

NEW ZEALAND STERILE SERVICES ASSOCIATION

STERILE SERVICES ORIENTATION PROGRAMME

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INTRODUCTION

The Sterile Services Department is a specialised area of the hospital and the staff who work in these departments are expected to have appropriate skills and knowledge.

Most departments will have a system for training new staff, perhaps based on time requirements in each area of the department. This will meet the practical requirements for on the job learning but some theoretical knowledge is also necessary to explain why certain procedures and techniques are important.

This programme is designed to meet the need for theoretical information. Sterile Services departments in New Zealand vary widely in regard to their specific functions and procedures, so this programme is very generalised and is intended to supplement individual hospital orientation programmes, not to replace them.

It is for this reason also that the new staff member is not given specific information about some procedures in this programme, but is directed to ask appropriate questions instead.

Aims of the Programme

- Familiarise the new employee with the functions of a Sterile Services departments.
- Hasten the integration of new staff by providing information that promotes understanding of work practices.
- Increase job satisfaction and reduce stress for new staff by providing support and motivation.
- Increase levels of staff competence and knowledge to improve departmental effectiveness.

GLOSSARY OF TERMS

Antiseptic	Chemical which kills micro-organisms or stops their growth. Usually a solution used on skin.
Asepsis	The complete absence of micro-organisms that can cause disease. Achieved by sterilisation of equipment and by special techniques used by nursing and medical staff.
Autoclave	Term sometimes used when referring to a steam steriliser.
Bioburden	The types and numbers of organisms on unsterile equipment.
Compressed Air	Air that is reduced in volume creating pressure.
Contamination	Introduction of micro-organisms into sterile equipment or living tissue.
Decontamination	The process of making equipment safe to handle, e.g. eliminating the contamination.
Disinfectant	Chemical used to kill some micro-organisms.
Disinfection	A process that kills non sporing micro-organisms.
Disposable Items	Item that the manufacturer has designated as single use. Used once and discarded.
Dressings	Materials used to cover body wounds.
Ethylene Oxide	Gas used to sterilise equipment.
Gamma Radiation	Method of sterilisation using a radioactive source.
Infection	Invasion of the body by harmful micro-organisms.
Lumen	Interior of a tubular structure, e.g. channel of a tube.
Micro-Organisms	Any organism too small to be seen by the naked eye, e.g. bacteria, viruses and fungi.
Organism	Any living thing may consist of a single cell or a group of cells.
Pathogenic Organism	An organism/micro-organism that is capable of causing infection.
Porous Load	Steriliser load that includes dressings and linen.
Spores	Certain micro-organisms that are most resistant to sterilising procedures.

Steam Steriliser	A vessel built to withstand steam at high pressure.
Sterile	Free from living micro-organisms.
Steriliser	A machine in which micro-organisms are killed. There are various types of sterilisers depending on which method of sterilisation is used.
TSSU / TSC	Theatre Sterile Services Unit or Theatre Service Centre. A unit responsible for processing equipment to be used in the Operating Theatre.

FUNCTION OF A STERILE SERVICES DEPARTMENT

Function of a Sterile Services Department

- Provide hospital wards and departments with the sterile equipment and materials required for the care of the patient.
- Prevent infection passing between patients by sterilising all equipment after use

Sterile Services Departments play a vital role in preventing infection in hospitals. All equipment used for one patient must be thoroughly cleaned and sterilised before it can be used again. This is the job of Sterile Services staff.

Cleaning and sterilising hospital equipment used to be done on each ward by the nurses. This was unsatisfactory for various reasons and it became accepted practice that all cleaning and sterilising should be done in one central area, hence the formation of the Sterile Services Department.

The particular functions of sterile services departments in New Zealand vary between hospitals, depending on the size of the hospital and the areas serviced by the department.

The main work processes carried out in Sterile Services (SS) are:

- Collection and/or reception of used equipment
- Sorting, cleaning, drying and inspection of equipment
- Packaging
- Sterilising
- Storage and distribution of sterile goods

The Sterile Services Department is usually separated into three areas:

- Decontamination (dirty)
- Clean
- Sterile storage

Decontamination Area:

The reception area for all used equipment coming into the department. Equipment is contaminated with micro-organisms and staff must take care when handling it.

