SECTION 1

Guiding principles for selecting supplies and equipment

Selecting medical supplies and equipment is not easy because of the wide range of products available. The criteria discussed below, and summarised in the checklist at the end of this section, are intended to help you decide what to include in a standard list and what to procure.

Need

Think about why you are planning to purchase supplies or an item of equipment. Issues to consider are:

- Public health
- Technical
- Economic
- Clinical

There may be public health or epidemiological reasons for needing the supplies or equipment. For example, you may need them to prevent, diagnose or treat a new health problem or to improve existing services to patients. Whether you are adding something new to your facility or replacing an existing item, use the VEN system to help you think about whether a new or replacement item is ‘vital’, ‘essential’, or ‘not so essential’ for your services.

Equipment should not be replaced just because it is old or a newer model is available. Only buy replacements for items that have reached the end of their useful life, that are not economical to repair or that are technically obsolete – the manufacturer is no longer producing spare parts, consumables and accessories (see Box).

Sometimes an item of equipment becomes clinically obsolete, because the technology or technique is no longer considered appropriate, or a more cost-effective or more clinically effective model becomes available.

Consumables – are essential for an item to perform its basic function, e.g. immersion oil is essential for microscopes. Consumables are also items that are used within a short time, e.g. cotton wool.

Accessories – are complementary and add to the functions of an item of equipment, but are not always essential, e.g. a 20X objective is useful if you are using a microscope to examine plasma for parasites but is not required for other functions.

Spare parts – are required to maintain the basic function of an item of equipment, e.g. to replace parts that are damaged, worn or lost, or as part of PPM (see Section 2.3) to prevent breakdown.

Different types of equipment last for different lengths of time, although this depends on how often they are used and how well they are maintained (see Section 2.3).

Appropriateness

Supplies and equipment should be appropriate for the setting in which they will be used. Issues to consider include:

- Local conditions
- Compatibility
- Acceptability

Avoid buying items that are too technically sophisticated for local conditions. The latest model often requires more expertise to use and maintain, and complicated items tend to break down more frequently. If you are thinking about procuring a particular item, it can be useful to talk to someone in a facility that has experience of using that model.
You also need to check reliability and durability under local conditions. For example, it may be important to find out if supplies or equipment function well in an environment that is hot, humid, dry or dusty, and if special storage conditions are required. Some supplies and equipment are particularly sensitive to certain conditions, for example, condoms are sensitive to heat and microscopes are sensitive to humidity.

Supplies and equipment should be compatible with existing equipment and appropriate for the level of service provided by your facility. You also need to check that supplies and equipment will be familiar to staff and culturally acceptable to patients.

Quality

Supplies and equipment must be of sufficiently high quality in terms of:

- Performance
- Safety
- Materials and design
- Labelling and packaging

The quality of performance you need depends on how often an item will be used and how long you are expecting it to last. Buy the quality that is best suited to your needs.

It is worth buying better quality supplies and equipment if they are going to be used frequently or are expected to last a long time. However, it is not always necessary to buy the very best quality. For example, good ‘mid-range’ quality stainless steel instruments are probably the best buy. It is not cost-effective to buy the most expensive because instruments are easily misplaced, or the cheapest because these are more likely to rust or fall apart.

Patient care and safety should never be compromised by poor quality. Supplies and equipment must meet safety standards (see Table 1.1). Safety also depends on the quality of installation, correct use and regular maintenance.

