23.1.1 Bacterial infection

Acne (Fuofua)

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 low-irritant, pH-balanced, soap-free cleanser; twice a day.
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.

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*
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 identify 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**
- *Cloxacillin (flu)choxacillin (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
- *Phenoxyppencillin (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**
Boils and carbuncles

Boils (also called furuncles) 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 and carbuncles (“hangatamaki”)  
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)*cloxacillin (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 ‘oral 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
Standard Treatment Guidelines

To cover *Staphlococal 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

- Phenoxyethylpenicillin (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 rhythematous 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.

23.1.2 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 37: Different types of Tinea

<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</td>
</tr>
<tr>
<td>(scalp ringworm)</td>
<td></td>
<td></td>
<td>• More common in children than in adult</td>
</tr>
<tr>
<td>Tinea pedis (athlete’s foot)</td>
<td>Web of the feet</td>
<td>Trichophyton rubrum Trichophyton interdigitale Epidermophyton floccosum</td>
<td>• Commonest type of fungal infection caused by</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Spread by direct contact, most through bare feet in bathrooms and health clubs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Leather or plastic footwear that does not “breathe” encourages tinea pedis (rare in children)</td>
</tr>
<tr>
<td>Tinea cruris (Jock itch)</td>
<td>Groin</td>
<td>Trichophyton sp. Microsporum sp.</td>
<td>• A rash develops in the groin commonly affecting men more often than women</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Has a itchy spreading red border</td>
</tr>
<tr>
<td>Tinea barbae (beard and mustache areas of the face)</td>
<td></td>
<td>Trichophyton mentagrophytes var equinum</td>
<td>• Less common than tinea capitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Generally affects</td>
</tr>
</tbody>
</table>
Trichophyton verrucosum only adult men

| Tinea unguiniium of the nails | Nails | Trichophyton sp. Microsporum sp. | Long-term treatment required to eradicate the infection 
Usually associated with tinea pedis |
| Tinea coporis (‘Lafa’) | Trunk, legs and arms | Trichophyton sp. Microsporum sp. | Advice patient to clean underclothing and bed sheets while under treatment |

**Note:** The pharmacological treatment for tinea fungal infection are detailed on the table below.

### Table 38: Treatment of Tinea fungal infection

<table>
<thead>
<tr>
<th>TYPES OF TINEA</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinea capitis</td>
<td>None</td>
</tr>
<tr>
<td>Tinea cruris</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.</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 in powder</td>
</tr>
<tr>
<td>Condition</td>
<td>Treatment Details</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tinea Barbae</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 (Specialist drug).</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 (Specialist drug).</td>
</tr>
<tr>
<td>Tinea Unguimium</td>
<td>None</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; 20 to 40kg: 125mg) 250mg orally, daily for 6 weeks for fingernails and 12 weeks for toenails (Specialist drug).</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 5% 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®*

**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,* and *C. guilliermondii*

(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*

23.1.3 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.*

**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.

Bathe 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 varicella-zoster 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.
Standard Treatment Guidelines

- 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
Standard Treatment Guidelines

- 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 (eg. 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.

### 23.1.4 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
Standard Treatment Guidelines Tonga 2007

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.
  - 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.
  - 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 antiscabectic 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 methods 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.*
  o 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.
  o 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.
  o Wash hands thoroughly after using lice treatment.
  o Do not blow dry hair.
  o Lice treatment should not be used on children under 2 years of age without medical supervision.
  o Wash pillow cases on hot cycle and combs and brushes in hot water (60°C).
  o 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.
  o 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
  \[ \text{Trimethoprim + sulfamethaxazole (child: 2 + 10 mg/kg up to) 80 + 400mg orally, 12 hourly for 3 days. Repeat after 10 days.} \]
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.

23.2 Other Skin Disorders (Diaper Rash, Eczema, Urticaria, Psoriasis, Pemphigous, Vitiligo)

**Nappy/Diaper Rash**
Nappy rash is characterized by skin rashes in the diaper area that are caused by various skin disorders and/or irritants.

*Generic rash* or *irritant diaper dermatitis* (IDD) is characterized by
joined patches of erythema and scaling mainly seen on the convex surfaces, with the skin folds spared.

Diaper dermatitis with secondary bacterial or fungal involvement tends to spread to concave surfaces (i.e. skin folds), as well as convex surfaces, and often exhibits a central red, beefy erythema with satellite pustules around the border.

Differential diagnosis
Other rashes that occur in the diaper area include seborrheic dermatitis and atopic dermatitis. Both seborrheic and atopic dermatitis require individualized treatment

- Seborrheic dermatitis, typified by oily, thick yellowish scales, is most commonly seen on the scalp (cradle cap) but can also appear in the inguinal folds.
- Atopic dermatitis, or eczema, is associated with allergic reaction, often hereditary. This class of rashes may appear anywhere on the body and is characterized by intense itchiness.

Causes
Irritant diaper dermatitis develops:

- when skin is exposed to prolonged wetness
- increased skin pH caused by urine and feces

Urine's effects

- wetness alone macerates the skin
- soften the stratum corneum
- greatly increase susceptibility to friction injury
- affect skin pH
- ammonia and urea exposure (direct irritant)

Diet's effects
The interaction between fecal enzyme activity and IDD explains the observation that infant diet and diaper rash are linked, since fecal enzymes are in turn affected by diet.

- breast-fed babies, have a lower incidence of diaper rash
- most common in infants 8–12 months old (change in diet –
Standard Treatment Guidelines

- significant change in an infant’s diet (change in milk formula or from milk to solid food)
- post-antibiotic treatment
- diarrhoea (previous 48 hours)

Secondary infections
- Candida albicans (most common)
- Staphylococcus aureus

Treatment
- Discontinue diaper use (most effective but not most practical)
- Zinc oxide and castor oil ointment (Petroleum jelly can be used as a protectant if “zinc oxide and castor oil” is not available)
- Clotrimazole creams (in extreme cases)
- Hydrocortisone cream 0.5% (low concentration) sometimes used to treat symptoms of diaper rash (do little to clear up the rash on it’s own)
- Antibiotic may be required if secondary infection is present

Practical points for prevention and treatment of nappy rash:
- Check the baby's diaper often and change it as soon as it's wet or soiled.
- Carefully clean the baby's bottom between diaper changes. Use plain warm (not hot) water with or without a very mild soap.
- Allow the baby's skin to dry completely before putting on another diaper.
- Use products that contain “zinc oxide and castor oil” ointment or petroleum (such as vaseline) to protect the baby's skin from moisture.
- Avoid using plastic pants.
- If diaper rash persists, change the type of wipes, diapers or soap you're using.

Insects Bites Reaction
Topical antipruritic such as calamine lotion may provide rapid relief. If this is inadequate, use:

- *A potent corticosteroids like betamethasone dipropionate 0.05% topically, twice daily until itch has settled (max. of 1 week on the face).*

**Note:** Persistent nodules and ulcerated lesions should be referred to a dermatologist

Severe acute reaction to insect bites may be treated with:

- *Prednisone 25-50mg (approx. 0.5mg/kg) orally, daily until settled*

**Eczema/ Dermatitis**

There is no clear distinction between dermatitis and eczema therefore the terms are used interchangeably. Dermatitis is a non-specific inflammatory response of the skin to a combination of endogenous (individual susceptibility) and exogenous (external) factors. It manifest as an erythematous rash that is usually itchy and sometimes scaly. In the acute stage, there is spongiosis (intracellular oedema) and superficial inflammation.

There are several different types of eczema, many of which look similar but have very different causes and treatments. The first step in effective treatment of eczema is a correct diagnosis.

**Atopic eczema**

Atopic eczema is the commonest form of eczema and is closely linked with asthma and hayfever. It can affect both children and adults, usually running in families. One of the most common symptoms of atopic eczema is its itchiness (or pruritis), which can be almost unbearable. Other symptoms include overall dryness of the skin, redness and inflammation. Constant scratching can also cause the skin to split, leaving it prone to infection. In infected eczema the skin may crack and weep (‘wet’ eczema).

**Treatment**

Treatments include emollients to maintain skin hydration and corticosteroids to reduce inflammation.

- *Aqueous cream to be applied 3 times daily to the affected dry skin.*
Betamethasone 0.1% cream to be applied twice daily sparingly to the affected area.

**Allergic contact dermatitis**
Develops when the body’s immune system reacts against a substance in contact with the skin. The allergic reaction often develops over a period of time through repeated contact with the substance. For example, an allergic reaction may occur to nickel, which is often found in earrings, belt buckles and jeans buttons. Reactions can also occur after contact with other substances such as perfumes and rubber. In order to prevent repeated reactions it is best to prevent contact with anything that you know causes a rash.

**Treatment:**
- Promethazine (up to) 25-50mg orally daily may reduce the itching, and are particularly helpful at night-time.
  - OR
- Chlorpheniramine 4mg every 4-6 hours, max 24mg daily. Child 1-2 years: 2-5 years: 1mg every 4-6 hours: 6-12 years: 2mg every 4-6 hours max 12mg.
- Hydrocortisone 1% cream if associated with inflammation.

**Irritant contact dermatitis**
This is a type of eczema caused by frequent contact with everyday substances, such as detergents and chemicals, which are irritating to the skin. It most commonly occurs on the hands of adults and can be prevented by avoiding the irritants and keeping the skin moisturised.

**Infantile seborrhoeic eczema**
A common condition affecting babies under one year old, the exact cause of which is unknown. Also referred to as cradle cap, it usually starts on the scalp or the nappy area and quickly spreads. Although this type of eczema looks unpleasant, it is not sore or itchy and does not cause the baby to feel uncomfortable or unwell. Normally this type of eczema will clear in just a few months, though the use of moisturising creams and bath oils can help to speed this along.
If the cradle cap doesn't improve with frequent washing or if the rash spreads to other areas, use
Adult seborrhoeic eczema
Characteristically affects adults between the ages of 20 and 40. It is usually seen on the scalp as mild dandruff, but can spread to the face, ears and chest. The skin becomes red, inflamed and starts to flake. The condition is believed to be caused by a yeast growth. If the condition becomes infected, treatment with an anti-fungal cream such as Ketoconazole 2% cream may be necessary or corticosteroid betamethasone valeate 0.1% lotion.

Varicose eczema
Varicose eczema affects the lower legs of those in their middle to late years, being caused by poor circulation. Commonly the skin around the ankles is affected, becoming speckled, itchy and inflamed. Treatment is with Aqueous cream and betamethasone cream 0.1%. If left untreated, the skin can break down, resulting in an ulcer.

Discoid eczema
Is usually found in adults and appears suddenly as a few coin shaped areas of red skin, normally on the trunk or lower legs. They become itchy and can weep fluid.