Appropriate protective clothing must be worn in the area for staff protection.

Equipment is sorted, dismantled, cleaned and decontaminated.

Clean Area:

Cleaned equipment is assembled and packaged in this area. Instruments are inspected to ensure that they are clean and working correctly. Every item is packaged in a suitable material and labelled.

Soft goods and linen are usually prepared in the clean area, often in a separate room.

The machines for sterilising equipment are also in or near the clean area.

Sterile Storage Area:

Sterile equipment is stored in this area. Careful handling, transportation and storage of sterile articles are necessary to ensure that the items do not become contaminated again before they are used for the patient.

This is very basically an introduction to the function of a Sterile Services Department. You should familiarise yourself with the decontamination, clean and sterile storage areas of your department and with the rules that apply to each area.

Areas are physically separated to keep clean and dirty items separated and so lower the risk of contaminating sterile equipment.

SAFETY IN THE WORKPLACE

Some aspects of Sterile Services work have the potential to cause injuries to staff. You should be alert at all times to these potential hazards.

- Needlestick injuries
- Burns from hot surfaces
- Chemicals
- Lifting/carrying injuries
- Slippery floors

Needlestick Injuries

Some items used for patient care are called sharps, e.g. needles, scalpel blades and intravenous equipment. These items are mostly disposable so once they have been used they should be discarded into a sharps container.

Sometimes sharps are not disposed of correctly and are found in or on used equipment. Unsuspecting SS staff who are handling and sorting equipment can be accidentally pricked with a sharp.

This is called a Needlestick injury and can also be the result of handling surgical instruments which have sharp edges.

Some diseases can be passed on through needlestick injuries, e.g. Hepatitis B and all healthcare workers should take great care when handling and disposing of sharp objects. Procedures for dealing with needlestick injuries vary in each hospital.

Ask your Supervisor to Explain to You:

- The procedures used in your hospital to prevent needlestick injuries
- The procedure to follow if you have a needlestick injury
- The policy in your hospital regarding Hepatitis B immunisation -this should be available to SS staff

Burns from Hot Surfaces

Heat is generated from much of the machinery used in Sterile Services and you need to be aware of possible heat hazards.

In the decontamination area, various types of washing machines, washer/decontaminators and sterilisers are hot to touch and also produce instruments etc which are very hot.

Metal tends to retain heat, so equipment just removed from any heat processing should be handled with care. Steriliser carts just removed from a steriliser are very hot and should only be manoeuvred onto the trolley using suitable heat resistant gloves or a metal pulling device. Equipment removed from a hot air oven should be handled with heat resistant gloves.

The First Aid treatment for burns is to run cold water over the affected area.

Chemicals

Sterile Services uses a variety of chemicals and detergents for cleaning and disinfection purposes.

You need to be aware of the correct use and dilution of all the solutions used in your department and how you should handle them.

Gloves should always be worn to handle dirty equipment and to protect our hands from the harsh chemicals.

Ethylene Oxide is a gas which is used in some Sterile Service departments to sterilise heat sensitive items. Ethylene Oxide gas is available in cylinders and cartridges and its use as a sterilising agent should be strictly controlled. Ethylene Oxide is a toxic substance which can cause injuries to staff if incorrectly handled.

If Ethylene Oxide is used in your department, ask your supervisor to explain its handling and use.

Every department should have Material Safety Data Sheets (MSDS) which detail the precautions that apply for each chemical.

***GLOVES AND OTHER PROTECTIVE CLOTHING ARE FOR YOUR PROTECTION.
ALWAYS USE THE PROTECTIVE CLOTHING AVAILABLE IN YOUR AREA.***

Lifting / Carrying Injuries

As part of your job you will be transferring loads – either around the department and/or around the hospital.

