Advanced Diploma of Dental Prosthetics 9365 Learning Guide

UNIT/ MODULE CODE:

HLTDP501A: Maintain an effective health work environment.

HLTDP301A: Comply with infection control policies & procedures in health work

HLTDP302A: Process reusable instruments and equipment in health work.

HLTDP400A: Maintain OHS processes.

THESE ARE NON GRADED UNITS HIGHLIGHTED IN PURPLE IN THE ASSESSMENT GUIDE.

Students name: ________________________________
Infection Control
Acknowledgments:

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General Introduction

This learning guide has been designed for you to do most of the learning at home. You study the same material and gain the same qualification as learners attending face-to-face classes. It is designed for you to work at your own pace and at a time convenient for you. It also allows you to self direct and control your learning, remembering that your teacher is available to answer any questions that you may have.

There may be a number of lectures, tutorials, practical sessions and workshops which you are required to attend. You will be notified of the times and dates of these activities at the commencement of the module. If these are not supplied, please contact your teacher. In addition to these, you may also access tutorial support. This can be an informal basis such as telephoning your teacher or on a formal basis, making an appointment to visit your teacher. It is important for you to contact your teacher and ask for this support if you are experiencing difficulties with the learning material.

It may also be necessary for you to access resources at a TAFE college or library. These resources may include computer facilities and software, library material and videos. The resources are listed under the heading Suggested learning resources for this module and references to these resources are made at the relevant sections of the guide.

Module Overview

Welcome to the module of Infection Control. The purpose of this module is to enable you to develop the knowledge and skills that you will use to apply the principles of infection control and Occupational Health and Safety to work practices in the dental health industry.

The infection control protocol and standards that are set up and practised in the dental surgery/clinic are extremely important. The standards of hygiene, safety and infection control can affect a wide range of the population – from all members of the staff, to every person who attends the surgery for treatment, their families and contacts. The possibilities are endless!

The repercussions of a break down in hygiene and infection control can range from a minor illness to a life threatening disease.

A breakdown in Occupational Health and Safety standards can result in injuries that may range from minor to major, requiring loss of work time, or even hospitalisation.

As we work through this module you will see the importance of adopting correct OH&S, and infection control standards.
Module Learning Outcomes

At the end of this module, you will be able to:

- state the professional responsibilities and infection control standards for the dental surgery/clinic.
- state and demonstrate personal precautions taken to prevent cross infection
- apply infection control principles for the control of cross infection
- identify and select methods of sterilisation and disinfection suitable for given situations/instruments/equipment.

Module Organisation

As you can see there are 4 learning outcomes for the module Infection Control. These are covered in the ten sections of the guide. Each learning outcome covers a different area of content that you need to know in order to be able to undertake Infection Control. The contents are grouped into the following topics:

Topics

1. Legal and Ethical Obligations
2. Infection Control Requirements in the Dental Practice
3. Standard/Additional Precautions
4. Review of Micro-Organisms
5. Personal Protection
6. Principles of Infection Control
7. Specific Areas of Contamination
8. Implementing Infection Control Principles
9. Cleaning before Sterilisation and Disinfection
10. Sterilisation and Disinfection
The internet is a good source for researching this topic

Assessment for this module

As part of this module you will need to complete certain assessment tasks. These may include:

1. A short answer/multiple choice assessment
2. Practical assessment
3. Personal research

Your teacher will provide an assessment outline for each of these.
A Special note for students studying away from college

You study the same material and gain the same qualification as students attending face-to-face classes. Assessments may be completed at home and sent to your teacher or they may be completed at the college. It is important that you understand what is expected of you and the arrangements for contacting teachers when you need to.

Remember, however that studying away from College has its advantages because you can go back and over the material as often as you like and work at your own pace. Also you can concentrate on small bits at a time.

In order to be successful, you must show that you:

- are self-disciplined and motivated
- are a good time manager
- can organise your study schedule to meet deadlines and complete work or time
- are responsible for your learning

Do not hesitate to find a mentor from your workplace or other area who can give you advice on how to effectively study and guide you to reference material and other resources.
### Glossary of terms used in this module

<table>
<thead>
<tr>
<th>Words or Terms</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Additional Precautions</strong></td>
<td>Precautions over and above, and used in conjunction with standard precautions where there is a risk of infection from known infectious patients.</td>
</tr>
<tr>
<td><strong>Asepsis</strong></td>
<td>The prevention of microbial contamination of living tissues or sterile materials by removal, exclusion or destruction of micro-organisms.</td>
</tr>
<tr>
<td><strong>Autoclave</strong></td>
<td>Is the name given to the machine that utilises the steam under pressure method of sterilisation.</td>
</tr>
<tr>
<td><strong>Capsule</strong></td>
<td>Form taken by some bacteria to resist the body’s defense mechanisms from destroying it.</td>
</tr>
<tr>
<td><strong>Cleaning</strong></td>
<td>The removal of all foreign material from objects prior to disinfection or sterilisation. Thorough cleaning means removing or reducing the number of micro-organisms on a surface by the use of detergent or water.</td>
</tr>
<tr>
<td><strong>Contamination</strong></td>
<td>The introduction of micro-organisms into sterile material or living material.</td>
</tr>
<tr>
<td><strong>Disinfectant</strong></td>
<td>A substance that will kill a range of micro-organisms.</td>
</tr>
<tr>
<td><strong>Disinfection</strong></td>
<td>Is the process which destroys or inhibits the activity of micro-organisms that cause disease. This does not include some viruses and resistant bacterial spores.</td>
</tr>
<tr>
<td><strong>Dry Heat</strong></td>
<td>This equipment utilises heat at very high controlled temperatures.</td>
</tr>
<tr>
<td><strong>Infection</strong></td>
<td>Invasion by living pathogenic micro-organisms of a part of the body where the conditions are favourable to their growth.</td>
</tr>
<tr>
<td><strong>Pathogen</strong></td>
<td>Any organism capable of causing disease.</td>
</tr>
<tr>
<td><strong>Spores</strong></td>
<td>Forms taken by some bacteria to withstand unfavourable conditions.</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Standard Precautions</strong></td>
<td>Are work practices that are required for the basic level of infection control. They apply to all body fluids regardless of the known infectious status.</td>
</tr>
<tr>
<td><strong>Sterilization</strong></td>
<td>Complete destruction of all micro-organisms, including spores. Sterile is an absolute term – there is no such thing as partially sterile or almost sterile. Modern Standards call for sterilization of all instruments used in intra-oral treatment.</td>
</tr>
<tr>
<td><strong>Transmission</strong></td>
<td>The conveyance of an infectious disease from one person to another.</td>
</tr>
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</table>
LEARNING OUTCOME 1

STATE THE PROFESSIONAL RESPONSIBILITIES AND INFECTION CONTROL STANDARDS FOR THE AREA OF DENTAL HEALTH WORK.

Assessment criteria:
You will have achieved this learning outcome when you can:

- State legal and ethical obligations relating to infection control.
- Outline requirements of infection control as set out in the relevant dental regulations specific to the area of dental health work.
- Explain universal/standard precautions and additional infection control procedures.
TOPIC 1 – Legal and Ethical Obligations.

Introduction

Health care workers should ensure that the minimum standard of care they provide and the minimum standard of protection they adopt is sufficient to prevent transmission of infection in the dental setting.

Health Care Establishments have a legal and ethical responsibility for:

- Promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations
- Prevention among workers of departures from health caused by their working conditions
- Protection of workers in their employment from risks resulting from factors adverse to health
- Placing of and maintenance of the worker in an occupational environment adapted to his/her physiological and psychological equipment

Civil liability for damages to a patient or health care worker may arise where care of a sufficiently high standard has not been taken to prevent transmission of infection. Breach of confidentiality is an ethical area of responsibility.
The Occupational health and Safety Act governs health and safety in all NSW workplaces. Its purpose is to make legislative provisions to prevent work-related injury and illness. Under these provisions both employers and employees have occupational health and safety responsibilities.