Table 1.1  Safety and performance standards

<table>
<thead>
<tr>
<th>Safety and performance standards</th>
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</thead>
<tbody>
<tr>
<td>All medical supplies and equipment should meet international, regional or national safety and performance standards. The most important standards include:</td>
</tr>
<tr>
<td><strong>IEC</strong> – which are international standards for the electrical safety of electrical and electromechanical equipment, and apply to refrigerators for example. IEC 601 is the international standard specifically for electrical and mechanically safe medical equipment for use by staff and with patients.</td>
</tr>
<tr>
<td><strong>ISO</strong> – which are international standards for quality management and systems. ISO 9000–9004 is a series of standards covering the quality of manufacturing processes, design and development, construction, installation and service. ISO standards do not currently exist for all medical supplies and equipment, but do apply to syringes, needles, gloves, instruments and scales, for example.</td>
</tr>
<tr>
<td><strong>CE mark</strong> – which indicates that a product meets European Union directive standards, and apply to sterile medical supplies for example.</td>
</tr>
<tr>
<td><strong>Pharmacopoeia specifications</strong> – which establish quality specifications for the most commonly used drugs and some medical supplies, such as bandages, tape and swabs. Important pharmacopoeias include the British (BP), European (EP), United States (USP) and WHO International Pharmacopoeia (IP).</td>
</tr>
<tr>
<td><strong>Quality certificates or export certificates</strong> – which are issued under various national and regional standards such as ISO 9000 or the equivalent EN 29000.</td>
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</tbody>
</table>

If possible, before purchasing, check the quality of the labelling and the packaging. Labelling should include information about country of origin, date of manufacture and, if appropriate, expiry date and storage instructions. Packaging should protect supplies and equipment from damage or deterioration during transit and storage.

Labelling or packaging also includes information that manufacturers are required to provide to users. This information is sometimes presented as symbols, which are intended to be understood by any user irrespective of their languages. Explanations for the most common information and symbols are included in Table 1.2.
Costs

Better quality supplies and equipment are more expensive, but cheaper supplies and equipment are often of poor quality. Buying the cheapest items can be a false economy, because they may need repairing or replacing more frequently. It may be more cost-effective to spend more on a higher quality item that is more reliable and that lasts longer.

Supplies that are close to their expiry date are sometimes offered for sale at low prices. Be careful not to buy more than you can use before the expiry date, otherwise you will waste resources. Packaging also adds to the cost of supplies and equipment, but it is usually worthwhile purchasing goods that are well packaged. Poorly packaged goods are more likely to be damaged in transit.

In addition to the purchase cost, other initial costs to consider include:

- Import tax and customs duty
- Transportation and insurance
- Installation
- Staff training

You also need to check that your budget will cover operational (running) costs throughout the lifespan of the equipment, including:

- Consumables and accessories – allow for continuity of these supplies
- Maintenance and servicing – allow 5-7% of capital cost for this
- Spare parts
- Kerosene, electricity or other fuel
- Safe waste disposal

<table>
<thead>
<tr>
<th>Table 1.2 Information provided by manufacturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Sterile]</td>
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<tr>
<td>Sterile</td>
</tr>
<tr>
<td>2005-06-30</td>
</tr>
<tr>
<td>Use by date e.g. use by 30 June 2005</td>
</tr>
<tr>
<td>![Do not re-use]</td>
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</tbody>
</table>

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Source
Another important factor is the source of supplies and equipment. There are issues to consider related to:

- Manufacturers and suppliers
- Imported supplies
- Used supplies

The quality of manufacturing standards differs from country to country. Only procure supplies and equipment from a licensed, reputable and reliable source. Before buying, ask the supplier which safety and performance standards an item complies with. Be wary of copies – items made to look like a well-known brand – as these are often of poor quality and do not conform to international standards.

If you are thinking about importing supplies and equipment, you will need foreign exchange. Find out if the supplier will provide all the necessary documentation for customs clearance and decide whether you can deal with import procedures, transport, insurance and other arrangements (see also information about Pre-Shipment Inspection in Section 2.1).