Treatment
- *Aqueous cream to be applied to the affected area twice daily.*
- *Promethazine (up to) 25-50mg orally daily may reduce the itching, and are particularly helpful at night-time.*
  
  OR
  
  - *Oral chlorpheniramine 4mg every 4-6 hours, max 24mg per day and child 1-2 years: 1mg ‘o’ bd; 2-5 years, 1mg every 4-6 years, 6-12 years 2mg every 4-6 hours max: 12mg.*
  
  - *Hydrocortisone 1% cream applied twice daily sparingly for any inflamed or reddened areas or betamethasone valeate 0.1% cream depending on the severity and the area affected.*
  
  - *Systemic steroids by mouth (prednisolone) or injection (hydrocortisone) are reserved for severe and extensive cases of*
nummular dermatitis. Systemic steroids are usually only necessary for a few weeks, and any residual dermatitis can be treated satisfactorily with steroid creams and emollients.

- Antibiotics ((flu)cloxacillin) are important if the dermatitis is weeping, sticky or crusted. Sometimes nummular dermatitis clears completely on oral antibiotics, only to recur when they are discontinued.

Urticaria
Urticaria or hives is a transient pruritic localized oedema which each individual lesion last less than 24 hours. The same reaction taking place in sub-mucosa and subcutaneous tissue is termed angioedema. Urticaria of more than 6 weeks duration termed chronic urticaria. Urticaria wheals are raised erythematous and edematous plaques sharp serpiginous borders surrounded by erythematous halo and have a balanched center, the diameters are range from a few millimeters to several centimeters.

Treatment:
- Identification and removal of the triggering factors.
- Antihistamine therapy promethazine and chlorpheniramine. If one group of antihistamine fails use another antihistamine from a different group.
- Calamine lotion may eliminate itching
- Avoid aspirin® and if angioedema is present; inject 0.3 – 0.5ml adrenaline (1:1000) SC.

Vitiligo
Vitiligo is a common acquired heritable melanocytopenic disorder characterized by progressive well – circumscribed, white muscles, ocular abnormalities, autoantibodies and associated with other autoimmune diseases. The macules of vitiligo have well-defined border. The border may have a red halo (inflammatory vitiligo) or a rim of hyperpigmentation.

Treatment
- Topical or systemic corticosteroid
- Sunscreen
Bullous Pemphigoid

Bullous pemphigoid is a blistering skin disease which usually affects middle aged or elderly persons. It is an immunobullous disease, i.e. the blisters are due an immune reaction within the skin.

Characteristically, crops of tense, fluid-filled blisters develop. They may arise from normal-looking or red patches of skin, and the blisters may be filled with clear, cloudy or blood-stained fluid. Bullous pemphigoid is usually very itchy. It may be localized to one area but is more often widespread, often favouring body folds. In severe cases, there may be blisters over the entire skin surface as well as inside the mouth.

Treatment

If the pemphigoid is very widespread, hospital admission may be advised so the blisters and raw areas can be expertly dressed. Antibiotics may be required for secondary bacterial infection.

- Prednisone (child up to) 50mg daily then slowly titrate back over months to years to a maintenance dose of 5-10mg daily.

As systemic steroids have many undesirable side effects, other medications are added to ensure the lowest possible dose (aiming for 5 to 10mg prednisone daily). These other medications may include:

- Topical corticosteroids like betamethasone cream 1% and hydrocortisone cream 1% to applied twice daily until infection clears up.
- Doxycycline orally 100mg daily to treat secondary infection.

Treatment is usually needed for several years. In most cases the pemphigoid eventually completely clears up and the treatment can be stopped.

Psoriasis

Psoriasis occurs in 1% to 3% of the population world-wide. The disease is transmitted genetically, most likely with a dominant mode with variable penetrance; the origin in unknown. Psoriasis is associated with an increased frequency of certain histocompatibility antigens, the most significant association is with HLA-CW6. The disease is lifelong and characterized by chronic recurrent exacerbations and remissions that are emotionally and physically debilitating. Men and women are equally affected.
Psoriasis, in most cases, can be controlled with therapy. It is important that treatment is appropriate for the type and site of psoriasis. In a mild case, emollients or a weak topical corticosteroid may suffice, but disabling or disfiguring psoriasis may warrant the use of systemic drugs such as antimetabolites or immunosuppressants. Treatment of different types of psoriasis is shown on tables.

**General measures**
Stress can aggravate the disorder. Exercise and reduction of alcohol intake. Weight reduction will help patients with flexural psoriasis or plantar psoriasis.

**Antibiotics**
Psoriasis occasionally becomes infected, usually with *Staphylococcus aureus*. Flexural psoriasis can become infected with coliforms. Guttate psoriasis may be triggered by an upper respiratory tract *streptococcal* infection and, if proven, requires treatment with *Phenoxymethylpenicillin* or suitable alternative. Palmoplantar pustular psoriasis may respond to *tetracyclines* (which their efficacy to their anti-inflammatory effects).

**Corticosteroids**
Topical corticosteroids are potent inhibitors of cytokine production, resulting in anti-inflammatory and antimitotic effects. They are the most commonly employed agents in therapy of psoriasis. In general terms, the more potent preparations are used to treat thicker areas of skin or thicker plaques of psoriasis. The major adverse effects with the use of topical corticosteroids are skin atrophy, sometimes with the formation of striae, and telangiectasia. These effects are seen most often in the flexures and on the face, and special care is required when using topical corticosteroids in these sensitive areas.

**Emollients**
Where scaling or irritation are prominent features, the soothing actions of emollient creams or ointment offers prompt relief.
- *Use emulsifying ointment*

**Keratolytics**
Salicyclic acids is used to lift and soften thick scale in psoriasis in the form of ointment.

- Use salicyclic acid 5% (in emulsifying ointment) topically daily.

**Systemic therapy**
Refer to dermatologist

### Table 39: Treatment of different types of psoriasis

<table>
<thead>
<tr>
<th>Type of Psoriasis</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>Plaque – mild, moderate</td>
<td>• Topical corticosteroids</td>
</tr>
<tr>
<td>Plaque – widespread</td>
<td>• Topical corticosteroids (persistent cases – refer to dermatologist)</td>
</tr>
<tr>
<td>Guttate</td>
<td>• Penicillin</td>
</tr>
<tr>
<td></td>
<td>• Topical corticosteroid</td>
</tr>
<tr>
<td>Flexural</td>
<td>• Mild to moderate topical corticosteroids</td>
</tr>
<tr>
<td>Erythodermic</td>
<td>• Hospitalization, baths, emollients, (persistent cases – refer to dermatologist)</td>
</tr>
<tr>
<td>Palmoplantar – pustular</td>
<td>• Tetracycline, topical corticosteroids (persistent cases – refer to dermatologist)</td>
</tr>
<tr>
<td>Palmoplantar – hyperkeratolytic</td>
<td>• Whitfield’s ointment</td>
</tr>
<tr>
<td></td>
<td>• Salicyclic acid 5% ointment</td>
</tr>
<tr>
<td>Scalp – mild</td>
<td>• Topical corticosteroid lotions; tar shampoo</td>
</tr>
<tr>
<td>Scalp – severe</td>
<td>• Tar shampoo</td>
</tr>
<tr>
<td></td>
<td>• Systemic therapy (Specialist drug)</td>
</tr>
<tr>
<td>Nail</td>
<td>• Potent topical corticosteroids, systemic therapy (Specialist drug)</td>
</tr>
<tr>
<td>Genital</td>
<td>• Topical corticosteroids</td>
</tr>
</tbody>
</table>
24  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.

24.1 Treatment Options For Common Causes Of Cervicitis And Vaginitis

Table 40: Treatment of cervicitis and vaginitis

<table>
<thead>
<tr>
<th>Causes</th>
<th>Recommended regimen</th>
<th>Alternative Regimens</th>
<th>For pregnant women and breastfeeding mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial vaginosis</td>
<td><em>Metronidazole</em> 400mg <em>bd</em> <em>with food</em></td>
<td><em>Amoxicillin</em> 500mg <em>tds</em> for 7</td>
<td>Preferably after the first</td>
</tr>
</tbody>
</table>
### Trichomonas

- **Metronidazole 2g orally in a single dose**
- **Metronidazole 500 mg orally twice a day for 7 days**
- Preferably after the first trimester

### Candida albicans (yeast)

- **Clotrimazole^2** 100mg vaginal tablets a day for 3 days
- **Nystatin 100,000 units vaginal tablet, one a day for 14 days**
- **Clotrimazole^2** 100mg vaginal tablets a day for 3 days
- **Nystatin 100,000 unit vaginal tablet, one a day for 14 days**
- **Miconazole 200mg vaginal suppository, one a day for 3 days**

### Gonorrhoea

- **Amoxicillin 2-3g, +/- Amoxicillin/clavulanic acid 500mg-1g**
- **Ciprofloxacin** 500mg orally as a single dose
- **Amoxicillin 2-3g, +/- Amoxicillin/clavulanic acid 500mg-1g**

### Chlamydia

- **Azithromycin 1g 'o' as a single dose**
- **Erythromycin base 500mg 'o' qid for 7 days**
- **Erythromycin base 500mg 'o' qid for 7 days or azithromycin 1g 'o' as a single dose**
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.

24.2 Treatment Options For Common Causes of Urethritis

Table 41: Treatment of urethritis

<table>
<thead>
<tr>
<th>Causes</th>
<th>Recommended regimen</th>
<th>Alternative Regimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>*Amoxicillin 2-3g, +/- Amoxicillin/clavulanic acid 500mg-1g</td>
<td>Ciprofloxacin 500mg ‘o’ as a single dose</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)

24.3 Treatment Options For Common Causes Of Genital Ulcer Disease

Table 42: 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>
<tbody>
<tr>
<td>Syphillis</td>
<td>Benzathine penicillin 2.4million units by</td>
<td>Doxycycline4 100mg ‘o’ bd</td>
<td>Benzathine penicillin</td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines  Tonga 2007

<table>
<thead>
<tr>
<th>STG</th>
<th>Ministry of Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>322</td>
<td></td>
</tr>
</tbody>
</table>

| Single intramuscular injection for 14 days | 2.4 million 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 ‘o’ qid for 30 days |

---

**Genital herpes**

<table>
<thead>
<tr>
<th>Primary infection</th>
<th>Aciclovir 200mg ‘o’ 5 times a day for 7 days, or aciclovir 400mg ‘o’ tds for 7 days</th>
<th>Famciclovir 250mg orally 3 times a day for 7 days, or valaciclovir 1g bd for 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent infection</td>
<td>Aciclovir 200mg ‘o’ 5 times a day for 5 days, or aciclovir 400mg ‘o’ tds for 5 days</td>
<td>Famciclovir 500mg bd for 5 days, or valaciclovir 500mg bd for 5 days</td>
</tr>
</tbody>
</table>

*Use aciclovir only when benefit outweighs risk. Dosage is the same as for primary infection*

---

In areas where **chancroid, granuloma inguinale or lymphogranulom venereum** 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>
</table>

---
**Granuloma Inguinale**
(donovonosis)
(treatment should be continued until lesions have completely epithelialized)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Doxycycline 100mg ‘o’ bd OR Azithromycin 1g ‘o’ as a single dose followed by 500mg once a day.</th>
<th>Erythromycin 500mg ‘o’ qid OR Trimethoprim (80mg)/sulphamethoxazole (400mg), 2 tablets ‘o’ bd</th>
<th>Azithromycin 1g orally as single dose OR Erythromycin 500mg ‘o’ qid</th>
</tr>
</thead>
</table>

**Lymphogranuloma Venereum**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Doxycycline 100mg ‘o’ bd for 14 days</th>
<th>Erythromycin 500mg ‘o’ qid for 14 days</th>
<th>Erythromycin 500mg ‘o’ qid for 14 days</th>
</tr>
</thead>
</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.
25  SURGICAL CONDITIONS (COMMON)

Introduction
The provision of a quality surgery service depends on many factors, which are independent of the surgical expertise of the surgeon. They include the following:

- good planning
- good teamwork
- effective communication with both colleagues and patients
- consent
- confidentiality
- continuous education by staff
- good record keeping
- evaluation of quality of services through mortality/morbidity meetings and the review of the relevant indicators.
- disaster and trauma planning

Creating the environment for surgery:

- infection control procedures (Please refer to “Infection Control Manual” for Vaiola Hospital)
- equipment and instruments:
  - there must be standard procedures for the care, sterilization, creating an inventory and storage of surgical equipments, ready for use.
  - every doctor/health officers should be familiar with the use of common instruments such as forceps, needle holders, scissors, knife and retractors.