Correct techniques for lifting and carrying are important for two reasons:

1. To protect your back and arms from injury
2. To protect sterile equipment and prevent recontamination before use

Important Points

- Always use a clean trolley to transfer loads

- Never clutch a load of sterile equipment to your uniform – you can damage or soil the packaging and the item will become unsterile
- Always push trolleys – don't pull
- Divide heavy loads – do not attempt to take a large load in one
- Lift with your legs, not your back



Lift with your legs



Not with your back



Avoid twisting when lifting.
Face the direction you want to go!!



- Divide your load or ask for help.
- Recognise your own limits.



When using aids, push rather than pull

TRANSMISSION OF DISEASE

The Sterile Services department provides sterile equipment which means free from organisms.

Micro-organisms are germs which can only be seen by a microscope. These micro-organisms are found all around us in large numbers. Some are harmless, some are helpful for body functions and some are harmful.

The harmful organisms cause disease and the three main types are bacteria, viruses and fungi.

All organisms require food, warmth and moisture in order to grow. When these conditions are present, bacteria and viruses can grow and multiply very rapidly.

Four factors are necessary for an infection to occur:

1. Pathogenic organism
2. An entry route into the body
3. Establishment and multiplication of the organisms within the body
4. An exit route from the body and a means of transmission to another victim

Pathogenic Organism is an organism which can cause disease.

Route of Entry into the Body

- *Inhalation* e.g. breathed in through the nose and mouth e.g. common cold
- *Ingestion* e.g. swallowed by mouth e.g. dysentery
- *Inoculation* e.g. through the skin via insect bites or through skin cuts or wounds. Disease can also be introduced directly into the bloodstream from unsterile needles

Establishment and Multiplication within the Body

Organisms require food, warmth and moisture in order to grow and multiply and the human body provides all three of these requirements.

The body also has ways of fighting disease and not every pathogenic organism will cause disease. Some organisms are very selective and will only cause disease if they infect a particular type of tissue e.g. brain tissue.

Once established in the warm, moist tissue a pathogenic organism can multiply rapidly and the signs and symptoms of infection will become apparent in the host.

Exit Route and Means of Transmission

The pathogenic organism has produced disease in one person and it must now pass onto another host or the organism will die.

The type of organism has a bearing on the way it will be transmitted to another person e.g. the common cold is spread by coughing, sneezing and talking, e.g. through the air by droplets.

Some organisms can live out of the body in a kind of dehydrated state. These are called spores and they are the most difficult organisms to kill.

Routes of Infection Transmission

- Contact
 - *Direct contact*: by people directly touching the organism e.g. touching dressings
 - *Indirect contact*: by people touching contaminated articles called fomites. A fomite is an inanimate object which may have organisms on it e.g. used instruments, bed linen, uniforms etc
- Airborne
 - *In droplets* from one person to another by coughing and sneezing
- Common Vehicle
 - One source infects a group of people e.g. contaminated water supply or food causing food poisoning.
- Insects/Vermin
 - Insects such as mosquitoes can cause disease e.g. malaria. Vermin (rats and mice) live in dirty conditions and can transmit organisms to clean areas.

Prevention of Infection

Unfortunately, hospitals are wonderful places for micro-organisms. They have a continuous supply of patients who are often weakened by their disease or operation. The body's defence system against infection will not be able to work very well when illness is already present so these patients are very vulnerable to infection.

As well as patients, hospitals have staff who can easily be responsible for transmitting infection if they do not follow good procedures to prevent infection.

An infection acquired in hospital is called a nosocomial infection and all staff, including SS staff, can take the following steps to prevent cross infection.

- Hand washing is the most important infection control measure. Thorough hand washing between procedures, after handling dirty equipment and before handling clean or sterile equipment, is the most simple and effective method of

preventing infection. Thorough hand washing means washing between fingers and the top of the hand and fingers, not just the palms.