Under OH&S guidelines there are legal responsibilities of all parties involved in a health care environment. This is called Duty of Care.

There is a Duty of Care responsibility for the employer; a Duty of Care for the employee; and a responsibility of the patient.

1. **Employer Duty of Care**

Every employer must protect the health, safety and welfare at work of all employees. Employers fail to do this duty if they do not:

- Provide and maintain equipment that is safe to use and possesses no risk to the health of employees, eg autoclave equipment must be functional, meet safety requirements (regular inspection) and cycles monitored.
- Ensure that all arrangements are made for the safe storage, handling and transport of materials and substances eg sterilisation and disinfection chemicals must be securely stored.
- Provide training and supervision of staff eg ensure staff can use equipment and carry out decontamination procedures correctly.
- Ensure that a work area is safe and that entry and exit to the area is safe eg the surgery/clinic design is such that infection control procedures can be carried out following infection control guidelines.
- Develop a satisfactory Occupational Health and Safety policy eg there is a strict protocol for infection control within the workplace and ensure this protocol is adhered to for the safety of all employees.

2. **Employee Duty of Care**

As an employee you are obliged to:

- Take reasonable care of the occupational health and safety of others
- Co-operate with the efforts taken by your employer to comply with the safety procedures and directions imposed in the interest of health and safety
- Notify your employer as soon as possible after injury, obtain a Workcover medical certificate from your doctor and actively participate in the treatment.

This means that you should always take care that your actions at work will not place yourself or others at risk of harm.
3. Patients

Patients also have responsibilities towards health care workers. Their responsibility is that they disclose to the health care worker their infectious status, if known, and if there is a known risk to others associated with their treatment.

Risk Assessment

This involves identifying the risk of hazards in the workplace, and the risk of exposure of transmission of blood borne diseases to persons in the workplace.

This exposure relates to both materials and situations.

Questions asked when considering risk assessment of workplace hazards include:

- What is the worst outcome from exposure to the hazard, eg is it minor injury, major injury, fatal etc?
- What is the likelihood of harm coming to a person exposed to a hazard?
- How many people are exposed to the hazard?

The risk of exposure to transmission of blood borne diseases in the dental health area may be classed as:

1. High risk
2. Intermediate risk
3. Low risk

You will find more detailed information in the Infection Control in the Health Care Setting publication. Take some time now to read through this information thoroughly.

Spills Management

A spill can be as simple as spilling water when cleaning instruments, to the spilling of body fluids, and chemical spills such as Gluteraldehyde. As you would be aware the management of spills is part of the OH&S Act, and can also be found in the ‘Infection Control in the Health Care Setting’ booklet.

All spills are to be dealt with IMMEDIATELY. Depending on the spill, you will need to:

1. Act immediately
2. Minimize hazards
3. Inform other staff members

Think about the spills that may happen in the dental situation.
WATER SPILL

You are cleaning out the Procomat Developing machine and accidentally spill the contents of the water container on the floor. What will you do?

If you were thinking to:

- Immediately remove/mop up all water and dry the area, and
- Make sure the area is not slippery, that it is not a hazard to you or others

Terrific, you are on the right track.
In the space provided it is now time for you to use your research skills.

What procedure would you adopt for the following:

<table>
<thead>
<tr>
<th>Small spill of Body Fluid</th>
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</tbody>
</table>

Refer to your workplace procedures.
CHEMICAL SPILLS

- Refer to the manufacturers instructions specific to the chemical
- Refer to Safety Data sheets
- Consider the safety of others
- Personal safety
- Prevention of slips and falls
- Prevention of damage to equipment and other surfaces
- Notify appropriate staff

1. What are the fines on a workplace if they breach certain provisions of the OH&S Act?

_________________________________________________________________
_________________________________________________________________

2. For individuals, including employees, who breach certain provisions, what penalties do they have to pay?

_________________________________________________________________
_________________________________________________________________

Your co-operation in OH&S measures is vital to preventing accidents. Remember, if you do not wear employer provided protective attire such as gloves, eyeshields etc, or other wise do not follow the safe working practices in which you have been trained, you may be found guilty of breaking the law.

Additional responsibilities
Your responsibilities do not end here. If you read your OH&S act carefully, you will find that there are additional responsibilities you have to take.

You must take the time to read through the act and be familiar with the relevant areas.
TOPIC 2 – Infection Control Requirements in the Dental Practice.

Physical Environment
Physical environment plays a large part in infection control in the dental practice. The design of the dental practice is fundamental to the implementation of effective infection control procedures. The following design features should be considered:

- Ventilation
- Patient treatment and waiting areas
- Hand washing facilities
- Work areas – treatment, laboratories, sterilisation rooms
- Cleaning areas
- Surface and equipment materials
- Waste management

Infection Control Procedures and Policies
Each dental practice/clinic should implement correct infection control policies and procedures. The policies of the practice must be well documented and readily available.

All staff should have knowledge of, and be educated and trained in these procedures/policies.

The following points should be included:

- Hand washing and hand care
- Use and disposal of Sharps
- Processing and cleaning of instruments prior to sterilisation
- Sterilisation procedures
• Chemical Disinfection
• Cleaning and disinfection procedures for surfaces and equipment
• Protective clothing and equipment for staff
• Spills Management
• Waste Management
• Protection for patients
• Education and training
• OH&S
TOPIC 3 – Standard/Additional Precautions.

Recommended Time – 0.5 hrs

Now would be a good time to review your workplace organisational infection control policy/procedures/protocol. It is extremely important that all staff have a knowledge of these procedures and know what to do if any action is required.

Standard precautions
Standard precautions are work practices required for the basic level of infection control. They include:

- Good hygiene practices, particularly washing and drying hands before and after patient contact
- The use of protective barriers which may include gloves, gowns, aprons, masks or shields
- Proper handling of sharps
- Use of aseptic techniques – ie cleaning, disinfecting and sterilisation

Standard precautions are recommended for the treatment of ALL patients, regardless of their infectious status.

Additional Precautions
Additional precautions are used for patients that are known or suspected of being infected with highly transmissible pathogens that can cause infection.

They are particularly used when there is the possibility of air borne transmission, eg T.B., measles of chicken pox; or droplet infection eg mumps, rubella, influenza.

Additional precautions are specific to a given situation. They are applied in addition to standard precautions.
1. What is meant by standard precautions?

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2. Why is it important to apply these precautions in the dental surgery/clinic?

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3. What is meant by additional precautions?

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_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
So, how did you go with the topics under Learning outcome 1? Did you answer all the questions correctly? If you did, congratulations and please proceed to Learning outcome 2. If you answered a question incorrectly or you had difficulty with any of the activities, go back and have a look at the information again. If any part of this module is not clear, it is very important to contact your teacher and discuss this with him or her before you start Learning outcome 2.
LEARNING OUTCOME 2

STATE AND DEMONSTRATE THE PERSONAL PRECAUTIONS TO BE TAKEN TO PREVENT CROSS-INFECTION IN THE AREA OF DENTAL HEALTH WORK.

Assessment Criteria:
You will have achieved this learning outcome when you can:

• State the importance of personal hygiene.
• State the importance of serological testing and immunisation.
• State the principles of universal/standard precautions to control cross-infection in the dental practice.
• Demonstrate the implementation of personal hygiene measures.