Operating room:

- Good standard operating procedures should be in place for the proper use of operating theatres and for the rules to be enforced

Sponge and instrument counts:

- Always count them before beginning case; before final closure and on completing procedure.

Scrubbing and gowning:

- Standard procedures should be in place
Skin preparation and draping.
- Standard procedures should be in place

Cleaning, disinfection and sterilization of equipments and instruments.
- Refer to “Infection Control Manual” plus standard procedures used.

Waste disposal.
- Refer to “Infection control and Waste Management manual”

Approach to the surgical patient:
- History
- Physical examination
- Differential diagnosis
- Investigations to confirm diagnosis
- Treatment
- Observation of the effect of treatment
- Re-evaluation of the situation, the diagnosis and the treatment.

A clinician should be aware that as a general rule: before any laboratory or radiology investigation is requested; ensure that one can interpret the results and the management plan depends on the results.

Once a diagnosis is made; decision for treatment depends on:
- whether the team can perform the procedure
- can potential complications be managed
- is the patient stable enough for transfer
- the patient (and/or family) understands and consents to the proposed procedure.

Preparation for surgery:
Always see the patient before surgery, on the day of surgery. Check patient’s notes and ensure he/she is fasting if required.

Intra-operative care:
When an anaesthetist is required to give anaesthesia, there must be clear communications between him and the surgeon regarding any changes or findings throughout the procedure.

Operative and post-operative notes.
After any operation, an “operative note” must be written in the patient’s chart. It should include at least:

- Names of persons in attendance during procedure.
- Pre- and post-operative diagnosis.
- Procedure done including the presence of tubes or drains.
- Findings.
- Length of procedure.
- Estimated blood loss.
- Anaesthesia record (including drugs administered) - may be on separate sheet.
- Fluids given.
- Specimens removed.
- Complications.
- Post-operative management plan (including orders for vital signs, pain control, rate and type of IV fluid, other medications and laboratory investigations etc.).

**After Care:**

- Prevent complication (e.g. Deep breathing/ coughing, early mobilization, adequate nutrition, prevent pressure sores, adequate pain management).

25.1 **Surgical Problems In Neonates.**

Every clinician must be aware of the necessary resuscitation measures for common neonatal surgical problems, in order to stabilize the patient before referral for definitive surgical care.

**Intestinal Obstruction:**

Any newborn with abdominal distension, vomiting or no stool output; has a bowel obstruction until proven otherwise. Bile stain (green) vomitus can be a sign of a life threatening condition. A peristaltic wave across the abdomen can be seen, just before a child vomits.

What to do:

- Place an Nasogastric tube
- Start IV fluid
- Keep child warm
- Transfer child
If transfer is impossible, a laparatomy can be done (if possible), to rule out a mid-gut volvulus (which needs to be untwisted). If this condition is not promptly treated, it can cause gangrene of the entire small intestine.

**Hypertrophic pyloric stenosis**
- causes non-bilous (not green) vomiting
- In relaxed infant, a mass is palpable in upper abdomen at midline or slightly to the right of midline.
- It occurs in male infants 2-5 weeks old. They usually present with dehydration and electrolyte imbalance.

**Treatment:**
- *Give IV N/S (20ml/kg bolus) and insert a nasogastric tube*
- Repeat IV fluid boluses (2-3 times) until infant urinates and vital signs normalizes.
- Once stabilized, refer to hospital for proper surgical treatment.

**Oesophageal atresia**
- Presents with drooling or regurgitation of the first and subsequent feeds. Choking or coughing on feeding is frequent. An X-ray with nasogastric tube coiled up in an air filled pouch is diagnostic.

**Management:**
- Nurse infant in the 30 degrees head up position.
- Place a sump drain in oesophageal pouch.
- Administer IV fluid (per weight)
- IV antibiotics (for inevitable pneumonia)
- Refer to surgeon.

**Abdominal Wall defect:**
- Relieve any obstruction if possible (by enlarging defect)
- Apply sterile dressing and plastic bag cover to prevent fluid loss.
- Urgent transfer to surgeon.

**Anorectal anomalies (eg. Imperforate anus)**
- NG tube
- IV fluid
Meningo-myelocele (spina bifida)

- Cover defect with sterile dressing. Treat with strict aseptic technique
- Refer to surgeons

Cleft lip and palate

- These babies have difficulty sucking.
- Prone to aspirate feeds
- Feed carefully with spoon
- Surgery for cleft lip is best done at 6 months and palate at 1 year.
- Urgent referral is not required.

Talipes Equinovarus (club-foot)

This can often be corrected by early treatment, as soon as possible after birth. Treatment is by gentle manipulation and cast application. Surgery should only be done in very severe cases and in those who present late to the clinic.

Technique

- Place baby in supine position (on examination table or in mother’s lap)
- Gently manipulate foot by pushing forefoot from varus to a valgus position. Place your thump on base of 5th metatarsal to serve as fulcrum while pushing forefoot laterally.
- Evert the inverted heel by grasping the heel in your hand and relating the whole foot outward.
- Bring foot out of plantar flexed position by placing hand around the heel and relate foot upward pushing on the mid foot. (not head of metatarsals since this will create a rocker bottom foot)
- Hold corrected position in a padded long leg plaster cast with knee flexed.
- Change cast or splint weekly slowly bringing foot to normal position. Once completely corrected, keep foot in a cast or brace until walking age.
- Severe deformity may need surgery.
25.2 Surgical Problems In Children

Acute Abdominal Conditions

Be concerned with:

- Abdominal pain > 6 hours duration
- Tenderness/guarding
- Pain associated with nausea/vomiting

Common Causes

- Appendicitis
- Bowel obstruction
- Typhoid fever

Most causes of peritonitis require referral for surgery.

Appendicitis:

Commonest cause of peritonitis in children is appendicitis. The physical finding is usually a steady abdominal pain localized to the right lower abdomen, accompanied by vomiting. In children less than 2 years of age, a lot of appendicitis cases are diagnosed late, after they perforate.

Bowel Obstruction:

In children, clinical signs are similar to adults:

- Vomiting
- Constipation
- Abdominal pain
- Distension

Common causes are:

- Hernia (umbilical or inguinal)
- Intussusceptions
- Adhesions
- Rare causes include large numbers of ascaris worms.

Management:

- NG tube
- IV fluid
- Transfer to surgeon

Hernias in children
Most common hernias are:

- Umbilical
- Inguinal

Umbilical hernia is required for referral for surgical intervention, only if obstruction had occurred. Otherwise, delay it because spontaneous resolution can occur, even up to 10 years of age.

Inguinal Hernia:
When present; should be referred for surgery. Hydrocoele (communicating one) that fluctuates in size; needs referral for surgery too.

25.3 Principals Of Immediate Management Of Trauma
(refer to section 5.7 for further information on Major Trauma)

25.4 Common Fractures And Dislocations

i) Hand and carpal

Scaphoid fracture occur from falling on outstretched hand. It causes tenderness in the anatomical “snuff box”. X-Ray (scaphoid view) may not detect fracture in first X-Ray.

- Treatment is by POP (scaphoid position).
- Refer to surgeons if in doubt.

Fracture of 5th metacarpal is usually due to punching. Angulation is common.

- Treat by neighbour strapping, for 2 weeks, elevation and analgesia. Warn patient that 5th knuckle may be shorter than before!
- Advice intensive hand exercise as soon as possible.
- Refer to surgeons if significant angulations or rotation deformity. Rotation deformity can be detected by flexing the little finger and it points at the Thenar eminence.
- Remember to refer compound human bites (fight bites!)

Fracture of index, middle and ring metacapals

- Treat by neighbourhood strapping (as for 5th MC fracture).
- Refer if rotation deformity or severe angulation.

Bennett’s fracture
Standard Treatment Guidelines

• Fracture of base of thumb (MC) with lateral subluxation.
• This is an unstable injury needing surgical referral.

Thumb dislocation
• Reduce after median and radial nerve blocks.
• Keep in scaphoid POP. Follow-up X-Ray to confirm reduction.
• Refer to surgeon if cannot do reduction.

Phalangeal dislocations
X-Ray to exclude fracture and confirm reduction.
• Reduce under digital block, immobilize by neighbour strapping.

Phalangeal fractures:
• Compound fractures require meticulous surgical exploration.
• Closed fractures require reduction under digital block and neighbour strapping.

ii) Wrist
Colle’s fracture
defined as fracture of the radius within 2.5cm of wrist with the distal fragment angulated to point dorsally.
• Non displaced fractures are treated with analgesia and POP backslap.
• Grossly displaced fractures need referral to surgeons, for reduction under anaesthesia.

Refer the following fractures:
Barton’s fracture, Smith’s fracture and radial styloid fracture.

iii) Forearm fractures
Fractured ulna with dislocated radial head (Monteggia fracture) need referral to surgeons.
Fractured radius with dislocated radial ulna and joint (Galeazzi) need referral to surgeons.

iv) Elbow
Radial head fracture – refer to surgeon.
Fractured olecranon
Standard Treatment Guidelines Tonga 2007

- Treat non-displaced fractures with above elbow 90°, POP backslab.
- Refer displaced fractures to surgeons.

Supracondylar fractures
- Elbow is grossly swollen but triangular relationship of olecranon to medial and lateral
epicondyles are maintained.
- Check distal pulses and sensation to evaluate possible neurovascular injuries.
- Refer to surgeon.

Dislocated elbow
- Reduce under sedation by flexing elbow (60°) with counter traction at upper arm.
- Pull on fully pronated arm at this angle.
- Confirm pulses are satisfactory and post reduction X-Ray is good.

v) Shoulder:

Anterior dislocation
Reduce under sedation/analgesia using Kocher’s maneuver. Flex elbow to 90°, externally rotate shoulder - pause if any resistance and continue when muscle relax, adduct arm across chest with shoulder still in external rotation, once adducted as far as possible; internally rotate shoulder by flipping forearm towards opposite shoulder - make sure patient is relaxed; no traction is needed).