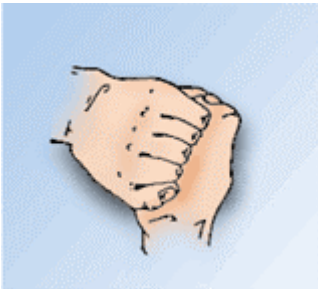
- Wear a clean uniform daily and change it promptly if it becomes soiled during the course of the duty.
- Maintain a high standard of personal hygiene.
- Keep dirty equipment separated from clean and sterile equipment.
- The secret of controlling infection is to contain it e.g. confine the infectious material to as small an area as possible. Infectious dressings etc should be discarded into rubbish containers and burnt. Used equipment should be kept covered for storage and transportation to Sterile Services.
- All hospitals have cleaning schedules which reduce dirt and dust. Dust is an infection threat as it is easily spread and can contain spores which are the most difficult organisms to kill.
- Thorough cleaning and sterilisation of equipment prevents cross infection. These procedures should be carried out only by appropriately trained staff e.g. Sterile Services staff



1. Palms



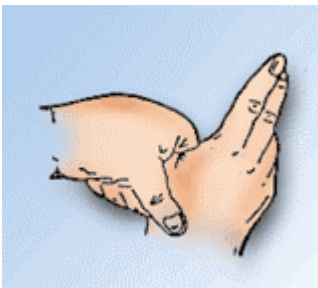
2. Palms to back of hand



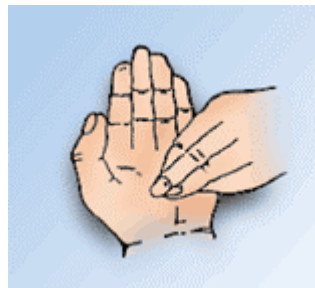
3. Palms & fingers



4. Palms & fingers



5. Thumbs



6. Fingertips

HOSPITAL EQUIPMENT

Hospitals use many different types of equipment for patient procedures. Your department may not process all of the equipment used in the hospital, some areas have separate units which process all operating theatre equipment.

Equipment processed in the Sterile Supply Department falls into three main categories:

- hardware
- softgoods
- linen

Hardware and linen are reusable equipment. Soft goods are disposable.

Hardware

Includes:

- instruments
- bowls
- some tubing
- reusable needles.

Instruments

There are many thousands of different instruments used in hospitals for operations and other procedures.

Instruments have many and varied names, some are named after their inventor and some are named for their purpose and / or part of the body they are used on.

Instruments are of various shapes, sizes and weights. Generally, finer instruments are used for more delicate work e.g. eyes, ears and heavier instruments are used for bones and larger body organs.

Basic Instrument Categories

1. Clamping (haemostatic)
 - commonly called artery forceps
 - used to control blood flow by clamping onto the bleeding vessel
2. Cutting
 - Scissors – curved and straight
 - used to cut or separate tissues or to cut stitches, dressings etc

3. Grasping or holding

- Commonly called tissue forceps and dissecting forceps
- Tissue forceps – used to hold a piece of tissue. Usually tissue forceps have a ratchet lock
- Dissecting forceps – also used to hold tissue but usually held by finger pressure (like tweezers)

4. Suturing

- commonly called needleholders
- Used to hold needles used for suturing wounds
- NB: suturing means putting in stitches to close a wound

5. Retracting

- Retractors are used to hold tissue out of the way eg, retract tissue
- Some are handheld and some have a locking device to hold them in position

Hollow ware

Includes:

- bowls
- kidney dishes
- jugs made of metal or plastic

Soft Goods

Includes:

- dressing materials e.g. gauze, cotton wool, gamgee, swabs etc

These are all items that Sterile Services traditionally prepared, packaged and sterilised. All of these products are now available commercially and some hospitals buy some or all them already sterile.

Even if your department does not manufacture or package these items you may still issue the sterile products, so you need to be aware of the different types of soft goods.

All soft goods are used once and then discarded.

LINEN / NON-WOVEN BARRIER FABRICS

Linen is sterilised in packs made up of several different items. Non woven barrier fabrics are also used instead of linen.

Sterile packs are used for operations and other procedures to create a sterile environment e.g. the area around the operation / procedure site is draped with sterile fabric to keep it as clean as possible.

Linen and / or non-woven fabric is folded in a particular way which allows sterilisation to take place and enables the user to maintain the sterility.

Each item in a linen pack is usually placed in the pack in a particular order. The order is usually the reverse order of use e.g. the last item in the pack is the first to be used.