Buying second hand, refurbished or reconditioned equipment requires particular care. Asking the following questions can help:

- What condition is the equipment in? How much longer will it last?
- If it has been reconditioned, what is its new life time?
- Will it be supplied with installation and use instructions, service and repair manuals?
- Has it been fully tested and calibrated? Are all the essential parts, and at least two year’s supply of accessories and working materials (including all the consumables and spare parts needed to use the equipment) included?
- Will the supplier be able to continue to provide accessories, consumables and spare parts, technical support and maintenance for the future life of the item?
- What after sales support will the supplier provide?
- How long will it take from placing the order to receiving the item?
- Will staff have to be trained to use the equipment or are they already familiar with it?

Sometimes it is more cost-effective to buy new rather than used equipment, which only has a limited life. Obtaining accessories, consumables and spare parts can also be difficult for older models that are no longer made. Find out the cost of a new model of the same or a similar item of equipment and compare this with the cost of a used model.

Use and maintenance
It is essential that your facility can use and maintain the supplies and equipment you procure. There is no point in obtaining items if your staff do not have the expertise or information to use them effectively or if you cannot access maintenance support and technical back up. Issues to consider include:

- Utilities
- Skills and training
- Technical back up
- Consumables, accessories and spare parts

Check that your facility has the utilities needed to use an item of equipment. For example, some equipment requires a reliable power supply, adequate quantities and quality of water, and an effective waste disposal system. If your facility has an unreliable or fluctuating power supply, choose equipment that can be operated with kerosene, gas or battery power, or consider whether you can afford to purchase a voltage stabiliser for electronic equipment.

Consider how easy it will be for your staff to use, clean and maintain the equipment. Do all the staff who will use it already have the skills required or will they receive training? Find out if the manufacturer or supplier provides training and other support services.

Check that the equipment is supplied with simple, easy to use instructions, user, repair and service manuals, and a list of spare parts.
If maintenance requires the services of a skilled technician, find out whether you have access to technicians locally or nationally who can service and repair the equipment, and who can provide planned preventive maintenance (PPM). PPM is the regular maintenance service recommended by manufacturers, which should supplement maintenance carried out by health facility staff using the equipment. Manufacturers and suppliers do not have service agents in all countries. If there is no authorised agent in your country, find out if there are other organisations that offer this service, for example JMS in Uganda and CSSC in Tanzania.

Check whether the supplier provides a guarantee or warranty for the equipment and parts. Guarantees can last for a year or more, although the length of time depends on the type of equipment or product. While an item of equipment is under guarantee or warranty, the manufacturer should replace or repair it (either directly or through a distributor or local agent), or provide a refund if the equipment is found to be defective due to faulty materials or workmanship, either on arrival or during use. However, if there is no authorised agent in a country, the user may be responsible for the cost of sending the item back to the manufacturer. A guarantee does not cover defects arising from items not used correctly, misuse, neglect, accidents or repairs carried out by other companies.

Finally, consider the availability of consumables, accessories and spare parts. Find out what you will need to operate and maintain the equipment, how much these items cost, where they can be obtained and how easy it is to get hold of them, and for how long they will continue to be available in future.

### Procedure for products sent to ECHO for repair

ECHO is able to accept a wide range of medical equipment from customers for repair, whether or not it was bought from ECHO. Customers wishing to use this service should first check with ECHO’s Biomedical Engineering Department. Please note that if you are sending goods to ECHO from outside the UK, special paperwork is required to show that the items are being brought on a 'temporary import basis' to be repaired. If you do not complete this documentation you will be charged import duty on the goods by the UK authorities. ECHO can advise you about the procedures if necessary.

**Warranties:** Medical equipment bought from ECHO, whether new or reconditioned, is normally offered with a warranty (or guarantee) for a fixed period. If the item you purchased develops a fault in the course of normal use during the warranty period, then ECHO will offer you replacement, repair or other appropriate support according to the terms of the warranty. However, you should be aware that warranties do not cover damage caused by inappropriate use, and will be invalidated if the customer has attempted an unauthorised repair. Details of the warranty offered by ECHO on any specific item of equipment are available on request.