Fracture dislocation of shoulder
- Refer to Surgeons.

Posterior dislocation
Easy to miss by AP X-Ray view.
- Refer to surgeons.

Acromioclavicular (AC) joint injury
AC joint injuries (grade 1-3)
- can be treated with analgesia, broad arm sling and follow-up.

vi) Clavicle fracture:
vii) **Humerus neck/head fracture**
- Treat with collar and cuff support and analgesia.
- Arrange follow-up by surgeons.

Shaft of humerus fracture
- Using “hanging cast” POP and refer for follow-up. (or if unable to treat).

viii) **Pelvic fractures:**
- This is a major injury which can cause significant blood loss and bladder/urethral injuries.
- Always refer after appropriate resuscitation (ABC).

ix) **Hip dislocations (posterior)**
- Stabilize patient (ABC first)
- Give analgesia and refer to surgeons for reduction under GA.
- Anterior dislocation is less common.

x) **Fracture of coccyx**
- Treat symptomatically unless there is rectal damage or grossly displaced.

xi) **Fractured neck of femur**
- ABC then refer to surgeons.
- admit

xii) **Shaft of femur fracture**
- ABC, be aware of need for blood.
- Refer to surgeons. Use appropriate splints where indicated.

xiii) **Knee fractures/dislocations**
- Bone injuries to knee require referral to surgeons.

xiv) **Ankle**
**Dislocation:**
- This is an orthopaedic emergency.
- Try to do reduction as soon as possible with analgesia,
even before X-Ray.
• Once reduced (by traction on heel with calf supported with other hand) check pulse and post-reduction X-Ray.
• Immobilize in POP slab and refer to surgeons.

xv) Foot fractures and dislocations
• Delayed or inadequate treatment result in high percentage of post-traumatic osteoarthritis.
• Refer these cases for early surgical review.

Toe fractures
• Treat with analgesia, elevation and soft padding.

Dislocated toes
• Reduce promptly under digital block then immobilize by “buddy padding”.

25.5 Head Injury
• airway, circulation, breathing – ABC
• always suspect associated cervical lesion – immobilize head and neck in rigid collar.

Assess Glasgow coma scale
Best eye opening
• spontaneously - score 4
• to voice - score 3
• to pain - score 2
• not at all – score 1

Best verbal response
• converses, oriented – score 5
• converses disoriented score 4
• inappropriate words – score 3
• incomprehensible sounds – score 2
• no verbalization – score 1

Best motor response
• follows motor commands – score 6
• clearly pushes away painful stimuli – score 5
Standard Treatment Guidelines

- only withdraws arm or leg to painful stimuli – score 4
- flexion of arms with extension of legs to stimuli (decorticate) – score 3
- extension of all limbs in response to pain (decerebrate) – score 2
- flaccid with no response to painful stimuli – score 1

Add up the scores from each of the three categories to give a total. Record it.

Glasgow coma score total – from 3-15

Assess and record also - pupil size, shape and reaction to light

- evidence of asymmetry in limb movement, is there a weakness on one side?

If Glasgow coma score equals, or is less than, 13 immediately consult with surgeons on duty.
If sudden deterioration in conscious level with dilating pupil, deterioration of motor response, slowing of the pulse – suspect increase in intracranial pressure.

- Immediately contact surgeon
- Infuse mannitol 1g/kg IV rapidly – use a 20% solution in 500ml which will give a total of 100g. Adjust amount given according to actual/presumed body weight.
- Prepare for urgent transport to surgical facility.

25.6 Spinal Injury

- ABC
- Always suspect spinal (especially cervical) lesion until it can be ruled out
- Immobilize with a rigid neck collar
- X-ray lateral cervical spine
- assess any motor or sensory loss which might relate
- consult before finally deciding on presence or absence of a fracture.
Miscellaneous Surgical Problems (Trauma, burns, wound management, tetanus prophylaxis)

Trauma and burns
- contribute significantly to morbidity and mortality.
- preventive strategies need to be implemented

Primary prevention of trauma and burns in children

Motor vehicle accidents

Strategies shown to be effective in the prevention of mortality from motor vehicle accidents:
- compulsory wearing of seat belts.
- high roadworthiness of vehicles
- separation of alcohol drinking from driving – breath alcohol random testing, large penalties including loss of license for drink driving, use of “designated driver” (who does not drink alcohol that evening) for groups going out together to parties, clubs etc.
- compulsory wearing of helmets for cyclists
- no unrestrained passengers (e.g. On the back of trucks)

Burns
- safer domestic appliances
- greater care with cooking utensils on domestic stoves
- Regulation of the “bamboo pitu” – at Christmas-which regularly produces burn injuries, mainly in children.

Burns
- remove patient from source of burn
- check ABC – note any burn lesions in the mouth or upper airway
- for chemical burn, lavage with water in copious amounts
- check for associated injuries
- Estimate extend and depth of the burns – “rule of nines” (adult), or “rule of seven” (children) to estimate the area involved.
(Please refer to section 5.3.11)
Standard Treatment Guidelines

- Start IV fluid – preferably N/S or hartman’s®, 4ml/kg/per cent burn in 24 hours – e.g. 20% burn in a 70kg man = 4 x 20 x 70 = 5600ml in 24 hours (half in 8 hours and half in next 16 hours).
- If nausea, vomiting or distension occur, place nasogastric tube
- Adequate analgesia with morphine e.g. 10mg only given by the IV route and repeated as necessary.
- Tetanus prophylaxis – 0.5ml tetanus toxoid by subcutaneous injection if indicated
- Consult about further management.

Wound Management
Aim to achieve wound closure by apposition, eversion and minimum tension.
- Cleanse wound with antiseptic e.g. chlorhexidine
- Anaesthesia – lignocaine 1% plain. Do not use lignocaine with adrenaline for lesions of the digits, ears or penis: irrigate with N/S.
- Explore extent of wound and remove or wash out any foreign bodies within
- Remove dead or devitalized tissue
- Aim for primary closure if it can be achieved without undue tension
- Dress the wound, immobilize and elevate the part injured, where necessary.

Tetanus prophylaxis
- Consider in all wounded patients
- Below 10 years of age – no tetanus toxoid required if fully immunized.
- 10–15 years – if not given tetanus toxoid in the last 5 years, give one booster of 0.5ml IMI.
- Over 15 years – if not received tetanus toxoid in the last 5 years, give 0.5ml IMI and repeat after 4 weeks.
- Give antibiotics only for contaminated wounds e.g. ‘o’ (flu)cloxacillin, 500mg bd for three days

25.8 Surgical Antibiotic Prophylaxis

STG

Ministry of Health
Orthopaedic procedures

- “Clean” procedures e.g. internal fixation of bones, give gentamicin 5mg/kg as a single daily dose for up to 3 days (adjust if renal function impaired)
  OR
- Cloxacillin 1g IV 6-hourly for 48 hours
  OR
- A combination of cloxacillin and gentamicin.

If wound has the chance of being contaminated with C. perfringens (gas gangrene), ADD benzylpenicillin 1 megaunit 6-hourly, IV for 5 days.

Genitourinary

- If no pre-existing infection, give ampicillin 1g IV PLUS gentamicin 3mg/kg IV at induction
- If pre-existing infection, give and continue same antibiotics as patient is already receiving based on urine culture and sensitivities.

Caesarian Section

- If ruptured membranes seen at vaginal examination, give ampicillin 1-2g IV at induction
- If signs of infection become apparent, give 5mg/kg gentamicin as a single dose IV slowly
- (over 30 minutes) plus ampicillin 1g IV 6-hourly for up to 2 days.
- In spontaneous rupture of the membranes when immediate delivery is NOT intended:
  - Antibiotic prophylaxis needs to be given for a few days or until delivery.
  - Give erythromycin 500mg 6-hourly ‘o’ in penicillin sensitive patients.

Elective gynaecological surgery

If the vaginal vault is to be opened,

- Give metronidazole 400mg ‘o’ 4 hours before surgery
  PLUS
- Cephalothin 2g as a single dose at induction.
Elective gastro duodenal, biliary, colonic or appendix surgery

- Give ampicillin 1-2G IV
- Gentamicin 3mg/kg IV slowly at induction
- If major colonic surgery, ADD metronidazole 1g rectally as a suppository about 2 hours before surgery.

Oropharyngeal and thoracic surgery

- Give cephalothin 2g IV at induction

Lower limb amputation

In non-diabetic, give benzylpencillin 2 megaunits IV 6-hourly starting at induction and continued for 48 hours.

- Metronidazole 1g rectally 2 hours before surgery followed by 400mg ‘o’ 8-hourly for 48 hours.

If amputation is for diabetic sepsis., ADD

- Gentamicin 3mg/kg IV slowly (over 20 minutes) at the time of induction as a single dose.

Intra-abdominal infections

e.g. – cholecystitis, cholangitis, diverticulitis

Culture and sensitivity are often not available. It is important to use antibiotics that cover the patient for gram negative and anaerobic infections. Intestinal Streptococci (S. faecalis) may also play a part in the infection.

If no culture result is available to guide treatment, give gentamicin 5mg/kg IV slowly as a single dose – repeated as a daily single dose over the next three days in the presence of normal renal function. If renal function is impaired, consult with physician for advice about dosage.

- Gentamicin 3mg1kg IV slowly (over 20 minutes) as a single dose
- PLUS
- Metronidazole 1g suppository rectally 12-hourly for 7 days

PLUS
25.9 Breast Cancer
Cancer is the second commonest cause of mortality in Tonga and breast cancer is the commonest cancer in females.

In the female (rarely male), it presents as a breast lump. Such a case should always be urgently referred to the surgical team for further management.

Diagnosis is made by FNA and cytology or surgical biopsy and histology. Management will depend on the nature of the cancer and its clinical staging.

25.10 Palliative Care
According to WHO definition, palliative care is an approach that improves the quality of life of patients and their families, in facing the problems associated with life threatening illness, through the prevention and relief of suffering, by means of early identification and impeccable assessment and treatment of pain and other problems, be it physical, psychosocial and spiritual.

It is a multi-disciplinary task which requires the cooperation and participation of the clinician, nurse, other allied health workers (pharmacist, dietician, psychologist, physiotherapist), family members, community groups, volunteers and last but not the least, pastoral care staff and chaplains.

The goal of this multi-disciplinary team is to provide care that leads to the achievement of the best possible quality of life for patients and their families and friends.

Palliative care:
- Provides relief from pain and other distressing symptoms such as nausea and so forth;
- Affirms life and regards dying as a normal process;
- Intends neither to hasten nor postpone death;
Standard Treatment Guidelines  Tonga 2007

- Integrates the psychological, emotional, social and spiritual aspects of care for patients, the family and close carers in a culturally sensitive manner;
- Offers a support system to help patients live as actively as possible;
- Offers a support system to help the family and carers cope, during the patient’s illness and after the patient’s death;
- Uses a team approach;
- Avoids futile interventions;
- Recognizes the patient’s central role in decision making.

This STG will deal only with what is required of the health worker, as member of the multi-disciplinary palliative care team.