Introduction
Regardless of which section of the dental health area you are working in you are always in contact with people, clients, equipment and instruments. Transfer of disease from person to person has resulted in a greater emphasis on the role of decontamination, sterilisation and disinfection in the prevention of cross infection.

Standard and Additional precautions and the Principles of infection control have been developed, as a guide for all health care works in controlling and preventing diseases and infections from surgery/clinic environments, and reusable instruments that enter the skin, the mouth or inside the body from being transferred.

The first step in preventing cross contamination lies with our knowledge of micro-organisms and how they are transmitted, adoption of national recommendations, like those you have just read and will learn further about as you move through this learning guide and our own personal health and protection.
TOPIC 4 – Review of Micro-Organisms.

**Introduction**

You may be saying to yourself ‘I’ve done this section’ It’s important that time is taken to review micro-organisms, their appearance, the conditions in which they live and reproduce. Understanding these fundamentals emphasises the importance of scrupulous personal protection, cleaning, sterilisation and disinfection of instruments and items in the dental health care area.

**Protozoa**

*Do you remember learning about this micro-organism and how it’s transmitted?*

No. *Well now is a great opportunity to review.*

Protozoa are single celled microscopic animals. They are transmitted by insects to humans. A good example of this is the protozoan that causes malaria which is transmitted by mosquitoes.

Examples of Protozoa

- Amoeba
- Trypanosoma
- Paramecium
**Fungi**

You see these in fields under trees, in shower recesses and in ponds.

They are commonly known as mushrooms, moulds and yeast. In the diagram below you will see that some of these organisms have thread-like strands called filaments. Filaments are tubular branches of fungi that carry the fungi spores.

You may have heard about or seen ringworm? – This is a disease that is caused by a fungus.

A very common dental disease caused by the fungi group yeast, is ‘candida’. Candida is naturally found on and in the human body, however at times of poor health candida multiplies and becomes invasive, causing disease.

Fungi like to grow in moist, warm and often semi dark environments. They reproduce by spreading spores. The spores are basically a single cell of the parent plant. These spores are not the same as bacterial spores.

*Do you know why bacterial spores are so significant?*
Bacteria

If you didn’t know or were not sure of the significance of bacterial spores, it will be reviewed in this section.

Bacteria consist of a rigid cell wall that protects the cell membrane and other internal structures. Within the protection of the cell membrane is the cytoplasm of the cell and within the cytoplasm is the nucleus. Bacteria can have other internal structures depending on the type and its function, however all have these basic structures. To enable movement some bacteria have long thin appendages projecting from the main body of the cell, these are know as flagellum.

Bacteria reproduce by cell division that is why when environmental conditions are at an optimum growth is so rapid.

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**Basic structure of Bacterium**
Bacteria also form capsules and spores. A capsule is a protective layer that forms around a bacterium (singular to bacteria). This bacterium can be virulent as they can resist the body’s defense mechanisms.

Bacteria can change into bacterial spores when the environmental conditions are unfavorable, in this condition bacteria are inactive. When the environmental conditions become more suitable the bacteria become active and cause disease. Bacterial spores are extremely resistant and can survive most forms of disinfection and inadequate sterilisation.
Bacteria have distinctive cell shapes. Below are 4 of the most common shapes of bacteria. As a revision exercise try to name these bacteria without looking back at your notes.
Viruses

Viruses differ from other micro-organisms as they can only grow and reproduce within the cytoplasm of a host’s living cell. Being metabolically inert, viruses are not susceptible to antibiotics which act on the metabolism of bacteria.

Fungi and bacteria can be helpful to our environment, however viruses cause disease and death in organisms and need to be destroyed.

Micro-organisms like people require certain elements to live, grow and reproduce. Not all micro-organisms require the same environmental conditions to live, but once you read the list of their general requirements, you will understand why in the next section it is so important to follow guidelines in the prevention of cross contamination.

- Food, Water or moisture
- Oxygen
- Comfortable temperatures
- Certain pH levels

Micro-organisms have requirements for survival that you have just read but they also have some properties that can be listed as;

- Pathogenicity – these are micro-organisms that cause disease through the toxins they produce. In many circumstances they are quite virulent and infective, meaning that once they are transferred they will cause the host to become ill.

*Do you know the name used for micro-organisms that do not cause disease?*

*Well done. Yes they are non-pathogenic.*

- Size, Motility
- Resistance to destruction – such as spores and capsule bacteria

Complete 4.2 to determine how well your knowledge and understanding of this section on micro-organisms has progressed.
1. Using your research skills list at least two diseases in the mouth that are caused by:
   - protozoa
   - fungi
   - viruses

_________________________________________________________________
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2. In the table below write down a human disease caused by each form of bacteria.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Disease caused by this bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococci</td>
<td></td>
</tr>
<tr>
<td>Staphylococci</td>
<td></td>
</tr>
<tr>
<td>Diplococci</td>
<td></td>
</tr>
<tr>
<td>Bacilli</td>
<td></td>
</tr>
<tr>
<td>Spirilla</td>
<td></td>
</tr>
<tr>
<td>Vibriols</td>
<td></td>
</tr>
<tr>
<td>Spirochaetes</td>
<td></td>
</tr>
</tbody>
</table>

Activity 4.2
3. List the elements that micro-organisms need to grow.

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4. What is the significance of bacterial capsules and spores in disease and infection?
   You may like to do a little further reading on these.
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TOPIC 5 – Personal Protection.

Why is it important?
Personal protection is a major step in the prevention of cross infection. The wearing of masks, eye protection, gloves, aprons and shoes is routine while working in a dental surgery/clinic. These barriers in the prevention of the transmission of micro-organisms is very important. There is a good flow chart in learning outcome 3 of what can happen and how easy it is to transfer disease and infection to others. You may like to take a peek at it now, to emphasis why this section, hand washing and the maintenance of the skin and nails of your hands is so important.

An area of personal protection that many of us over look is our immunisation status, why this is important will be discussed towards the end of this topic.

Hand washing
You may be saying to yourself ‘I know how to wash my hands and I know how important it is.’ However, to ensure no step is missed we will have a look at the hand washing routine.

Have a look at the diagrams and sequence of hand washing over the page. Is this the same routine you practice?
Some other important points about hand washing and hand care

- It is important to use a neutral liquid soap and warm water. These agents help to inhibit the growth of micro-organisms on the skin and breakdown debris and oils in which micro-organisms are harboured.
- Hands should be wet then the cleaning agent is added.
- After washing, hands are to be rinsed thoroughly from fingertips to wrist. Remember when turning off the tap not to contaminate your clean hands.
- Dry hands thoroughly with paper towelling.
- The use of an oil free moisturiser is also important to replenish the skin’s moisture that is removed by regular hand washing.
- All cuts, sores and abrasions must be covered, waterproof dressing is preferable, the covering will need to be changed frequently each day.
- Hands must be washed before putting on gloves and after removing them. The wearing of gloves is ineffective without the inclusion of thorough hand washing.

How did you go? Is this the routine you follow? If you do, terrific. This section has been good revision.

If you do not use this or a routine with the same important steps it is important that you study and practice using this routine the next time you wash your hands.

Do you remember having a peek at the flow chart mentioned earlier? If you don’t, have a look at it now and you will see why hand washing is so critical as the first step in preventing cross contamination.
Personal Protective Items

- Masks or face shields
- Eye wear
- Gloves
- Fluid resistant aprons
- Uniforms
- Shoes

**Masks** and **eye wear** or **face shields** protect the operator and the assistant from airborne micro-organisms and any potential splatter of body fluids. The nose, mouth and eyes are a potential portal of entry for micro-organisms.

**Gloves** are to be worn whenever assisting in the surgery/clinic and cleaning and handling of instruments prior and often after sterilisation or disinfection.