This has been a brief summary of the types of equipment you are likely to be processing. Each department processes different items so you need to familiarise yourself with your departments requirements.

Initially you may have difficulty understanding what other staff are talking about when they are using the correct names of instruments and other equipment. Every job has jargon specific to the type of work being carried out. Sterile Services is no different and you will find yourself picking it up surprisingly easily.

REVISION 2

1. Name two types of hardware.

A _____

B _____

2. Name two types of soft goods.

A _____

B _____

3. What are artery forceps used for?

4. You might call them tweezers, what do hospital staff call them?

5. Give one reason why linen is folded in a particular way.

Practical

Ask your supervisor to check this assignment.

1. Identify two instruments from each category by name.

2. Identify two soft good items by name

COLLECTION AND CLEANING

Collection

Collection of used equipment from wards and departments is the first step in the SS process of making equipment safe to reuse.

Collection of equipment is most often done at the same time each day although times will vary in different hospitals.

Your hospital will have a method of collecting used equipment – ask your supervisor to explain it to you.

The following procedures should be observed for collection of any used equipment.

- Use a covered trolley or container to transport used equipment
 - to confine possible contamination
 - to prevent staff contaminating their uniform by carrying the equipment
- Staff should wear gloves to handle used equipment
 - to protect staff from possible infections
- All used equipment should be delivered only to the decontamination/dirty area of Sterile Services.
 - to prevent contamination of clean and sterile goods
- Sterile Services staff should check all used equipment for sharps mistakenly left in or on instruments. Report these incidents to your supervisor.
- Always wash hands thoroughly after handling used equipment – even when wearing gloves.

Keeping records is an important part of Sterile Services work. When collecting equipment you need to record certain information so that the correct numbers of instruments are returned to the correct area.

Ask your supervisor to explain the recording system in your department.

Equipment must then be sorted before cleaning can begin.

Sorting serves several purposes:

- Items are sorted according to the cleaning process they will undergo.
- Items belonging to the same area may need to be kept together.
- During sorting, all items are opened and/or dismantled to allow thorough cleaning to take place.

Cleaning

Cleaning is a process used to remove blood etc from all surfaces of equipment. If cleaning is inadequate, blood and tissue containing organisms will remain on equipment. The blood etc protects the organisms from the steam or gas which is designed to kill them in the sterilising process.

There are **two methods** of cleaning:

- *Manual cleaning* – hand washing, scrubbing or soaking
- *Mechanical cleaning* – the use of machinery

Manual Cleaning

Manual cleaning involves the use of hot water, a suitable detergent and a brush or pad to remove dirt and debris from equipment.

It is important that the correct equipment is used to clean all used items. It is our job to remove dirt and debris, not to add to it by leaving fluff, residues or particles on equipment. It is also important not to use agents that can scratch metal as this can lead to rust and corrosion.

Ask your supervisor what is required to manually clean equipment.

Mechanical Cleaning

Mechanical cleaning involves the use of one or more machines to clean equipment. Some machines are specifically designed to clean certain items only.

Types of mechanical cleaner:

- Washer Decontaminator general purpose cleaning
- Washer Steriliser general purpose cleaning
- Ultrasonic Cleaner used in addition to other manual and mechanical means, removes very fine particles of dirt from crevices and joints of instruments

Mechanical cleaning is more effective than manual cleaning and is usually faster.

When instruments are completely clean, it is important to dry them immediately to prevent corrosion and staining.

Once it is dry, equipment must be inspected to make sure it is completely clean and in good working order. There is no point supplying sterile instruments which cannot be used because they are faulty. Equipment which has many parts should be checked to make sure all of the pieces are present.

REVISION 3

1. Why should you use a covered trolley or container to collect used equipment?
2. What information do you need to record about equipment you have collected?
3. Why is it important to clean equipment?
4. For manual cleaning you need three things. They are:
 - A _____
 - B _____
 - C _____
5. What do you check equipment for, after it has been cleaned?

Practical

Ask your supervisor to check this assignment.

1. Collect used equipment from wards and/or departments.
2. Sort the equipment and prepare for cleaning.
3. Operate the machine used for mechanical cleaning for one cycle or manually clean one batch of instruments.