Pain management in terminal cases:
Strategies to control pain and optimize the quality of life will include the following:
- Regular analgesic administration according to the WHO analgesic ladder;
- Use of appropriate pharmacological and non-pharmacological adjuvant therapies;
- A wide range of strategies to improve mood, morale, general health and resilience;
- Open discussions arising from strong therapeutic relationships to assist in appropriate pain interpretation;
- Multi-faceted interventions to overcome impairment to relationships, normal activities of daily life, the sense of self and physical capability.

The WHO Analgesic Ladder:
Up to 88% of cancer patients will receive adequate pain relief from implementation of this ladder.

<table>
<thead>
<tr>
<th>Non-opioid</th>
<th>Non-opioid</th>
<th>Non-opioid</th>
</tr>
</thead>
<tbody>
<tr>
<td>± Adjuvant</td>
<td>± Adjuvant</td>
<td>± Adjuvant</td>
</tr>
</tbody>
</table>

Step 1  Step 2  Step 3
Step 1:
A non-opioid is used for analgesia on the first step of the ladder. This is usually paracetamol at 1g ‘o’ 6-hourly. An adjuvant would be amitriptyline for neuropathic pain, as an example. An alternative to paracetamol would be a NSAID. At the same time, the NSAID could be adjuvant therapy if the pain is originating from the bone. People with high risk of gastrointestinal side effects should also get oral ranitidine, at 150mg at night. If this is not effective, move to step 2.

Step 2:
Weak opioid (e.g. codeine) + step one analgesic ± adjuvant. Recommended dose of codeine is 30-60mg every four hours up to a max of 240mg daily.

Note: About 10% of the population respond poorly to codeine due to deficiency of liver enzymes that convert the codeine to its active metabolite. If pain is not controlled by this action, move to step 3.

Step 3:
Strong opioid like morphine + non-opioid (in step 1) ± adjuvant.
• Start with morphine elixir at 5mg ‘o’ 4-hourly and stop the weak opioid;
• If a weak opioid was not taken initially, start morphine at 2.5-5mg ‘o’ every four hours;
• Elderly, cachetic and renal failure patients should also be started at 2.5-5mg ‘o’ every four hours.

Constipation is inevitable with morphine use. Starting a laxative at the same time as the morphine reduces future problems of faecal impaction. Use a stimulant PLUS softener.

Nausea and drowsiness are common during the first week of starting morphine and patients should be advised against driving during this time. An antiemetic can be given for this week.

Switching to slow release preparations of morphine can be done as long as the total daily dosage of morphine is the same. Example:
Titration of morphine dose is slowly done upwards until effective pain control is achieved. There is no upper dose for morphine unless the patient suffers from distressing and uncontrollable adverse effects.

Opioid tolerance and dependence should never be barriers to giving morphine to achieve optimum pain relief. Any increase of need for morphine is usually due to the disease process and not tolerance.

Management of opioid induced adverse effects:
Congestion should be prevented by giving regular stool softener and stimulant, titrated to maintain the patient’s normal bowel opening.

Nausea and vomiting is experienced by two thirds of patients started on morphine; this usually resolves within a few days. An antiemetic can be given during this time, example:
- Metoclopramide 10mg ‘o’tds. However, this should not be given if there is intestinal colic, especially in association with bowel obstruction.
- Haloperidol, 0.5-1mg at night is an appropriate alternative
  OR
- Prochlorperazine at 5-10mg ‘o’ every six hours.
- Dexamethasone 2-8mg every 8 hours can be effective in intractable nausea and vomiting.

Drowsiness and drowsiness occurs during first week of starting morphine or when the dose is increased. Patients should be advised to stop driving.

Opioid toxicity show classic signs such as:
- Pinpoint pupils
- Hallucinations
- Drowsiness
- Vomiting
- Respiratory depression
- Confusion
Standard Treatment Guidelines

- **Myoclonic jerks**
  These occur when the dose is increased too rapidly, renal impairment, poor response to morphine, an adjuvant therapy has caused pain relief and baseline morphine dose has not been reduced.

When toxicity signs occur, morphine should be stopped and started at lower dose later. If there is dehydration, IV fluid can dilute the morphine; reducing the active level and signs of toxicity, much more quickly. The delirium symptoms of toxicity may be treated with haloperidol while the toxicity resolves.
Respiratory depression rarely occurs unless excessive dose of morphine was given. Naloxone can be used in this situation at a dose of 20µg every two minutes until the respiratory rate is satisfactory.

**Pethidine** is not used in palliative care.

**Co-analgesics:**

The following drugs can be added to help the analgesic effects of morphine:
- *NSAIDs help to decrease inflammation and bone pain;*
- *Corticosteroids like dexamethasone help decrease swelling; (It can cause increase appetite, mood swings, depression, psychosis and proximal myopathy)*
- *Muscle relaxants like diazepam decrease muscle spasm;*
- *Antidepressants (like amitriptyline 10-60mg at night) and anticonvulsants (like carbamazepine 100mg a day increasing to 200mg three times a day; or sodium valproate) help in neuropathic pain.*

**Other symptoms in the terminally ill:**

**Dyspnoea:**
Can be caused by anaemia, heart failure, COAD, chest infection, pericardial effusion, anxiety and superior vena cava obstruction.
Simple non-specific measures can produce relief. This include sitting up in bed, oxygen, controlled breathing techniques and management of anxiety with a benzodiazepine (*like diazepam 5mg ‘o’*).
Other specific causes as mentioned above should be treated accordingly.

**Cough:**
Non-productive cough can be managed by using a cough suppressant unless there is dyspnoea. If it is due to tumor, dexamethasone at a dose of 6-8mg daily may be beneficial. Productive cough should be treated with nebulised saline, physiotherapy and an expectorant.

**Hiccups:**
- **Rebreathing from a bag can be beneficial.** Prolonged hiccups can be treated with haloperidol 1.5mg ‘o’ 8-hourly to a max. of 9mg/day. Another alternative is chlorpromazine 25mg ‘o’ 8-hourly to a max. of 200mg/day.
- Metoclopramide, 10mg ‘o’ 8-hourly to reduce gastric distension.
- Anti epileptic such as carbamazepine or sodium valproate can be used if the hiccups is due to an intracranial disease.

**Pruritis:**
- Apply a surface cooling agent(s) (such as an appropriate aqueous skin lotion)
- Use a soap substitute
- Give ‘o’ antihistamine like promethazine
- Use rifampicin for chronic cholestasis
- Use anxiolytics such as diazepam

**Retained secretions (death rattle)**
- Reposition the patient
- Exclude pulmonary oedema and treat appropriately with diuretic
- **Hyoscine butylbromide (buscopan®)** 20mg SC stat and review after 30 minutes. If effective, give it at 20mg SC every 6-8 hours.
Policy for Restriction Level of the Essential Drugs
The Restriction Levels for the Essential Drugs are reviewed on a regular basis, by the National Drugs and Medical Supplies Committee. The main reason for this review is to provide practical restriction levels, which can guarantee, that the prescriber is competent in using a specific level of drug/s at his/her health care setting; in order to meet the pharmaceutical needs of the people under his/her care.

As an example, a certain drug may be restricted to level 3 (hospital use only) at Tongatapu. However, at the setting of the outer islands with no easy access to a medical officer (eg: NTT or Ha’afeva island), the drug may be reduced to a level 2 restriction. Incidentally, a HO stationed at any one of these outer island stations will be carefully screened, to ensure that he/she can safely and appropriately use these higher level drugs.

Restriction Level of the Drugs as determined by the National Drugs and Medical Supplies committee:
Level 1  -  Drugs available from MCH
Level 2  -  Drugs available from Health Centers
Level 3  -  Drugs available from Hospitals
Level 4  -  Specialist Drugs Only

There is also another legally based classification for the restriction levels of drugs; dictated by the “Therapeutic Goods Act 2001” part III, 5(1),(2), (3) and (4). All drugs that can be used in Tonga are listed in the ‘National Registered Drugs List’, which is maintained by the National Drugs and Medical Supplies Committee. The restriction levels in the EDL, as listed below, is based on this classification. However, one should always remember, that for logistical and practical reasons, the National Drugs and Medical Supplies committee may, from time to time, decide to use a slightly altered level of restriction in geographically isolated areas.

Classification of the of the National Registered List are as follows:
Class 1  -  Medicinal Drugs available from a licensed retail outlets;
Class 2 - Medicinal Drugs available from a registered pharmacy premises under the supervision of a registered pharmacist, divided into-
Class 2A - Where advice of a pharmacist at point of sale is not required;
Class 2B - Where advice of a pharmacist at point of sale is required
Class 3 - Medicinal Drugs available on prescription only and dispensed by pharmacist or Assistant Pharmacist;
Class 4 - Medicinal Drugs available on special prescription only dispensed by a Pharmacist or Assistant Pharmacist;
Class 5 - Narcotic Drugs available and Psychotropic Substances subject to Special Import Controls;
Class 6 - Medicinal Drugs available from Veterinary Practitioners for animal use.

26.1 Anaesthetics

**General anaesthetics & Oxygen**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halothane</td>
<td>Liq</td>
<td>250ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Isoflurane</td>
<td>Liq</td>
<td>250ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Ketamine</td>
<td>Amp</td>
<td>50mg/1ml, 10ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Inh</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>Inh</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Propofol</td>
<td>Amp</td>
<td>10mg/ml, (1%), 20ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Thiopentone Sodium</td>
<td>Amp</td>
<td>500mg, 2.5% = 25mg/ml when reconstituted</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------</td>
<td>----------------------------</td>
<td>---------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Bupivacaine HCl</td>
<td>Amp</td>
<td>0.5%, 20ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bupivacaine HCl</td>
<td>Amp</td>
<td>inj for spinal anaesthesia, 0.5% in 4ml amps. (8% glucose)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Ethyl Chloride</td>
<td>Spray</td>
<td>100ml</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Lidocaine (Lignocaine)</td>
<td>Amp</td>
<td>1%, 10ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lidocaine (Lignocaine)</td>
<td>Oint</td>
<td>2%</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Lidocaine (Lignocaine)</td>
<td>Gel</td>
<td>2%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lidocaine (Lignocaine) + Adrenaline</td>
<td>Amp</td>
<td>1% + 1:200,000, 20ml</td>
<td>3</td>
<td>For Dental Use Only</td>
</tr>
<tr>
<td>Lidocaine (Lignocaine) + Adrenaline</td>
<td>Dental cartridge</td>
<td>1% + 1:80,000, 2.2ml</td>
<td>3</td>
<td>For Dental Use Only</td>
</tr>
<tr>
<td>Lidocaine (Lignocaine) + Adrenaline</td>
<td>Dental cartridge</td>
<td>2.2%</td>
<td>3</td>
<td>For Dental Use Only</td>
</tr>
<tr>
<td>Lignocaine</td>
<td>Topical solution</td>
<td>4%, 50ml</td>
<td>4</td>
<td>For Paediatrics and Theatre Use Only</td>
</tr>
<tr>
<td>Lignocaine &amp; Prilocaine</td>
<td>Cream</td>
<td>2.5% &amp; 2.5%, 5g</td>
<td>4</td>
<td>For Dental Use Only</td>
</tr>
<tr>
<td>Prilocaine</td>
<td>Inj</td>
<td>1%, 5ml</td>
<td>4</td>
<td>For Dental Use Only</td>
</tr>
<tr>
<td>Prilocaine + fenylpressin</td>
<td>Dental cartridge</td>
<td>3%</td>
<td>3</td>
<td>For Dental use only</td>
</tr>
</tbody>
</table>