**Insurance:** If ECHO is freighting your goods to you, we will normally insure them unless we have been instructed not to by you. If your products are lost or damaged in transit, you should let ECHO know within two months of the arrival or expected arrival of the goods. If notified within this period, ECHO will process your insurance claim for you so that replacement or repair can be set in motion.

### Material

Another important consideration is the material an item is made from. Instruments made from tungsten carbide last longer but are the most expensive. Instruments made from good quality stainless steel last longer than plastic instruments but are more expensive. Items made of aluminium are lightweight but bend and buckle more easily than items made of iron or stainless steel.

Metal items that rust easily are difficult to clean. Make sure metal items that need to be cleaned and sterilised or disinfected regularly have a polymerised finish, polyester coating, epoxy coating or are made from good quality stainless steel. Polyester or epoxy coating also provides additional protection from scratches and abrasions.

Glass items are fragile and break easily. Not all glass items can be re-used. Many glass items are also manufactured in plastic. Plastic does not break easily and weighs less than glass, making it safer to use and easier and cheaper to transport. Some plastic items can be re-sterilised, others cannot. Table 1.3 summarises the key properties of different types of general plastic-ware.

Although most supplies are quite durable, some spoil if left unused for too long, for example, rubber tubing and latex items such as condoms. Plastic wrapping helps to protect such items against high humidity and is more robust than paper wrapping.
### Table 1.3 General plastic-ware

<table>
<thead>
<tr>
<th>Type</th>
<th>Uses</th>
<th>Sterilisable(^a)</th>
<th>Temperature resistance (up to 15 min)</th>
<th>Chemical resistance(^b)</th>
<th>Flexibility</th>
<th>Transparency(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polypropylene (PP)</td>
<td>Centrifuge tubes, some disposable syringes, funnels, test tube racks, trays, buckets</td>
<td>Yes</td>
<td>140°C</td>
<td>High</td>
<td>Rigid</td>
<td>Translucent(^d)</td>
</tr>
<tr>
<td>High density polyethylene (HDPE)</td>
<td>Trays, bottles</td>
<td>Yes (with caution, up to 20 min)</td>
<td>120°C</td>
<td>High</td>
<td>Rigid</td>
<td>Translucent</td>
</tr>
<tr>
<td>Low density polyethylene (LDPE)</td>
<td>Wash bottles, buckets, airtight boxes</td>
<td>No</td>
<td>95°C</td>
<td>Medium</td>
<td>Excellent</td>
<td>Translucent</td>
</tr>
<tr>
<td>Polystyrene (PS)</td>
<td>Disposable laboratory ware</td>
<td>No</td>
<td>70°C</td>
<td>Low (but can be disinfected with bleach solution)</td>
<td>Rigid</td>
<td>Clear</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>Tubing, trays</td>
<td>No</td>
<td>80°C</td>
<td>Low (but can be disinfected with bleach solution)</td>
<td>Rigid</td>
<td>Clear</td>
</tr>
<tr>
<td>Polymethylpentene (PMP)</td>
<td>Conical centrifuge tubes, beakers, jugs</td>
<td>Yes</td>
<td>200°C</td>
<td>Medium</td>
<td>Rigid</td>
<td>Clear</td>
</tr>
</tbody>
</table>

\(^a\) Autoclaving: 121°C 15 psi for 30 minutes

\(^b\) Chemical resistance: High – exceptional resistance to almost all laboratory chemicals; medium – good to excellent resistance to a broad range of common laboratory chemicals; low – moderate to good resistance to common aqueous laboratory chemicals but avoid organic solvents and strong acids and bases

\(^c\) Transparent: Can be clearly seen through and allows light to pass through without diffusion

\(^d\) Translucent: Allows light to pass through but not transparent

Source: Adapted from Selection of basic laboratory equipment for laboratories with limited resources (WHO).
Disposable or reusable

Some supplies and equipment, such as gloves and syringes, are available as disposable and as reusable products, and you may need to decide which type to procure.