Surgery/clinic gloves may be latex or vinyl and allow more tactile senses. Nails are to be clean and should be kept to an acceptable length to prevent the gloves being damaged.

Surgery/clinic gloves are single use only.

Gloves must be changed if torn or punctured.

Cleaning gloves are thick rubber gloves for maximum protection, surgery/clinic gloves MUST never be worn to clean contaminated instruments.

**Aprons** prevent cloths and the skin coming into contact with body fluids.

The use of these types of barriers prevent transmission of disease via direct contact.

**Uniforms** and **shoes** are part of the occupational requirements of a dental professional. There is no specific type of uniform that must be worn; however, it is preferable that sleeves do not extend further than the elbow. Shoes must cover the entire foot; this protects any area of the foot being damaged by falling instruments or any type of spill.
Immunisation

Australia’s immunisation policy has prevented many people from contracting serious diseases, such as measles. Most people born in Australia started their immunisation program when they were infants and ended approximately at the end of primary school.

However, some vaccinations like tetanus or the flu vaccination are given throughout our lives as the need arises.

Health care workers, such as dental prosthetists are at risk of exposure to several diseases that are preventable by vaccines, just like those mentioned. It is because of the availability of vaccines that there is strong recommendation for health care personnel to be immunised. It is appreciated that the freedom of choice is an important consideration in choosing not to be immunised, however it is an ethical responsibility to maintain a current immunisation status and can prevent legal implications.

As you are dealing with people in a close proximity and with body fluids adequate vaccination is required against such diseases as tetanus, mumps, measles and Hepatitis B. It is highly advisable to be immunised against influenza also. Other types of vaccinations may be considered if there is a risk of potential exposure, such as tuberculosis.

Prior to vaccination it is highly advisable to have a blood test to determine the need for vaccination and after some vaccination, to determine if the level of antibodies is sufficient.

Is your immunisation status current?
1. Give some suggestions as to when hands should be washed.

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2. Your employer has asked you to explain and show a new staff member the protective items that are necessary when:
   * Assisting the dental operator at the chairside
   * Cleaning and preparing instruments for sterilisation

   In point form, what would you tell and show this person?
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TOPIC 6 – Principles of Infection Control.

Introduction

By now you are aware of what the definition of Standard and Additional precautions are for people who work in the health care setting.

We are now going to look at the principles that a successful infection control strategy is based on. The summary of the principles applies to the role of the dental professional. In the following Learning Outcome 3 and 4, these principles will be applied to how they may be used in a practical setting.

This learning guide is to support the theory component of this module, there is also a compulsory practical aspect where you will have the chance to demonstrate all you have learned. Another form of demonstrating your practical ability in this area will be when it is time for you to demonstrate your abilities to your supervisor, for the completion of the ‘Clinical Experience Book” for this course.

The following points on the ‘Principles of Infection Control’ have been gathered from the text ‘Infection Control in the Health Care Setting’ it is recommended you have a look at the full principles in this book.

- Gathering knowledge
- Following the minimum recommended work practices: optimally best practice should be achieved
- Personal hygiene and scrupulous cleaning of work areas (Work areas includes, equipment, instruments etc)
- The use of nationally recommended sterilisation and disinfection procedures.
- Single use equipment where practicable
- Support and adherence of Occupational Health and Safety policies and practices

For any infection control strategy to work everyone needs to be committed to it and work towards minimum or preferable best practice. Strategies need to be regularly reviewed assessed and evaluated, with all contributions of staff acknowledge.
So, how did you go with the topics under Learning outcome 2? Did you answer all the questions correctly? If you did, congratulations and please proceed to Learning outcome 3. If you answered a question incorrectly or you had difficulty with any of the activities, go back and have a look at the information again. If any part of this module is not clear, it is very important to contact your teacher and discuss this with him or her before you start Learning outcome 3.
LEARNING OUTCOME 3

APPLY INFECTION CONTROL PRINCIPLES FOR THE CONTROL OF CROSS-INFECTION IN THE AREA OF DENTAL HEALTH WORK.

Assessment Criteria:
You will have achieved this learning outcome when you can:

- Identify specific contamination areas in the dental practice.
- State the risks of contamination to equipment/instruments/materials.
- Implement infection control principles when using/handling instruments/materials/equipment during treatment of a patient.
- State the patient’s role in infection control.
- Implement clean-up procedures and correctly transfer instruments from one work area to another.

Introduction

In Learning Outcome 2, you finished an overview of micro-organisms, and the effects they have on disease and infection. You also looked at the first step in preventing cross infection – personal protective measures – and the principles of infection control that you should be following were also outlined.

Now it is time to look at the areas in the dental surgery/clinic where cross infection may occur.
The dental surgery/clinic has a variety of areas where contamination and cross infection could occur.

**What is cross infection?** Cross infection involves coming into contact with a contaminated surface, instrument, or substance. Diseases may be indirectly transmitted by the micro-organisms that are present on the item that has been touched.

Of particular concern is the situation where sterilisation of an instrument used on one patient has not been carried out, and that instrument is then used on another patient. The micro-organisms could then be transferred from one patient to another.

Diseases may be indirectly transmitted by dirty hands, towels, instruments – even dust. Other common areas in the dental surgery/clinic may include tap handles, switches, handpieces, drawer handles, dental materials, patient’s chart, even the pen used to write on the treatment card.

Let’s look at some specific areas.

**RECEPTION AREA**

- Telephone handsets, computer terminals and keyboards, benches etc should all be cleaned regularly and kept dust free

- Handwashing is extremely important after glove removal before entering the reception area

- Patient treatment cards, radiographs, impressions etc may be brought to the reception area after the patient has completed their treatment in the surgery. All items must be de-contaminated where necessary prior to leaving the surgery/lab.

- No gloves are to be worn in the reception area. Of particular concern is the situation where a DP was to answer the telephone without removing their gloves – can you imagine the cross infection that can arise from this situation?
SURGERY

• The dental surgery should be designed to allow for proper cleaning and disinfection of all work areas and equipment. The design should allow for ease of movement for patients and staff, free of any possible danger areas.

• Areas should be designated ‘clean’ and ‘dirty’ areas for ease of cleaning and to keep the risk of cross infection low

Let’s take a moment to define ‘clean’ and ‘dirty’.

A ‘clean’ area is a specifically designated area for non-contaminated items. These would include items that are sterile, or have been disinfected. At no stage are any contaminated items to be placed in this area.

The ‘dirty’ area is a specifically designated area for placement of contaminated items, such as instruments and trays that have been used during patient treatment. This area should be clearly marked.

• Zones of contamination should be clear to the dental team and barriers should ideally be used in the commonly ‘touched’ areas such as light switches and handles, handpiece cords, suction tubes, chair controls etc

• Barrier gloves or bags must be used over normal surgery gloves if additional items are required from cupboards, drawers etc after a procedure has commenced

• Dispensing of mixing materials should be dispensed prior to glove contamination or barriers should be used

• Only a few sheets of mixing paper should be used (not the whole mixing pad)

• Staff should wear gowns or uniforms that are worn only in the surgery area

LABORATORY

• Laboratory area should be designed to allow for proper cleaning and disinfection of all work areas and equipment

• ‘Clean’ and ‘dirty’ areas should be established and be labelled clearly

• There should be designated areas for ‘incoming’ and ‘outgoing’ laboratory work

• All items should be disinfected prior to being sent to the technician
STERILISATION ROOM

- All staff must be trained and aware of the sterilisation room procedures
- ‘Clean’ and ‘dirty’ areas must be clear
- Sterilisation room should be designed to allow for proper cleaning and disinfecting of all areas and equipment
- Correct ventilation systems must be installed where chemical solutions are used

STAFF/LUNCH AREA

- No clinic/surgery clothing or gloves should be worn in this area
- Hands must be washed before touching any thing in this area

You are now aware of various areas of the dental surgery/clinic where contamination by micro-organisms can take place. Take a minute to think back to the term ‘cross infection’ and the possible undesirable effects this could have in the dental surgery. Now let’s have a more detailed look at how these areas can become contaminated.