Preoperative medication and sedation for short-term procedures

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<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine</td>
<td>Amp</td>
<td>600mcg/1ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>Tab</td>
<td>5mg</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>Amp</td>
<td>10mg/2ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>Amp</td>
<td>10mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Midazolam</td>
<td>Inj</td>
<td>15mg/3ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Midazolam</td>
<td>Inj</td>
<td>5mg/5ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Morphine</td>
<td>Amp</td>
<td>10mg/1ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Syrup</td>
<td>5mg/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Temezapam</td>
<td>Tab</td>
<td>10mg</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

## Complementary Drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ephedrine</td>
<td>Amp</td>
<td>30mg/1ml</td>
<td>3</td>
<td>Theatre/Anaesthesia only</td>
</tr>
<tr>
<td>Metaraminol</td>
<td>Amp</td>
<td>10mg/1ml</td>
<td>4</td>
<td>Theatre/Anaesthesia only</td>
</tr>
<tr>
<td>Noradrenaline</td>
<td>Amp</td>
<td>2mg</td>
<td>4</td>
<td>Theatre/Anaesthesia only</td>
</tr>
</tbody>
</table>
# 26.2 Analgesics

## Non-opioid

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylsalicylic acid,</td>
<td>Tab</td>
<td>300mg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>Tab</td>
<td>400mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Indomethacin</td>
<td>Tcap</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Indomethacin</td>
<td>Suppos</td>
<td>100mg</td>
<td>3</td>
<td>For Renal Colic &amp; Post-Op only</td>
</tr>
<tr>
<td>Naproxen</td>
<td>Tab</td>
<td>250mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Tab</td>
<td>500mg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Suppos</td>
<td>125mg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Suppos</td>
<td>250mg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Suppos</td>
<td>500mg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Paracetamol Elixir</td>
<td></td>
<td>120mg/5ml</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

## Opioid analgesics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfentanil</td>
<td>Inj</td>
<td>1mg/2ml</td>
<td>5</td>
<td>Vaoila Hospital theatre only!!! Anaesthetists only!!</td>
</tr>
<tr>
<td>Codeine phosphate</td>
<td>Tab</td>
<td>30mg</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------</td>
<td>---------------</td>
<td>----------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Fentanyl Citrate</td>
<td>Amp</td>
<td>100mcg/2ml</td>
<td>5</td>
<td>Vaoila Hospital theatre only!!! Anaesthetists only!!</td>
</tr>
<tr>
<td>Morphone Sulphate</td>
<td>Amp</td>
<td>10mg/1ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Morphone Elixer</td>
<td></td>
<td>10mg/5ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Morphone Sulphate (MST Continus)</td>
<td>Tabs</td>
<td>30mg</td>
<td>5</td>
<td>For management of severe chronic pain</td>
</tr>
<tr>
<td>Morphone Sulphate (MST Continus)</td>
<td>Tabs</td>
<td>60mg</td>
<td>5</td>
<td>For management of severe chronic pain</td>
</tr>
<tr>
<td>Pethidine</td>
<td>Amp</td>
<td>50mg/1ml</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Drugs used to treat gout**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allopurinol</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Allopurinol</td>
<td>Tab</td>
<td>300mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Colchicine</td>
<td>Tab</td>
<td>500mcg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Disease-modifying agents used in rheumatic disorders**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td>Tab</td>
<td>2.5mg</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### 26.3 Antiallergics & Drugs used in anaphylaxis

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline</td>
<td>Amp</td>
<td>1:1000, (1mg in 1ml)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Amp</td>
<td>8mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>Amp</td>
<td>100mg, vial, powder</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prednisone</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Amp</td>
<td>50mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Syrup</td>
<td>5mg/5ml</td>
<td>3</td>
<td>To be restricted for use for premed and rashes only. Available at level 2, but only 2 doses to be prescribed &amp; dispensed</td>
</tr>
<tr>
<td>Chlorpheniramine</td>
<td>Tab</td>
<td>2mg and 4mg</td>
<td>3</td>
<td></td>
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</tbody>
</table>

### 26.4 Antidotes & Other Substances Used In Poisonings

#### Non-Specific

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charcoal, activated</td>
<td>Powder</td>
<td>5g</td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>
### 26.5 Anticonvulsants/Antiepileptics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Syrup</td>
<td>100mg/5 ml, 250ml</td>
<td>3</td>
<td>Consultant Paediatrician use only. Must be dispensed on after a new Rx is issued</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>Tab</td>
<td>2mg</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>Amp</td>
<td>10mg/2ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>Tab</td>
<td>5mg</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Formulation</td>
<td>Strength</td>
<td>Recommended Dose</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ethosuximide</td>
<td>Elixir</td>
<td>250mg/5ml, 250ml</td>
<td>3</td>
<td>Consultant Paediatrician use only. Must be dispensed on after a new Rx is issued</td>
</tr>
<tr>
<td>Magnesium Sulphate</td>
<td>Amp</td>
<td>50% (1g/2ml)</td>
<td>3</td>
<td>2mmol Mg$^{2+}$ = 0.5g of MgSO4</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Tab</td>
<td>30mg</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Elixir</td>
<td>15mg/5ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Amp</td>
<td>200mg/ml, 1ml</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Amp</td>
<td>250mg/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Mixture</td>
<td>30mg/5ml, 500ml</td>
<td>3</td>
<td>Consultant Paediatrician use only. Must be dispensed on after a new Rx is issued</td>
</tr>
<tr>
<td>Valproate</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Valproate</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Valproic acid</td>
<td>Elixir</td>
<td>200mg/5ml, 300ml</td>
<td>4</td>
<td>Consultant Paediatrician use only. Must be dispensed on after a new Rx is issued</td>
</tr>
</tbody>
</table>
## 26.6 Anti-Infective Drugs

### Anthelminthics (Intestinal anthelminthics)

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mebendazole</td>
<td>Tab</td>
<td>100mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Pyrantel</td>
<td>Syrup</td>
<td>250mg/5ml, 60ml</td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>

### 26.7 Anti-bacterial, Anti-viral, Anti-fungal And Anti-protozoal.

#### Beta Lactam drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comment(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>Tcap</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Tcap</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Pdr for oral Susp</td>
<td>125mg/5ml, 100ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Amp</td>
<td>500mg (powder)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Benzathine Benzylpenicillin</td>
<td>Amp</td>
<td>1.2 million units, (powder)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Benzylpenicillin (Penicillin G)</td>
<td>Amp</td>
<td>600mg = 1 million units = 1 mega, vial, (powder)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>Tcap</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>Tcap</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloxacillin</td>
<td>Pdr for oral</td>
<td>125mg/5ml, 100ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td>Susp</td>
<td>500mg (powder)</td>
<td>3</td>
<td>Pending to replace cloxacillin</td>
</tr>
<tr>
<td>Flucloxacillin</td>
<td>Tcap</td>
<td>250mg</td>
<td>3</td>
<td>Pending to replace cloxacillin</td>
</tr>
<tr>
<td>Flucloxacillin</td>
<td>Pdr for oral</td>
<td>125mg/5ml, 100ml</td>
<td>3</td>
<td>Pending to replace cloxacillin</td>
</tr>
<tr>
<td>Flucloxacillin</td>
<td>Tcap</td>
<td>500mg</td>
<td>3</td>
<td>Pending to replace cloxacillin</td>
</tr>
<tr>
<td>Flucloxacillin</td>
<td>Amp</td>
<td>500mg (powder)</td>
<td>3</td>
<td>Pending to replace cloxacillin</td>
</tr>
<tr>
<td>Phenoxymethyl penicillin (Pen V)</td>
<td>Tab</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phenoxymethyl penicillin (Pen V)</td>
<td>Syrup</td>
<td>125mg/5ml (powder)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Procaine benzylpenicillin</td>
<td>Amp</td>
<td>3g = 3 million units, vial, powder</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Restricted indications

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin &amp; clavulanic acid</td>
<td>Tab</td>
<td>500mg + 125mg</td>
<td>3</td>
<td>For STI only</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>Amp</td>
<td>1g</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Cefuroxine</td>
<td>Amp</td>
<td>750mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Ministry of Health
### Other antibacterials

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloramphenicol (Chloromycetin)</td>
<td>Tcap</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol (Chloromycetin)</td>
<td>Syrup</td>
<td>125mg/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol (Chloromycetin)</td>
<td>Amp</td>
<td>1g, vial, powder</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>Tab</td>
<td>500mg</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole</td>
<td>Tab</td>
<td>400mg + 80mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole</td>
<td>Syrup</td>
<td>(200mg + 40mg)/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Tab</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Tab</td>
<td>125mg/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------</td>
<td>------</td>
<td>---------------</td>
<td>----------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Roxithromycin</td>
<td>Tab</td>
<td>150mg</td>
<td>4</td>
<td>Pending awaiting costing for special cases</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Amp</td>
<td>80mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Amp</td>
<td>500mg / 100ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Suppos</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Amp</td>
<td>500mg, vial, powder</td>
<td>4</td>
<td>For MRSA cases only - Vaiola hosp only</td>
</tr>
</tbody>
</table>

### Antituberculosis drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethambutol</td>
<td>Tab</td>
<td>400mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rifampicin</td>
<td>Tab</td>
<td>150mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rifampicin</td>
<td>Tab</td>
<td>300mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rifampicin &amp; Isoniazid</td>
<td>Tab</td>
<td>300mg + 150mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rifampicin &amp; Isoniazid</td>
<td>Tab</td>
<td>150mg + 100mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Antifungal Drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Griseofulvin</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nystatin</td>
<td>Oral</td>
<td>100,000 iu/ml</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Nystatin</td>
<td>Pessaries</td>
<td>100,000 units, pkt/15</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Clotrimazole</td>
<td>Pessaries</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Antiprotozoal Drugs (Antiamoebic and antiGiardiasis)

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metronidazole</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Amp</td>
<td>500mg in 100ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Antimalarial drugs for curative treatment

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroquine</td>
<td>Tab</td>
<td>150mg (base)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Quinine</td>
<td>Tab</td>
<td>300mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Quinine</td>
<td>Amp</td>
<td>600mg/2 ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Antiviral Drugs (Antiherpes Drugs)
### Standard Treatment Guidelines

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aciclovir</td>
<td>IV</td>
<td>250mg</td>
<td>4</td>
<td>Drugs committee to review cost implications before introduction</td>
</tr>
</tbody>
</table>

### Antiretroviral Drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevirapine</td>
<td>Tab</td>
<td>200mg</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Zidovudine</td>
<td>Tab</td>
<td>250mg</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### 26.8 Antimigraine Drugs

#### For treatment of acute attack

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ergotamine + Caffeine</td>
<td>Tab</td>
<td>1mg + 100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Tab</td>
<td>500mg</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### For prophylaxis