PACKAGING

Packaging is used to protect sterilised items from becoming contaminated again before they are used.

There are many types of packaging and the choice of which type to use depends upon the following:

- size and shape of the article
- method of sterilisation
- expiry date required
- compliance with Standards and Codes of Practice

To be considered suitable as a packaging material for sterile goods any material must meet the following requirements:

- allow penetration of the sterilising agent
- provide a barrier to micro-organisms
- able to withstand high temperature during sterilisation
- be strong and flexible to allow for wrapping and handling
- allow for air removal
- permit aseptic removal of sterile contents
- have a tamper proof method of sealing
- be free of dyes or toxic chemicals

Some materials used in New Zealand are:

- linen
- sterilising paper
- non woven wrap – polypropylene or cellulose (disposable)
- paper/laminate pouches and reels
- paper bags
- rigid container systems

The type of packaging used is a major factor in deciding upon the shelf life of sterile articles. Again this varies between hospitals, two hospitals may have the same packaging but have different expiry date times. Some hospitals may use Event Related Sterility which does not have an expiry date but uses a statement such as “Sterile Unless Package Opened or Damaged”.

Storage life can be prolonged by the use of dust covers. This is an impervious packaging which is sealed around an article after it has been sterilised.

Packaging must be held in place in some way and again there are some different ways of doing this:

Linen/Non Woven/Sterilising Paper	autoclave tape
Paper/Laminate Pouches & Reels	heat sealed or self seal

NOTE: Staples should never be used to close packaging. They perforate the packaging material which allows the entry of micro-organisms.

Packaging should be inspected before and after sterilisation for holes, tears or breaks. Any package that is not intact must be returned to the processing area.

Labelling

All sterile equipment should be clearly labelled with information that is essential to Sterile Services and the user.

Every package should have the following information:

- name of the article
- sterilisation indicator
- expiry date (if used)
- batch/lot number
- name of the area to which the article belongs
- name of the hospital and department which processed the article

A sterilisation indicator is a chemically treated tape or part of a packaging material which will change colour when it has been through a sterilisation process. The indicator does not prove that the item is sterile, only that it has been through a process.

Batch numbers should be put on all items so that they can be recalled if there is a steriliser failure.

When wrapping items the technique you use is important. The two most commonly used techniques are the envelope fold and the parcel fold. Ask your supervisor to show you these techniques.

STERILISATION

Sterilisation is the complete destruction of all organisms. There are several methods of achieving sterility:

- steam under pressure
- hot air
- ethylene oxide gas
- gamma radiation
- gas plasma
- peracetic acid

Steam under Pressure

This is the most common sterilisation method used in hospitals. Steam kills micro-organisms by “setting” the cell protein. For sterilisation to take place the steam must have sufficient moisture in it and come into contact with all surfaces of all items at the correct temperature for the correct length of time.

A steam steriliser is a metal chamber which is designed to withstand the pressure that is needed to heat the steam to the temperature required for sterilisation.

Times and temperatures in common use:

- 121° Celsius for 15 minutes
- 126° Celsius for 10 minutes
- 134° Celsius for 3 minutes

Steam sterilisers can be jacketed or non jacketed. A jacket is a shell that surrounds the chamber. It contains steam which keeps the chamber hot. A steam jacket enables the load to be dried, so a wrapped load must always be sterilised in a jacketed steriliser. A non jacketed steriliser is suitable for unwrapped equipment and liquids where it is not necessary to dry the load.

For sterilisation to take place inside the chamber, all of the air must be removed. Steam cannot reach every part of the load if it is blocked by air pockets.

Steam sterilisers are divided into two main types according to the way in which the machine removes all of the air:

- Downward displacement
- Prevacuum (also called high vacuum, porous load)

Downward displacement uses gravity to displace the air. The steam enters at the top of the chamber and pushes out the air through the outlet on the floor of the chamber. This is a slow process and relies heavily on the operator correctly loading the steriliser to allow for air removal.

Prevacuum uses a mechanical method of removing air. The initial stages of the prevacuum cycle involve drawing a vacuum and steam pulsing. This is a much faster process than downward displacement and although the loading of the steriliser is not as critical as in downward displacement, the same principles apply.