Just think about the areas you cover in a normal working day. It is quite common for you to move through the various areas of the dental surgery without even thinking about it. Now take a minute to think about what could happen if, for instance, you did not wash your hands prior to leaving the surgery area to answer the phone at the reception desk.

Take a look at the chart below and follow the route of the micro-organisms that may have been present on your hands. Think about the items you touched in that time- you may have even eaten your lunch!
Fill in the circle of people that come in contact with you throughout the day.

Dental Prothetist
Now have a look at the following example of how important hand washing, disinfection and consideration of items used in the surgery can be in the role of cross infection:

Pen used for charting in the clinic
taken to reception areapicked up by receptionist at lunch time to do a cross word
the receptionist answers the phone
a patient uses the phone
the patient goes home, greets their children with hugs and kisses, and prepares tea for their family

The possibilities are endless.

**The Patient's Role in Infection Control**

As mentioned earlier the patient also has a role in the prevention of cross infection in the dental surgery/clinic.

The patient should inform the dental team of any infectious diseases they may have presently, or have had in the past, by accurately completing the medical/dental history form. The dental prosthetist will then decide the treatment plan for this patient and the risk of infection to the dental team.

*Sometimes the patient may not be aware they have an infectious disease, or wish to disclose their infectious status and this is why we must treat all patients as if they are infectious and follow standard precautions.*
1. What is meant by the term cross infection?
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2. List four areas of the dental practice where cross infection may occur.
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3. State at least one method you can take to control the transmission of disease for each area.
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TOPIC 8 – Implementing Infection Control Principles.

Introduction

Quite often we may only think of major infectious diseases as being of concern to the dental team. You must remember even the common cold is an infectious disease and may result in members of the dental team requiring time off work or the spread of infection to other staff members and patients. We must consider all patients as being infectious, and this is why Standard precautions are followed.

Firstly, let’s take a look at the PRINCIPLES OF INFECTION CONTROL as stated in learning outcome 2. You will need to review these principles with the more extensive list in the text ‘Infection Control in the Health Care Setting’:

To implement these principles each dental surgery/clinic should have an infection control manual that has been designed for the education of all staff in the policies/procedures/protocol that are to be followed. The following areas should be detailed in the manual:

- Methods of hand washing
- Personal protective equipment requirements
- The setting up in preparation for a patient
- Defined areas of contamination
- Clean up procedures between patients
- Management of blood or body fluid spills
- Handling and disposal of sharps
- Waste disposal
- Management of blood/body fluid exposure
- Processing of re-suable items – cleaning, packaging, sterilisation or disinfection, and storage
- Quality control – documentation and monitoring programs for equipment
- Staff immunisation
Many forms of dental treatment are classed as being invasive procedures and the dentist does not want any risk of cross infection, whether it be from patient-to-patient or patient-to-staff, to occur in the dental surgery. In this topic we are going to look at the practical measures taken to prevent this from happening.

It is impossible to work in a sterile field in the dental surgery because it is not possible to sterilise some of the equipment used. The best we can hope for is to disinfect these areas, however, it must also be remembered that most of these areas are out of the main zone of contamination.

The first barrier to infection is self protection. This area has already been covered in learning outcome 2, however now is a good time to refresh your memory on self protection and think about the importance of self protection as a practical infection control method.

You should review:
- Hand washing
- Gowns/aprons
- Gloves
- Masks
- Protective eyewear
- Shoes
- Immunisation

Now let's take a look at some of the equipment used in our surgeries/clinics, and the implications in infection control procedures

**Dental Unit**
- Check all areas of the arms of the unit and the bracket
- Efficient disinfection is often difficult because of the crevices and uneven surfaces
- Regularly inspect all articulated arms, such as the light and bracket arm
- The unit should be dusted and disinfected at the start of each day and preferably covered at the completion of the day. This keeps dust of the unit
- The dental unit should be cleaned and dried between each treatment. Detergent and warm water should be used for routine cleaning. Where disinfection is required, manufacturer’s instructions must be followed
- Barrier use is recommended for the commonly touched areas of the dental unit
- All couplings and hoses for handpieces, suction, ultrasonic scalers, white light etc should be regularly checked for wear and damage, and should be wiped over after each treatment.
**Dental Chair**

- Chair should be cleaned with a recommended cleaner, remember, some chemical solutions may cause the vinyl to harden and crack
- Head rest covers may be used and should be changed between patients

**Suction Units**

- Refer to the manufacturers instructions as to the care of the particular evacuation system used in your surgery
- Water, or recommended solution, should be run through the evacuation system at the completion of each patient treatment
- Recommended solutions should be run through the suction system at the end of the day, or according to the manufacturers instructions
- Care should be taken in the cleaning of the suction hoses
- Regularly check all components for wear or damage

**Dental Light**

- Regularly check the globe
- Barriers are recommended for the light handles and switches
- The dental light should be wiped over after each treatment, paying particular attention to handles and switches

**Dental Handpieces**

All handpieces must be sterilised after each use. Most of the modern handpieces are designed to withstand the autoclave process.

- Regularly inspect handpieces for wear or damage
- Manufacturer’s instructions must be referred to for the correct method of cleaning and sterilisation.
- Handpieces should never be immersed in water or any chemical solutions.
- They are usually lubricated prior to autoclaving

Now lets put this all together and come up with an efficient clean up routine for the instruments and equipment we used in the dental surgery/clinic during treatment. The clean-up procedure for the surgery will be covered in more detail in the Chairside Assisting Module

Your tray or bracket table will now have all used and contaminated items from the treatment procedure, including materials and items that will need to be disposed of.

Now is a good time to have a look at ‘Sharps’
What are Sharps?

‘Sharps’ is the terminology used for items that can cut or penetrate the skin, and in doing so, potentially cause cross-infection of micro-organisms.

Dealing with Sharps

In the dental practice the management of sharps can be defined in to:

1. Dental Surgery (during treatment)

Sharps may be obvious such as needles and scalpel blades, however you must consider that the majority of dental instruments have some sort of sharp edge or blade.

2. Clean-up procedure (sterilisation room)

Sharps must be disposed of in a specific, approved “sharps” container. These are usually in the form of a clearly labelled impervious hard plastic container.

The general understanding is that the person responsible for using the ‘sharp’ is also responsible for its safe removal and disposal immediately after use. This would indicate that the sharp would be disposed of in the surgery. At no time should a sharp, particularly a scalpel, be left on an instrument tray that is being taken from one area to another.

What to do in the event of a Sharps Injury

Contact ANCA (Australian National Council on Aids) or the representative in the state where you work to set up a procedure for your surgery.

- Encourage bleeding.
- Wash the area with soap and water.
- Report immediately to a supervisor or OH&S officer.
- Make sure your workplace has a policy/protocol in the event of a sharps injury, and make sure every staff member knows what to do.
Transferring Instruments from one work area to another

It is advantageous in the design of the dental surgery to have a separate sterilisation room, situated close to the surgery. This creates the situation where the dental assistant will need to transfer instruments, trays and some equipment from the surgery to the sterilisation room.

As mentioned earlier all ‘sharps’ should ideally be disposed of in the surgery. Some or all of the waste material may also be removed and disposed prior to leaving the surgery. As part of the clean-up routine, all items that have been used during the treatment procedure should be gathered and placed on a tray to be transferred from the surgery to the sterilisation room.