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propranolol</td>
<td>tab</td>
<td>40mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 26.9 Antineoplastic And Immunosuppressive Drugs
### 26.10 Antiparkinsonism Drugs
**Dopaminergic drugs used in Parkinsonism**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromocriptine</td>
<td>Tab</td>
<td>2.5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Levodopa + Carbidopa</td>
<td>Tab</td>
<td>250mg + 25mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Antimuscarinic drugs used in Parkinsonism**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzhexol</td>
<td>Tab</td>
<td>2mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Benzhexol</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Benztropine mesylate</td>
<td>Amp</td>
<td>2mg/2ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 26.11 Antianaemia Drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous Gluconate</td>
<td>Syrup</td>
<td>300mg/5ml, 100ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Ferrous Sulphate</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### 26.12 Drugs Affecting Coagulation

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin Sodium</td>
<td>Amp, 5ml</td>
<td>5000units/ml, (25,000units)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Heparin Sodium</td>
<td>Amp, 0.2ml</td>
<td>5000units/ml, (1000units)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Heparinized Sodium Chloride</td>
<td>amp</td>
<td>5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phytomenadione (Vit K)</td>
<td>Amp</td>
<td>1mg in 0.5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phytomenadione (Vit K)</td>
<td>Amp</td>
<td>10mg in 1ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>Tab</td>
<td>1mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>Tab</td>
<td>3mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Enoxaparin (Low molecular weight heparin)</td>
<td>Inj (IMI)</td>
<td>40mg, 0.6ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 26.13 Blood Products And Plasma Substitutes

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelatin - Modified fluid gelatin</td>
<td>IV inf</td>
<td>500ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Antianginal Drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td>For use in Anaesthesia. Also for use only in OPD for MI</td>
</tr>
<tr>
<td>Atenolol</td>
<td>Inj</td>
<td>5mg/10ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glyceryl Trinitrate</td>
<td>Tablet, (sub - lingual)</td>
<td>500mcg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Isosorbide Dinitrate</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td>Health officer can prescribe, but not initiate therapy</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Tab</td>
<td>20mg SR</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Verapamil</td>
<td>Tab</td>
<td>40mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glyceryl trinitrate</td>
<td>Spray</td>
<td></td>
<td>3</td>
<td>Pending awaiting price</td>
</tr>
</tbody>
</table>

### Antiarrythmic drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenosine</td>
<td>Amp</td>
<td>6mg in 2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Amiodorone</td>
<td>Amp</td>
<td>150mg/3ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Antihypertensive drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength /Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Drugs Used in Heart Failure

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captopril</td>
<td>Tab</td>
<td>12.5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Enalapril</td>
<td>Tabs</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydralazine</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydralazine</td>
<td>Amp</td>
<td>20mg, powder for 1ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Labetalol</td>
<td>Amp</td>
<td>5mg/1ml (100mg in 20ml)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Labetalol</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metyldopa</td>
<td>Tab</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Tab</td>
<td>20mg SR</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Verapamil</td>
<td>Tab</td>
<td>40mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prazosin</td>
<td>Tab</td>
<td>0.5mg</td>
<td>3</td>
<td>Also used for management of BPH</td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines  
**Tonga 2007**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captopril</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Captopril</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>Tab</td>
<td>62.5mcg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>Tab</td>
<td>250mcg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>Elixir</td>
<td>250mcg/5ml. 50ml pack size</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>Amp</td>
<td>500mcg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>Amp</td>
<td>50mcg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td>Amp</td>
<td>200mg/5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dobutamine</td>
<td>Amp</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Enalapril</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Antithrombotic drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylsalicylic acid</td>
<td>Tab</td>
<td>300mg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Acetylsalicylic acid</td>
<td>Tab</td>
<td>100mg</td>
<td>1</td>
<td>Pending awaiting price</td>
</tr>
<tr>
<td>Streptokinase</td>
<td>Amp</td>
<td>1.5 million units, vial, powder</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

26.15 Dermatological Drugs (topical)

Antifungal drugs
### Standard Treatment Guidelines Tonga 2007

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid &amp; salicylic acid (Whitfields oint)</td>
<td>Oint</td>
<td>6% + 3%</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Clotimazole</td>
<td>Cream</td>
<td>1%, 15g</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

### Anti-infective drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoin Compound Tincture</td>
<td>Liquid</td>
<td>2A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methylrosanilinium chloride</td>
<td>Soln</td>
<td>0.50%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Neomycin + bacitracin</td>
<td>Oint</td>
<td>Ointment, 5mg + 500iu/g, 15g/tube</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Silver Sulfadiazine</td>
<td>Cream</td>
<td>1%, 500g containers</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

### Anti-inflammatory & Antipruritic drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betamethasone Valerate</td>
<td>Cream</td>
<td>0.1%, 15g</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Calamine lotion</td>
<td>Liquid</td>
<td>Lotion</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>
### Astringent drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc with Castor oil</td>
<td>Oint</td>
<td>7.5% + 80%</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

### Drugs affecting skin differentiation & proliferation

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Podophyllum resin</td>
<td>Soln</td>
<td>10-25%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Salicylic acid</td>
<td>Soln</td>
<td>5%</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

### Scabicides & pediculicides

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzyl Benzoate Application</td>
<td>Lotion</td>
<td>25%</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Permethrin</td>
<td>Cream</td>
<td>5%</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Permethrin</td>
<td>Solution</td>
<td>1%</td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>

### Miscellaneous

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubricating Jelly</td>
<td>Jelly</td>
<td>42g tube (KY)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lubricating Jelly</td>
<td>Jelly</td>
<td>Sachet, 150/pkt</td>
<td>1</td>
<td>For Paeds only!</td>
</tr>
<tr>
<td>Silver Nitrate</td>
<td>Sticks</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
## Diagnostic Agents

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albustix Reagent Strips</td>
<td>Strips</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Clinistix</td>
<td>Strips</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Dextrostix</td>
<td>Strips</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Glucose testing strips</td>
<td>Strips</td>
<td></td>
<td>2A</td>
<td>Depending on the testing machine in use in hospital.</td>
</tr>
<tr>
<td>Litmus Paper blue</td>
<td></td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Multistix SG</td>
<td>Strips</td>
<td></td>
<td>2A</td>
<td>Paediatrics &amp; Out-patient use only</td>
</tr>
</tbody>
</table>

## Disinfectants and Antiseptics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorhexidine gluconate</td>
<td>Solution</td>
<td>20% for dilution</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine gluconate</td>
<td>Scrub</td>
<td>3%</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine gluconate</td>
<td>Cream</td>
<td>1%</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Sodium Hypochloride</td>
<td>Solution</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Sodium Hypochloride</td>
<td>Granules</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>Solution</td>
<td>2g/L</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>
# 26.17 Diuretics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frusemide</td>
<td>Tab</td>
<td>40mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Frusemide</td>
<td>Amp</td>
<td>20mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydrochlorothiazide (HCT)</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Spironolactone</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mannitol</td>
<td>Amp</td>
<td>20%</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

# 26.18 Gastrointestinal Drugs

## Antacids and other antiulcer drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium Hydroxide</td>
<td>Tablet</td>
<td>300mg</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines Tonga 2007

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omeprazole</td>
<td>Cap</td>
<td>20mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cimetidine</td>
<td>Inj</td>
<td>200mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Magnesium Trisilicate (MMT)</td>
<td>Mixt</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ranitidine</td>
<td>Tablet</td>
<td>150mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Antiemetic drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoclopramide</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>Amp</td>
<td>10mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>Inj</td>
<td>25mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Amp</td>
<td>50mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Promethazine</td>
<td>Syrup</td>
<td>5mg/5ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Antihaemorrhoidal drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antihaemorrhoid</td>
<td>Oint</td>
<td>30g</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Antihaemorrhoid</td>
<td>Supp</td>
<td></td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>
# Standard Treatment Guidelines

## Tonga 2007

### Antispasmodic

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscine Butyl Bromide</td>
<td>Inj</td>
<td>20mg/ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Laxatives

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisacodyl</td>
<td>Tab</td>
<td>5mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Bisacodyl</td>
<td>Suppos</td>
<td>5mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Bisacodyl</td>
<td>Suppos</td>
<td>10mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Liquid Paraffin</td>
<td>Soln</td>
<td></td>
<td>1</td>
<td>Paediatric use only</td>
</tr>
<tr>
<td>Docusate sodium</td>
<td>Tab</td>
<td>50mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Docusate sodium</td>
<td>Drops</td>
<td></td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Docusate sodium</td>
<td>Supp</td>
<td>100mg</td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>

### Drugs used in diarrhea

#### Oral rehydration

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral rehydration salts (ORS)</td>
<td>Powder, 27.9g/l</td>
<td>Sachet for 1 Litre</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Antidiarrhoeal (symptomatic) drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loperamide</td>
<td>Tab</td>
<td>2mg</td>
<td>2B</td>
<td></td>
</tr>
</tbody>
</table>
## Drugs used in hepatic encephalopathy

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactulose</td>
<td>Syrup</td>
<td>3.35g/5ml, 500ml</td>
<td>1</td>
<td>For hepatic encephalopathy only</td>
</tr>
<tr>
<td>Neomycin Sulphate</td>
<td>Tab</td>
<td>500mg</td>
<td>4</td>
<td>On special request only</td>
</tr>
</tbody>
</table>

## 26.19 Hormones, Other endocrine Drugs And Contraceptives

### Adrenal hormones and synthetic substitutes

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>Tab</td>
<td>4mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Amp</td>
<td>8mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>Amp</td>
<td>100mg, vial, powder</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Methylprednisolone acetate</td>
<td>Amp</td>
<td>40mg/ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prednisone</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Prednisone</td>
<td>Tab</td>
<td>20mg</td>
<td>4</td>
<td>Level 4. For specialist use</td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------</td>
<td>---------------</td>
<td>---------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Ethinylestradiol + Levonorgestrel</td>
<td>Tab</td>
<td>30mcg + 150mcg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Ethinylestradiol + Norethisterone</td>
<td>Tab</td>
<td>35mcg + 1.0mg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Levonorgestrel</td>
<td>Tab</td>
<td>30mcg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Medroxyprogesterone acetate</td>
<td>Amp</td>
<td>depot, 150mg/1ml</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

**Intrauterine devices**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper containing device</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Barrier Methods**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condoms with or without spermicide (nonoxinol)</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Diaphragms with spermicide (nonoxinol)</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Estrogens**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjugated equine oestrogens-norgestrel 0.625mg/0.15mg</td>
<td>Tab</td>
<td>0.625mg-0.15mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Conjugated equine oestrogens

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clomifene</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Flutamide

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flutamide</td>
<td>Tab</td>
<td>250mg</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Ovulation inducers

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clomifene Tab 50mg</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Progestogens

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medroxy-progesterone acetate Tab 10mg</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Norethisterone Tab 5mg</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Insulins & other antidiabetic agents