Phases of a steam steriliser in a jacketed Steriliser

1. Removal of air and introduction of steam
2. Sterilisation of the load when the correct temperature is reached
3. Removal of the steam and drying of the load
4. Filtered air is let into the chamber and the cycle is complete

Loading a Steam Steriliser

All items must be placed in the steriliser so that air can move freely downwards and steam can contact all surfaces.

- Linen packs should be positioned on edge with the layers vertical
- Instruments should be in perforated trays or baskets
- Bowls, jugs etc should be placed on edge so that condensate can run out
- Metal bowls, instruments etc can drain condensate so these items should never be placed on the top shelf above any linen or other porous items
- All items should be placed inside the edges of the loading carts so that they do not touch the chamber sides
- All loads should be cooled on the loading cart. If hot packs are put onto smooth surfaces, condensation can occur resulting in wet packs
- All items should be inspected before storage. Any found in the following condition must be returned to the processing area for reprocessing:
 - wet
 - torn or damaged packaging
 - dropped
 - compressed paper packages
- All items should be handled only with clean hands

This is a brief introduction to steam sterilisation. You will be shown how the sterilisers in your department are operated. Machines vary in different departments and operator duties may also differ according to the organisation and the needs of the department.

For further information about steam sterilisation, see references at the end of this programme.

Hot Air / Dry Heat

This form of sterilisation has limited use in a hospital setting because dry heat is a less effective sterilising agent than steam under pressure.

Dry heat sterilisation is done in a form of oven where the temperature and time required for sterilisation is usually 160° Celsius for 60 minutes.

The high temperatures necessary for this type of sterilisation can damage some items and packaging materials.

It is a good method of sterilisation for powders and oils as these products do not have a high water content.

It is important to load a hot air steriliser in such a way as to allow the air to circulate freely around all of the items.

Ethylene Oxide Gas

Some equipment used in hospitals is required to be sterile but is made of material which will not stand the high temperatures necessary for steam or hot air sterilisation.

Ethylene Oxide gas is used as a sterilising agent for equipment which cannot be sterilised by steam or hot air. The temperature range necessary for this form of sterilisation is 37 - 60° Celsius.

Ethylene Oxide (ETO) sterilisation requires four factors to be present:

- correct temperature
- humidity
- gas concentration
- correct time

Preparation of products, packaging and loading the steriliser are also important factors in gas sterilisation.

Ethylene Oxide is a toxic substance which can cause injury to staff and patients if it is not handled and used correctly. At the end of the sterilisation process the gas is still present in the load items and the packaging. Metal and glass do not absorb the gas but plastic and other porous materials do.

It is important that the gas is completely removed from the load so that staff and patients are not exposed to the toxic effects. The only method of removing Ethylene Oxide is by aeration e.g. exposure to air. The aeration process can be done by leaving the load in a well ventilated room, but is more efficiently done by putting the load in an aeration cabinet.

An aeration cabinet has a continuous supply of heated air circulating through the load. It is more effective and faster than room aeration.

Gas sterilisation is a two stage process, sterilisation and aeration. An article cannot be said to be sterile and ready to use if it has not undergone both of these processes.

Toxic Effects of Ethylene Oxide

- Skin irritation
- Injuries to the eyes
- Breathing problems
- Nausea and vomiting

If your department uses Ethylene Oxide gas, find out what your responsibilities are when you are dealing with it.

This gas is quite safe to use in the well controlled situations which apply in New Zealand.

Gas Plasma Sterilisation

Plasma is the fourth state of matter: solid, liquid and gas being the others. A gas plasma steriliser is another form of low temperature sterilisation and it is much faster than Ethylene Oxide sterilisation. Most cycles take 40 - 60 minutes and there are no toxic after effects so the equipment can be used immediately.

Special packaging, biological monitoring and steriliser loading techniques are used with this process.

Peracetic Acid (Steris)

This system was developed for endoscope sterilisation. It is a tabletop unit which uses a dose amount of peracetic acid in a buffered solution. This is another low temperature method of sterilisation and is often used at the point of use e.g. Theatre or a clinic, not in the Sterile Services department.