Before moving around with any instruments, materials and/or equipment you must check for any hazards that may occur. Check for:

- A clear walking passage from one area to the other
- Are there any patients or other staff members in your path – there may be the possibility of dropping items, where injury may occur.

On arrival in the sterilisation area you must place the instrument tray, and any other items, in the clearly defined ‘contaminated’ area in the sterilisation room.

Now you are ready to move on to the next topic to see the correct method for processing these instruments.
1. What procedure would you follow in the event of a sharps injury?

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Now is a good time to have a look at, and update if required, your workplace infection control manual. If you don’t have one, why not ask your employer to assist you in compiling one.

1. What procedures and protocols should be clearly defined in this manual?

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So, how did you go with the topics under Learning outcome 3? Did you answer all the questions correctly? If you did, congratulations and please proceed to Learning outcome 4. If you answered a question incorrectly or you had difficulty with any of the activities, go back and have a look at the information again. If any part of this module is not clear, it is very important to contact your teacher and discuss this with him or her before you start Learning outcome 4.
LEARNING OUTCOME 4

IDENTIFY AND SELECT METHODS OF STERILISATION AND DISINFECTION COMPATIBLE WITH THE MODES OF TRANSMISSION AND SUITABLE FOR GIVEN SITUATIONS/INSTRUMENTS/EQUIPMENT.

Assessment Criteria:
You will have achieved this learning outcome when you can:

- Differentiate between various methods of sterilisation and disinfection for dental instruments and equipment.
- Describe the process for cleaning and preparing of instruments/equipment prior to sterilisation.
- Clean, prepare and disinfect/sterilise instruments/equipment using the appropriate method of disinfection/sterilisation.
- Store instruments/equipment that have been disinfected/sterilised appropriately.

Introduction

You have reviewed the relevance of micro-organisms in infection control and why personal protection especially hand washing and immunisation is so important as the first step in breaking the contamination route.

You are now aware of what the principles of infection control are and how they may be applied in the dental surgery/clinic. You may use some of the suggestions in your workplace or there may be others that have been adopted by you and your workplace. Now that you know why, it is time to discuss how cleaning, sterilisation and disinfection of dental instruments, items, equipment and surface areas is achieved.
TOPIC 9 – Cleaning before Sterilisation and Disinfection.

What is cleaning?

Cleaning is the removal and reduction of debris and bioburden from a surface, such as when a surface is washed with detergent and water. This sounds like a simple process, and one we all do in our everyday lives. However, in the dental health area cleaning is necessary prior to more thorough sterilisation and disinfection processes. Therefore the cleaning of instruments, items, equipment and surfaces is a critical step in breaking and preventing the contamination cycle.

Essential features and precautions of cleaning

All protective wear is to be worn for cleaning, face shields, aprons, gloves and covered shoes.

During the cleaning process you must:

- Be very cautious of any sharp items that may cause injury.
- Remain within the designated contaminated area for cleaning, so as not to contaminate other areas.
- Remove body fluid, eg. saliva, blood, pus and other debris such as cement, lining or impression material from the items you are cleaning.
- Not damage the item, hence the importance of reading and following the manufacturer’s instructions for specific instruments, items and equipment. A bur brush is not to be used on instruments because it scratches the surface allowing a hiding area for micro-organisms and debris.
- Not unduly contaminate the item, instrument, equipment or area you are cleaning. Use running water and detergent. Avoid soaking. Rinse and clean as soon after use as possible. Use disposable cleaning items were appropriate and disinfect sponges and brushes between cleaning sessions.
- Ensure no residue is left on the cleaned item, instrument or equipment. Detergent is to be thoroughly rinsed or sponged off. No lint from paper towelling or bristles from cleaning brushes is to remain.
- Prevent spills and if a spill occurs clean it immediately.
- Leave the cleaning area free of water, as micro-organisms like water. The articles you have used to clean should be washed or disinfected and hung up to dry. Washing your hands before leaving the area.
Surfaces and Equipment

Bench tops, dental chairs, light units and amalgamators are too large to be sterilised and it is unnecessary to do so as these do not enter a patient’s mouth, however these areas may be contaminated. I know you may be saying that we use protective wraps on the dental unit and light in the surgery, why should they become contaminated? As you know contamination of areas is not always something we are able to see, as micro-organisms are so small. Prevention is the optimum process, therefore all areas touched or used in the course of a patient’s treatment are to be cleaned and disinfected or sterilised.

The clean up area within a surgery can be minimised and an effective routine developed so as all surfaces are decontaminated in the minimum amount of time. This is best achieved by adhering to the specific zones discussed in a previous topic. If you do not remember reading this, now is the time to turn back and re-read this section before moving on.

General recommendations on cleaning, disinfection and sterilisation are given in this learning guide, based on National Health and Medical Research Council (NHMRC) guidelines, it is also important that you read and follow the manufactures guidelines and the protocol and practices within your work place. Infection control is a very critical area and continuing education and research into best practice is the optimum to preventing cross infection, it is your responsibility as a worker in the dental health area to maintain current knowledge and best work practices in this area.

Before the cleaning of instruments and items is started

In learning outcome 3 the major points on cleaning in specific areas of the dental surgery/clinic were discussed. You will remember that all soiled instruments and items used during the procedure are placed on the instrument tray and taken to the cleaning area. This is the point that we are going to start this section from.

When a dental procedure tray is taken into the cleaning area, the items on the tray need to be sorted.

What is the very first thing that must be done before commencing?

Yes. Put on all protective wear for cleaning.

There may be waste on the tray that requires disposal.

- All waste contaminated with body fluid is placed in the contaminated waste bin.
- If there are any sharps eg. damaged scaple blades, these are to be disposed of in an approved sharps disposal unit.

There should never be an incident where a scalpel/bland is left on the procedure
tray that has been taken to the cleaning area. These sharps are to be disposed of by the user immediately once they are no longer needed, in most circumstances this is in the surgery/clinic.

Some **instruments may require disassembling** prior to cleaning, such as burs from handpieces, mirror head from the handle or the amalgam gun needs to be dismantled.

Other instruments or items with **specific cleaning requirements** are separated, these may be divided into:

- Handpieces , hand instruments, hinged instruments glass mixing slabs, burs , hollow instruments.

These would all require different cleaning methods, which will be discussed in the following section.

### Manual cleaning

This is the method when we scrub or wash items using a brush/sponge and detergent. When manually cleaning **you must wear** all protective items, this is a requirement of OHS.

- Clean only in the area designated for the purpose.
- Pre rinse instruments and items if there is a lot of visible debris or bioburden
- Before you start using any cleaning agent you must read all the information and follow the directions on the label. This is to make sure that the product is suitable for the purpose and can be used for the manual method of cleaning. Agents used in automatic washes may not be suitable for manual cleaning

The detergent must be bio-degradable and non-corrosive, non-toxic, non-abrasive and low foaming. When rinsing the item no detergent residue is to remain, this is known as free rising and it is preferable to use detergent in a liquid form.

- Various cleaning brushes and sponges are used depending on the item you are cleaning. It is critical that you use the most appropriate cleaning item and process for the instrument or item that you are cleaning. Such as:

Handpieces – These are delicate and expensive items and you must follow the manufacture's instructions for cleaning and care. Generally handpieces are cleaned of bioburden with a non-abrasive sponge or brush and they are oiled prior to sterilisation.
Hand instruments – these may have sharp edges or fine delicate working ends, generally they should be cleaned with a soft nylon brush never a bur brush as this will damaged the surface of the instrument leaving scratches that can harbour micro-organisms.