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glibenclamide Tab 5mg</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glipizide Tab 5mg</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Insulin (Soluble) Inj 100units/ml in 10ml vial</td>
<td>Tab</td>
<td>100units/ml in 10ml vial</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Insulin (premixed) Inj 100units/ml in 10ml vial 70:30</td>
<td>Tab</td>
<td>100units/ml in 10ml vial 70:30</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Insulin Isophane Inj 100units/ml in 10ml vial</td>
<td>Tab</td>
<td>100units/ml in 10ml vial</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
| Drug Name         | Form   | Strength/Size | Proposed Restriction Level | Comments |}
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucagon</td>
<td>Inj</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>Tab</td>
<td>500mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Simvastatin</td>
<td>Tab</td>
<td>20mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pending awaiting price</td>
</tr>
</tbody>
</table>

**Thyroid hormones and antithyroid drugs**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbimazole</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Levothyroxine/Thyroxine</td>
<td>Tab</td>
<td>100mcg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Posterior pituitary hormones**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desmopressin acetate</td>
<td>Nasal spray</td>
<td>Spray 6ml</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**26.20 Immunological Diagnostic Agents**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculin, purified protein derivative (PPD)</td>
<td>Amp</td>
<td>5iu/dose, 10 doses</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>
## 26.21 Immunoglobulins And Vaccines

### Sera and immunoglobulins

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-D immunoglobulin (human)</td>
<td>Vial</td>
<td>250mcg in single dose vial</td>
<td>3</td>
<td>Keep - but with restrictions</td>
</tr>
<tr>
<td>Antitetanus immunoglobulin (human)</td>
<td>Vial</td>
<td>Injection, 500iu in vial</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Immunoglobulin, human normal</td>
<td>Vial</td>
<td>Intramuscular</td>
<td>4</td>
<td>Special request only?</td>
</tr>
</tbody>
</table>

### For universal immunization

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG vaccine (dried)</td>
<td>Vial</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Diphtheria - pertussis - tetanus vaccine (DPT)</td>
<td>Vial</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Diphtheria - tetanus vaccine</td>
<td>Vial</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Hepatitis B vaccine</td>
<td>Injection</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Measles vaccine</td>
<td>Vial</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Poliomyelitis vaccine (live attenuated)</td>
<td>Oral Sol</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Tetanus vaccine</td>
<td>Vial</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>
### 26.22 Muscle Relaxants (in anaesthesia) & Anticholinesterase

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atracurium Besylate</td>
<td>Amp</td>
<td>25mg in 2.5ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Atracurium Besylate</td>
<td>Amp</td>
<td>50mg in 5ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Neostigmine</td>
<td>Amp</td>
<td>2.5mg in 1ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pancuronium Bromide</td>
<td>Amp</td>
<td>4mg in 2ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Suxamethonium</td>
<td>Amp</td>
<td>100mg in 2ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vecuronium (Norcuron)</td>
<td>Amp</td>
<td>10mg</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### 26.23 Ophthalmological Preparations

#### Anti-infective agents

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aciclovir</td>
<td>Eye Oint</td>
<td>3%, 4.5g</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol eye</td>
<td>Oint</td>
<td>1%</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol eye</td>
<td>Drops</td>
<td>0.50%</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Framycetin eye / ear</td>
<td>Drops</td>
<td>0.50%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Framycetin / dexamethazone</td>
<td>Drops</td>
<td>0.5% / 0.05%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Tetracycline eye</td>
<td>Oint</td>
<td>1%, 4g</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Local anaesthetics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amethocaine eye</td>
<td>Soln</td>
<td>0.50%</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Miotics & antiglaucoma drugs

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetazolamide</td>
<td>Tab</td>
<td>250mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pilocarpine eye</td>
<td>Soln</td>
<td>2%, 15ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Timolol eye</td>
<td>Soln</td>
<td>0.25%, 5ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Timolol eye</td>
<td>Soln</td>
<td>0.5%, 5ml</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Mydriatics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine Sulphate eyedrops</td>
<td>Eye Drops</td>
<td>1%, 15ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phenylephrine HCl</td>
<td>Eye Drops</td>
<td>0.12%, 15ml</td>
<td>2A</td>
<td></td>
</tr>
</tbody>
</table>

### Diagnostic agents

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescein ophthalmic strips</td>
<td>Strips</td>
<td>strip with 0.6mg</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Tropicamide eye</td>
<td>Soln</td>
<td>1%, 15ml</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### 26.24 Oxytocics & Antioxytocics

#### Oxytocics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dinoprostone</td>
<td>Gel</td>
<td>1mg</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Carboprost</td>
<td>Amp</td>
<td>250mcg/ml</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Misoprostol</td>
<td>Tab</td>
<td>200mcg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>---------------</td>
<td>----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Ergometrine</td>
<td>Amp</td>
<td>0.5mg/ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Oxytocin</td>
<td>Amp</td>
<td>5units/1ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Antioxytocics

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salbutamol</td>
<td>Amp</td>
<td>500mcg/1ml</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 26.25 Psychotherapeutic Drugs

**Drugs used in psychotic disorders**

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpromazine</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>Amp</td>
<td>50mg/2ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Tab</td>
<td>0.5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Tab</td>
<td>1.5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Tab</td>
<td>5mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Amp</td>
<td>5mg/1ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Thioridazine</td>
<td>Tab</td>
<td>50mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Thioridazine</td>
<td>Tab</td>
<td>100mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Thiothixene</td>
<td>Tab</td>
<td>10mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Trifluoperazine</td>
<td>Tab</td>
<td>2mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
## Drugs Used In Psychotic Disorders (depot preparations)

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluphenazine decanoate</td>
<td>Amp</td>
<td>12.5mg/0.5ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Haloperidol Decanoate</td>
<td>Amp</td>
<td>50mg/ml. (1ml amps)</td>
<td>3</td>
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</table>

## Drugs used in mood disorders

### Drugs used in depressive disorders

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amitriptyline</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Clomipramine</td>
<td>Tcap</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mianserin</td>
<td>Tab</td>
<td>30mg</td>
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### Selective Serotonin reuptake inhibitors and other new antidepressants

<table>
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<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Fluoxetine</td>
<td>Tab</td>
<td>20mg</td>
<td>3</td>
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## Drugs used in bipolar disorders

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<th>Comments</th>
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<tbody>
<tr>
<td>Carbamazepine</td>
<td>Tab</td>
<td>200mg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Drug Name</td>
<td>Form</td>
<td>Strength/Size</td>
<td>Proposed Restriction Level</td>
<td>Comments</td>
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<tr>
<td>-----------------</td>
<td>------</td>
<td>---------------</td>
<td>----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Lithium carbonate</td>
<td>Tab</td>
<td>250mg</td>
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**Miscellaneous**

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<th>Proposed Restriction Level</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Methylphenidate HCl</td>
<td>Tab</td>
<td>10mg</td>
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**Drugs used in generalized anxiety and sleep disorders**

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<td>Diazepam</td>
<td>Tab</td>
<td>5mg</td>
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**Drugs used in obsessive-compulsive disorders & panic attacks**

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<tr>
<td>Clomipramine</td>
<td>Tcap</td>
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<td>Imipramine</td>
<td>Tab</td>
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**26.26 Drugs Acting On The Respiratory Tract**

**Antiasthmatic drugs**

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<tbody>
<tr>
<td>Aminophylline</td>
<td>Amp</td>
<td>250mg/10ml</td>
<td>3</td>
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<tr>
<td>Beclometasone</td>
<td>Aerosol</td>
<td>100mcg/puff</td>
<td>3</td>
<td>Paediatrics only</td>
</tr>
<tr>
<td>Beclometasone</td>
<td>Aerosol</td>
<td>250mcg/puff</td>
<td>3</td>
<td>Adults only!</td>
</tr>
<tr>
<td>Ipratropium Bromide</td>
<td>Nebules</td>
<td>500mcg/ml (1ml nebs)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

STG 382 Ministry of Health
<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Salbutamol</td>
<td>Tab</td>
<td>2mg</td>
<td>3</td>
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<tr>
<td>Salbutamol</td>
<td>Aerosol</td>
<td>100mcg/puff</td>
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<tr>
<td>Salbutamol</td>
<td>Resp Soln</td>
<td>5mg/ml. 30ml</td>
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<tr>
<td>Salbutamol</td>
<td>Amp</td>
<td>500mcg/1ml</td>
<td>3</td>
<td></td>
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<tr>
<td>Salbutamol</td>
<td>Syrup</td>
<td>2mg/5ml (1000ml)</td>
<td>3</td>
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<tr>
<td>Theophylline</td>
<td>Tab</td>
<td>250mg slow release</td>
<td>3</td>
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</tr>
<tr>
<td>Spacer device</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
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### Antitussives

<table>
<thead>
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<th>Proposed Restriction Level</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Ammonium &amp; ipecac (adult)</td>
<td>Mixture</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Ammonium &amp; ipecac (child)</td>
<td>Mixture</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Pholcodine (Adult)</td>
<td>Mixture</td>
<td>5mg/5ml</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>Pholcodine (child)</td>
<td>Mixture</td>
<td>2.5mg/5ml</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Pseudoephedrine</td>
<td>Tab</td>
<td>60mg</td>
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26.27 **Solutions Correcting Water, Electrolyte And Acid-Base Disturbances Oral**

<table>
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<th>Form</th>
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<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral rehydration</td>
<td>Powder, 27.9g/l</td>
<td>Sachet for 1 Litre</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

STG 383 Ministry of Health
## Parenteral

<table>
<thead>
<tr>
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<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound Solution of sodium lactate (Hartmanns)</td>
<td>IV inf</td>
<td>1 Litre</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>IV inf</td>
<td>10%, 1 litre</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>IV inf</td>
<td>50%, 20ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glucose with Sodium Chloride</td>
<td>IV inf</td>
<td>4% &amp; 0.18%, 1000ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Glucose with Sodium Chloride</td>
<td>IV inf</td>
<td>2.5% &amp; 0.45%, 500ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>amp</td>
<td>0.746g, 10ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>amp</td>
<td>8.4%, 10ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>IV inf</td>
<td>0.9%, 1 litre</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>amp</td>
<td>0.9%, 20ml</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sodium Polystyrene sulphonate (Resonium-A)</td>
<td>Powder</td>
<td>450g pack</td>
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## Miscellaneous

<table>
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<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water for injection</td>
<td>5ml</td>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Standard Treatment Guidelines

<table>
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<tr>
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<th>Form</th>
<th>Strength/Size</th>
<th>Proposed Restriction Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascorbic acid (Vit C)</td>
<td>Tab</td>
<td>250mg</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Multivitamin</td>
<td>Tab</td>
<td></td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Multivitamin</td>
<td>Syrup</td>
<td>25ml</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>Pyridoxine (Vit B₆)</td>
<td>Tab</td>
<td>25mg</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Water for injection**

10ml

3
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<td>Fluoxetine................ 386</td>
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<tr>
<td>Fluphenazine decanoate.. 386</td>
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<td>Folic acid ........... 179, 214, 366</td>
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<td>Folliculitis............. 294, 295</td>
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<td>Misoprostol</td>
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<td>40, 49, 51, 59, 69, 146, 353, 355</td>
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