Gamma Radiation

New Zealand has only one gamma radiation plant, situated in the Hutt Valley, Wellington.

The radiation source is Cobalt 60, around which the cartons of goods to be sterilised are circulated.

Gamma radiation is very penetrating and extremely effective in killing micro-organisms. It is used for sterilising goods supplied to hospitals by medical companies and for heat sensitive equipment. For obvious reasons it is not a common choice of sterilisation for everyday equipment.

Summary

This has been a very brief introduction to sterilisation methods. You may use only one or two of these methods in your department and your responsibilities will relate to the type of equipment and the departmental procedures.

Sterilisation processes include documentation; this aspect of your job has not been included in the programme as the requirements are different in individual areas.

REVISION 5

1. How does steam under pressure kill micro-organisms?

2. What must be removed from the steam steriliser chamber and load before sterilisation can take place?

3. Name two ways this can be achieved?
A _____
B _____

4. List three faults you check items for after sterilisation?
A _____
B _____
C _____

5. What do you do with faulty items?

Practical

Ask your supervisor to check this assignment.

1. Load a steam steriliser cart with porous and non porous items.
2. Complete all of the documentation for the load.
3. Start and finish the sterilisation cycle.
4. Check all of the items when cool and store according to department procedures.

STERILE STORAGE

Maintaining the sterility of equipment is as important as every other stage in the processing and sterilising of equipment.

Although some departments put expiry dates on all equipment, sterility is related to events not time. If you dropped a pack on the floor or splashed water on a pack it immediately becomes unsterile – even if you only took it out of the steriliser minutes before.

However, if you carefully handled, transported and stored another pack from the same load, it will remain sterile after the expiry date.

The three important stages in sterile storage are:

- Handling
- Transportation
- Storage

The end use of the item is another stage, but that is not Sterile Services work so we will leave that to the medical and nursing staff.

Handling

- Handle sterile goods with clean, dry hands
- Dropped items should immediately be returned to the processing area

Transportation

- Wherever possible, use clean trolleys to transport sterile goods
- Do NOT clutch packs to your uniform – you are compressing packs and your uniform is most likely to be contaminated
- Do NOT attempt to carry too much at one time. Packages which are jammed or squashed will be broken.

Storage

- All sterile storage areas should be clean and dry – no moisture or dust
- Sterile storage areas should be cleaned regularly using damp dusting and mopping or vacuuming techniques, to keep dust down.
- Use a stock rotation method to prevent stock being overhandled. The oldest stock is used first; new stock is put to the back.

Suggested Reading Material

Sterilisation, Disinfection and Infection Control, 3rd Edition 1998

Joan F Gardner, Margaret M Peel (Churchill Livingstone).

Australian Standard, AS 4187, Cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment, and maintenance of associated environment in health care facilities.

CONCLUSION

Depending on the way you have used this programme, by now you will be either very confused or feeling a little more comfortable and confident in your work situation.

If you have just read it through, then you will probably be confused. If you have used it as a reference document and used the revision and practical assignments at times when you are working in related areas, then you should feel more confident.

This is only been a brief introduction to a very extensive speciality within the health service. Use the information as a base to build on as you gain more skills. Practical skills and the theoretical knowledge go hand in hand and by using both, you will increase and improve your level of expertise.

New Zealand Sterile Services Association

Mission Statement

The New Zealand Sterile Services Association will promote quality service by the implementation of national standards and policies to meet customer needs.

Eligibility to Join

If you are employed in the field of Sterile Services or Supply, you are eligible to join.

Benefits of Membership

- Regular newsletter
- Badge
- Access to information on aspects of sterilising standards
- Postal library of books and videos
- Eligible to attend annual conference
- Networking and support
- To find out how to join see our website: www.nzssa.org.nz

BIBLIOGRAPHY

Sterilisation, Disinfection and Infection Control, 3rd Edition 1998, Joan F Gardner & Margaret M Peel. Churchill Livingstone

New Zealand Sterile Services Association

Sterilising Technology Course Manual

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