Hinged instruments – these may be extraction forceps particular attention needs to be taken when cleaning the serrated beaks to ensure all bioburden is removed. Occasionally these instruments will require oiling of the hinge. The oil used must not interfere with the sterilisation process.

Glass mixing slabs – all cements should be removed immediately from the slab and then washed with a non-abrasive sponge to prevent fine scratches

Burs – generally burs are cleaned with a bur brush, however there are many specialised burs and the manufacturer’s instructions on their cleaning and care need to be followed

Hollow instruments - such as surgical evacuator tips. Generally evacuators tips are disposable however if cleaning is required it is important to use a fine bottle brush inside the tube to ensure all debris and bioburden is removed, thorough flushing is also required.

- Scrub away from the face and body, positioning instruments deep in the sink.
- Rinse thoroughly after cleaning.
- Drain instruments on lint free, disposable paper towelling.

This seems like a long list for cleaning but in the dental area instruments and items are delicate, often small and expensive and require different cleaning techniques.

If there are instruments or items that you clean that are not included here you may like to start you own cleaning glossary. Here is some space for you to jot down some items not mentioned here, especially if you assist in a specialist dental practice.
**Mechanical cleaning**

This is cleaning using various forms of instrument washers and ultrasonic cleaners. This is becoming a more ideal form of cleaning as it is safer, effective and is a time saver, however not all surgeries/clinics have mechanical cleaners.

- Dishwashers replace the act of manual cleaning and rinsing

- Ultrasonic cleaning machines – a machine that vibrates and loosens debris and bioburden from instruments especially serrated areas

- It is important to use a recommended cleaning agent and to follow the manufacture instructions on the use of the machine.

- All debris and bio burden is to be removed from the items to be placed in the cleaner.

- When placing instruments in an ultrasonic cleaner it is important to remove excess water

- Do not overload the machines, the washing action must reach all surfaces of the items

- Tiny items must be secure so they are not lost in the cleaning machine.

- Mechanical washers rinse the contents, however if using an ultrasonic you will need to thoroughly rinse the instruments after their cycle before sterilisation.

- It is important to remember that not ALL items can be cleaned using these methods, you need to ensure that the manufactures instructions or the procedures and protocol of the surgery/clinic are followed to prevent damage to items.

Remember that after any sort of cleaning you need to leave the area neat and water free. The items you cleaned with should be disinfected and left to air dry.

Of course wash your hands before leaving the area
1. What does this label tell you about the solution inside the container?

**SONIDET**

*Medical Equipment & Instrument DETERGENT*

SONIDET is a neutral, free rinsing, bacteriostatic detergent composition formulated for medical equipment in hospitals. The product is non-irritant to skin when used as directed. SONIDET also contains a corrosion inhibitor.

**USE OF GLOVES IS RECOMMENDED WHENEVER USING DISINFECTANTS & DETERGENTS**

**DIRECTIONS**

- ULTRASONIC MACHINES: 5 ml SONIDET per litre of water for each cleaning cycle in the ultrasonic machine. Normal cleaning cycles should be followed.
- MANUAL CLEANING OPERATIONS: 5 ml SONIDET  litre of water - 25ml per 5 litres

**REFERENCES**

- **CONTENTS:** 4 litres
- **Batch number:**
- **Use By:**

- What is it to be used for?
- Are there any precautions you are to take as the user?
- Is it to be used at full strength?
- What are the first aid instructions: where would I get this information from?
- Does this solution have the essential properties of a cleaning agent? Name 3 of the properties.

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2. Why is it necessary to clean instruments and items prior to sterilisation or disinfection?

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3. In point form how would you like to see the cleaning area left after someone has used it?

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TOPIC 10 – Sterilisation and Disinfection.

Introduction

Now that the instrument, items and equipment have been cleaned of debris and bioburden it is time to destroy the micro-organisms that are on the surface of used instruments, items and equipment. Any instrument or item that has been in contact with mucosa or body fluids must be sterilised.

Sterilisation of an item is the process of totally destroying all living matter, this includes micro-organisms such as fungi, viruses, bacteria and bacterial capsules and spores.

Sterile is an all or nothing. There is no such thing as partly sterile.

An item only remains sterile after processing if it is contained within a sterile environment, such as a sterile bag. Items that have gone through the process of sterilisation and are then exposed to normal environmental conditions in a surgery/clinic are not sterile, as non pathogenic micro-organisms would be living on their surface.

The machines used for sterilisation of instruments and items must be monitored and checked by qualified personnel annually to ensure that the minimum temperature is maintained for complete sterilisation.

Recommended Time - 1 hr
Methods of Sterilisation

There are many methods by which to sterilise instruments and other items, however the following are the main types that are used in dental surgeries/clinics.

**Autoclave** – an autoclave sterilises instruments and items by superheated steam under pressure. The heat generated by the superheated steam is at a minimum of 121°C destroying micro-organisms.

There are Australian Standards for autoclaves, you may have these standards at your work place. There is further information about sterilisation in the recommended text ‘Infection Control in the Health Care Setting’ when you have the opportunity it is highly recommended that you have a look at these to further your knowledge.

The **advantages** of the autoclave are:

- It is a fast form of effective sterilisation
- Dental instruments and most items including paper, autoclave rubber items, glass and handpieces can be placed in an autoclave.
- Items can be bagged or wrapped to maintain sterility after the process is completed.
- It is an economical form of sterilisation.

The **disadvantages** of the autoclave are:

- That items may rust in the moist environment of the autoclave.
- Some cutting edges may become dull

If you are using an autoclave you should have read the manufactures instructions on its use and care. There is no substitute for reading the instructions yourself.
**Dry Heat ovens** – sterilises instruments using very high temperatures. The minimum temperature for the complete destruction of all micro-organisms is 160°C.

The **advantages** of dry heat are:

- That instruments will not rust as they are completely dry before placing in the dry heated oven.
- Sharp edges are maintained.
- Instruments can be enclosed to maintain sterility after processing however, it must be heat and flame resistant such as a stainless container with a lid.
- It is an economical form of sterilisation.

The **disadvantages** are:

- Only items that are high temperature resistant can be sterilised by this method.
- It takes a long time for each sterilisation cycle.
- It is harder to maintain the minimum temperature for sterilisation and human error may compromise the sterilisation process.

**Minimum standard for sterilisation**

In Australia, all sterilisers must be used at one of the temperatures shown in the table below.

**Steam sterilisers**

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>Kpa</th>
<th>Holding time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>103</td>
<td>15</td>
</tr>
<tr>
<td>126</td>
<td>138</td>
<td>10</td>
</tr>
<tr>
<td>132</td>
<td>186</td>
<td>4</td>
</tr>
<tr>
<td>134</td>
<td>206</td>
<td>3</td>
</tr>
</tbody>
</table>
Dry heat sterilisers

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>Holding time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 °C</td>
<td>120</td>
</tr>
<tr>
<td>170 °C</td>
<td>60</td>
</tr>
</tbody>
</table>

These temperatures MUST be maintained for the time of sterilisation, this is known as the ‘**Holding Time**’.

‘**Penetration Time**’ is the time that it takes to reach the minimum ‘Holding Time’. Penetration time MUST be added to the cycle for sterilisation. In the case of the autoclave a component of penetration time is the time it takes the pressure within the autoclave chamber to reach the minimum kPa (kilopascals), this is important as the steam will not be superheated without the minimum pressure being reached.

A major advantage of the autoclave system is that the Penetration Time and Holding Time are automatically calculated. Unlike the dry heat oven where the calculation of Penetration and Holding Time needs to be done by a human, hence there is an element of potential error. Once the cycle has commenced the door must not be opened and no other instruments are to be added to the cycle.