- **Disposables** – are items designed for single use. Disposables should only be used once and should not be re-used.
- **Reusables** – are items designed to be used more than once. Reusables should only be re-used after proper cleaning and sterilisation and/or disinfection.

Both types have advantages and disadvantages in terms of convenience and cost. Disposables are more convenient than reusables. However, using disposables costs more than reusables, because they need to be replaced more often. When comparing costs you also need to include the cost of sterilising reusable equipment. To help you to decide what type is most suitable for your health facility, consider the following issues:

- National policy
- Sterilisation
- Supply

Is there a national or local policy regarding the use of disposable or reusables? It is usually easier and more practical to follow existing policy.

Does your facility have the equipment required for sterilisation? You should only plan to use reusables if your facility can sterilise equipment properly (see Section 2.4). Staff and patients are at risk of diseases such as hepatitis B and HIV if equipment is not properly sterilised.

Can you obtain regular and reliable supplies? You should only plan to use disposables if you can obtain a regular and reliable supply of replacements. Disposable equipment is not intended to be sterilised and should not be re-used. If supply problems are likely, either use reusables or keep a reserve supply of reusables for times when disposables are not available. In both situations you need to have a reliable and effective sterilisation system in place.
Guiding principles checklist

Need
- Why do you need the supplies or item of equipment? Will it address an important or new health problem or improve existing services? Is it vital, essential or not so essential for your services?
- Is it new or replacing existing equipment?
- Has your existing equipment reached the end of its useful life? Is it no longer economical to repair?
- Is it technically obsolete? Is the manufacturer no longer producing spare parts, consumables and accessories?
- Is it clinically obsolete? Is a more clinically-effective or cost-effective model available?

Quality
- What level of quality best meets your requirements?
- How often will the item be used and how long is it expected to last?
- Do the supplies or equipment meet safety standards?
- Is the labelling and packaging of acceptable quality?
- Is the equipment supplied with necessary operations and service manuals?

Source
- Are you planning to procure from a local supplier or to import?
- If importing, do you have access to foreign exchange? Will the supplier help with arrangements for import?
- Is the manufacturer or supplier reputable, licensed and reliable?
- Are you planning to buy used, refurbished or reconditioned equipment? How long will it last? What technical support will be available? Will you be able to obtain spare parts, consumables and accessories?

Material
- What material is the item made from?
- Is it made from good quality, hard wearing material?
- Will it be easy to clean, disinfect and/or sterilise?
- Will it break or spoil easily?

Appropriateness
- Are the supplies or equipment appropriate for the type of services your facility provides?
- Are they technically suitable for local conditions?
- Will the item be efficient, reliable and durable in dry, hot, dusty or humid conditions?
- Are special storage conditions required?
- Will the supplies or equipment be compatible with your existing equipment?
- Will the item be familiar and acceptable to staff and patients?
- Is the item simple, robust and capable of local maintenance?

Costs
- Are you buying the cheapest supplies and equipment available? Are they of adequate quality?
- Would it be more cost-effective to spend more on a higher quality item?
- Have you taken into account the costs of import tax and duty, freight, transport and insurance, installation and staff training in addition to the capital cost?
- Have you budgeted for maintenance, fuel, spare parts, consumables and accessories?

Use and maintenance
- Do your staff have the skills to use, clean and maintain the supplies or equipment? Will training be provided?
- Does the item come with a guarantee or warranty? What support services are provided by the manufacturer or supplier? Is the technical expertise required for maintenance available nationally or locally?
- Does your facility have the utilities required to use the item? Does it need a reliable power supply, adequate quantity and quality of water, effective waste disposal?

Disposable or reusable
- Are you planning to procure disposable or reusable items? What is national policy?
- Can your facility afford to buy disposables? Are supplies regular and reliable?
- Does your facility have the capacity for proper sterilisation of reusables?