**Penetration time + Holding time = Sterilisation time**
Preparing sterilisation packages.

Depending on the protocol and procedure of the work environment preparing package for sterilisation may be for single or group instruments and items. Generally instruments and items are grouped for dental procedures such as restorative or periodontal procedures.

Types of packs may be:

- Linen wrapped as in hospitals
- Stainless steel containers as with dry heat ovens or
- Autoclave bags. These are the most common and will be discussed here.

These are generally paper or paper with clear plastic facings they come in a variety of sizes and are either sealed using a heated bar which melts the adhesive material or a specific autoclavable tape is used, to completely seal the bag to prevent any micro-organisms entering. Clean and dry instruments and items are placed in the bag leaving enough space for the heat and steam to penetrate. Autoclave bags have chemical indicators on the front of the bag that changes colour when it has been through the sterilisation process. All bags must be labelled with the contents and date of sterilisation so you are able to store and retrieve the package correctly.
1. Why is the monitoring of the correct time and temperature reached during the sterilisation process so important?

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2. **Sterile is an all or nothing. There is no such thing as partly sterile.**

If you had to explain this statement, what would you say?

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3. State three advantages for the use of each:
   - autoclaves
   - dry heat

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The answers are at the end of this learning outcome.
General points for and during sterilisation and disinfection processes

Instruments and items are to:

- Be free of all debris, bioburden and all detergent.
- Be inspected for cleanliness, damage, completeness and functioning correctly before the sterilisation cycle or disinfection.
- Have sufficient space around items for heat penetration or total immersion and free of air bubbles in a chemical disinfectant. Do not over load the machine.
- Be completely moisture free for dry heat sterilisation and chemical disinfection and drained of most moisture for autoclaving.
- Once a cycle has commenced no other item is to be added.
- After the sterilisation process instruments and items must be allowed to cool and in the sterilisation and disinfection process dry also, this is particularly important when using autoclave bags.
- All instruments, items and bags or wraps must be inspected for damage before storing of items.
- All manufactures instructions are to be followed. These are to be read before commencing the sterilisation and disinfection process.
- Weekly inspection of the machine or container is necessary to detect damage or maintenance required.
- The autoclave is a pressure vessel and it must be inspected and certified annually by an approved inspector.

Disinfection

Disinfection is the means of destroying or inhibiting the growth of micro-organisms that cause disease and infection. Disinfection is not as complete as the other forms of sterilisation mentioned, glutaraldehyde is the only chemical that destroys bacterial spores and resistant viruses.

Disinfection is only to be used when sterilisation is not possible due to the sensitivity of the equipment or the size of an object like the dental chair. Disinfection is not a substitute for sterilisation.
Thermal disinfection

The use of boiling water is a thermal form of disinfection.

- The water must be a consistent 100 °C for disinfection
- Items must be completely immersed at 100 °C for 5 minutes uninterrupted
- The water unit must have a secure lid and may have a temperature gauge. The accuracy of the temperature gauge needs careful maintenance to ensure the correct temperature is reached
- Calculation of ‘Penetration Time’ plus disinfection time must be adhered too. The principle of penetration time and disinfection time in this case is the same as with the autoclave and dry heat oven
- Scrupulous attention to the cleanliness of the unit is needed and the quality of the water must also be maintained to a high standard. Many units require deionised water.

Chemical disinfection

There are many chemicals that are used in disinfection solutions, currently the only approved chemical for instrument disinfection is Glutaraldehyde. Chemical disinfection should only be used when thermal disinfection is inappropriate.

Disinfectants should:

- Offer residual biocidal effect on the treated surface
- Fast acting, economical and Easy to use
- Odorless and stain resistant
- Adhere to Australian Standards and Worksafe Australia recommendation
When using any chemical you must:

- Strictly follow the manufacture guidelines, be aware of State and Worksafe guidelines and read the Safety Data sheet for the product prior to use.

- All protective items are to be worn, eye and face cover, moisture resistant aprons, covered shoes and heavy duty gloves.

- Use chemicals in a ventilated area designated for chemical use.

- Never mix chemicals unless specified by the manufacture.

- Prevent spills, if a spill occurs clean up immediately.

*Are there any other points you would add to this list?*

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Some other common chemicals that are used in disinfection solutions

- Iodophors

- Phenol compounds

- Sodium hypochlorite

*Why not have a look at some of the chemical components in the disinfectants you use at work?*
Are there chemicals that are not mentioned here?

Listing them would be a good idea for your reference.
Biological Monitoring

We have discussed that it is critical to ensure that sterilisers are maintained at the minimum temperature and in the case of the autoclave at the correct pressure for the stated time for the sterilisation of instruments and items.

Weekly monitoring using biological indicators is highly recommended. The biological indicators used for testing are in fact harmless bacterial spores that are highly resistant to heat. A typical sterilisation cycle is processed with the bacterial spore indicator imbedded within the load. After the cycle is completed the indicators are removed and cultured and then checked to ensure that the sterilisation machine is working effectively.

There are biological indicator kits for both autoclaves and dry heat ovens, it is important that the correct kit is used as different spores are used. Some autoclaves come with a validation system, this is a printer that is connected to the autoclave and the readings of temperature, pressure and time for each cycle is recorded and printed as a monitoring sources for complete sterilisation.

There is no monitoring system for chemicals however, strict adherence to usage periods of solutions is critical. Some type of written record for all staff to view and consult would be an advantage.

Antiseptics

Antiseptics unlike disinfectants are used on skin and mucousa surfaces.

Antiseptics inhibit the growth and multiplication of micro-organisms preventing infection. Do you remember we mentioned Chlorhexidine when talking about hand washing liquid soaps? This is an antiseptic.

Antiseptics and disinfectants are never to be interchanged as the strength of the active chemical differs and some chemicals can not come into contact with skin or mucousa as they cause irritation and can burn the tissue surface.
1. During the care and maintenance of sterilising machines:
   - what needs to occur weekly?
   - what needs to occur annually?

2. How is disinfection defined?

3. What care do you need to take when using chemical disinfectants?
4. Look at the label below.

- What is the product name?
- What is the active ingredient?
- What is this solution used for?
- Name three forms of micro-organisms that it is effective on?
- What are the directions for use?
Storage of instruments, items and equipment once sterilised or disinfected.

Now that you know why it is important to scrupulously clean, sterilise or disinfect it is extremely important to handle and store instruments and items correctly.

All sterile instruments must remain sterile until they are ready for use.

The fewer times an instrument is handled after sterilisation or disinfection contamination is minimised. To assist with maintaining this environment you should:

- Use aids when removing items not contained in an autoclave bag or wrap. This may be by either using clean, gloved hands or another safe secure method of transfer, such as tweezers.

- All instruments and items are to be stored undercover in a dry area.

- Minimum exposure to surgery/clinic environment is needed to prevent airborne micro-organisms from settling on instruments and items.

- All storage areas are to be labelled and easily accessible.

- Ideally items should be sealed correctly in bags, wraps or containers until the time of use.

We have now come to the end of this guide, you should feel confident in your knowledge about how to prevent cross infection in the dental/clinic area. The most important things to do now is to practice what you have learnt. This can be achieved in your everyday routines as a dental assistant, or it may be in a simulated environment at a college, no matter what environment you are in it is important to follow the minimum standards but strive to achieve best practice standards for infection control.

There is a theory and practical assessment for this module, so continue practicing your knowledge and skills.
So, how did you go with the topics under Learning outcome 4? Did you answer all the questions? If you answered a question incorrectly or you had difficulty with any of the activities, go back and have a look at the information again. If any part of this module is not clear, it is very important to contact your teacher and discuss this with him or her.