Dentistry Environment Essentials

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Contents

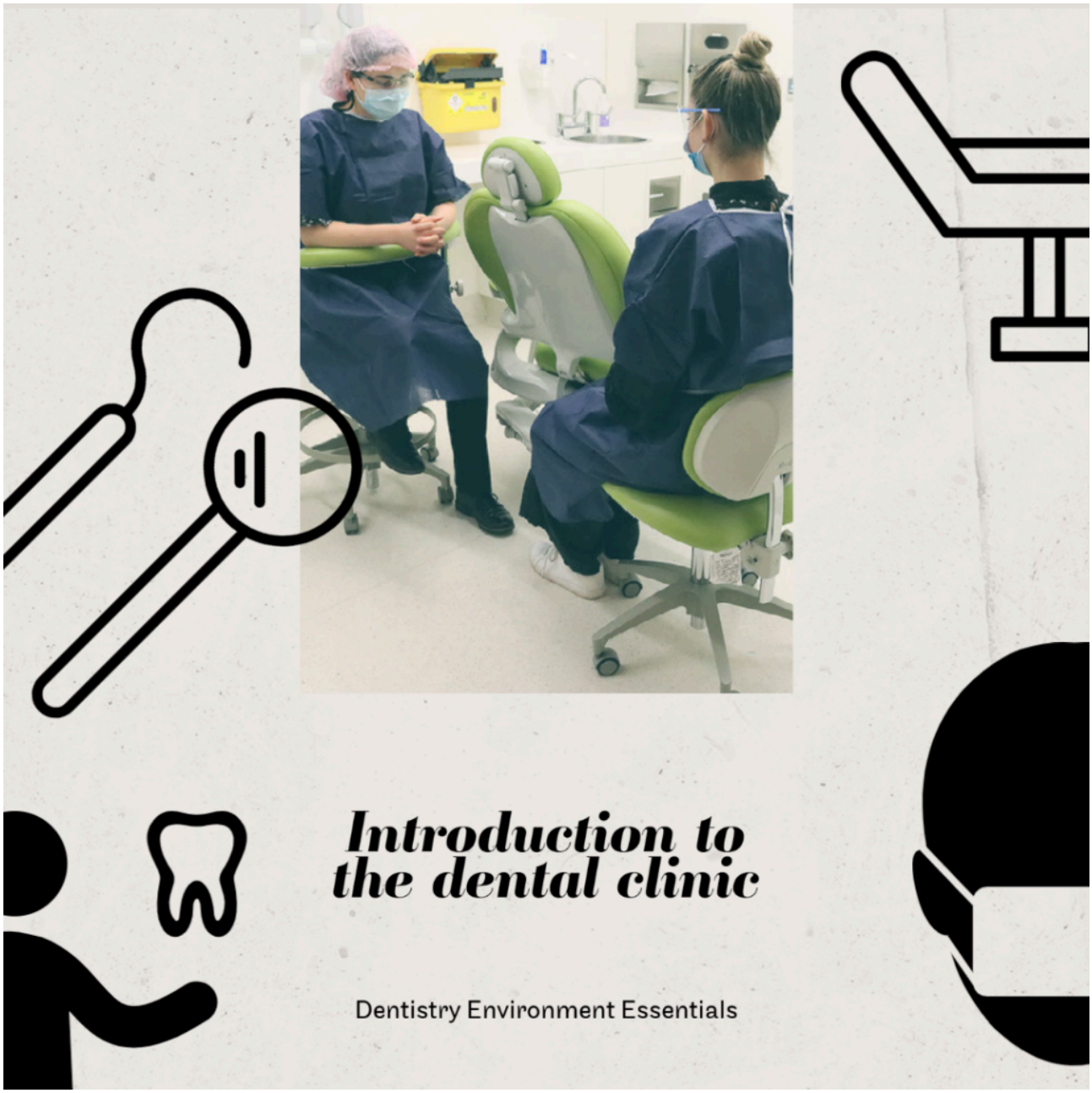
Introduction

NICOLE STORMON

The setting where dental procedures take place is a unique environment. The design of a dental clinic or surgery is purposefully built to promote ergonomic practice, safe procedures, efficiency and facilitates infection control. This book aims to introduce the dental environment and give practical guidance on how to navigate the equipment, instruments, procedures and how to stay safe. All dental team members require an appreciation and understanding of the principles in this book to ensure patients receive the safest and most pleasant experience when receiving dental treatment.

This book was written by a dental team to include multiple perspectives and ensure the content was as practical as possible.

INTRODUCTION TO THE DENTAL CLINIC



Surgery layout and equipment

NICOLE STORMON

Learning Objectives

Describe the dental surgery layout for facilitation of safe dental practices.

Apply the dental surgery area layout to universal principles of infection control in dentistry.

Identify common dental surgery equipment and their use in dentistry.

Appreciate the variation in equipment available in dental practices.

Principles

Effective layout of equipment in a dental surgery is crucial for facilitating infection control procedures and time management of procedure appointments. Dental surgeries must have floors that are waterproof and easily cleaned, such as laminate flooring. The room must be well ventilated and separate from waiting rooms, reception areas, lunchrooms and other rooms such as on-site laboratories in the practice.

All members of the dental team must have understanding of the use and maintenance for the dental surgery equipment. Dental surgery equipment can be divided into the dental chair and the surrounding workstation.

Dental chair

The dental chair is the main location where dental procedures occur. The chair reclines which facilitates the seated practitioner to comfortably view the patient's oral cavity.

Equipment	Description
Patient chair	The reclining chair where the patient sits for treatment.
Overhead light	The operatory light to direct light onto the operating field.
Dental Assistant chair	A chair on wheels with a bar located above the seat at waist height used to rest arms on.
Operator chair	A chair or stool on wheels, with or without back lumbar support.
Bracket table	A moveable unit with a control panel for the operation of the dental chair and storage of operatory instruments.
Suction unit	The unit that has the equipment for saliva evacuation.

The location of other major equipment in this area is determined by if the operator uses their right or left hand as the dominant hand for the procedures. Some dental chairs are designed to be interchangeable for both right and left handed operators.

Equipment	Location Right-handed operator	Location Left-handed operator
Patient chair	In the middle of the dental surgery, with easy access for the dental team and patient to move around.	
Overhead light	Directly above the patient chair, typically attached to the ceiling.	
Dental Assistant chair	To the right of the patient chair, towards the head of the patient.	To the right of the patient chair, towards the head of the patient.
Operator chair	Directly behind the patient chair around to the right of the patient.	Directly behind the patient chair around to the left of the patient.
Bracket table	To the right of the patient chair, near the operator.	To the left of the patient chair, near the operator.
Suction unit	To the left of the patient chair, near the dental assistant.	To the left of the patient chair, near the dental assistant.

Workstation

The workstation or working areas are the bench and surrounding equipment around the dental chair. The working areas are clearly differentiated into clean and contaminated zones. Only the required materials and equipment are placed in the working area and clutter needs to be minimised.

Clean areas must not be contaminated by potentially infectious materials. The design of the dental surgery facilitates the dental team to be able to keep these areas free of dust and other contaminants. The clean zone includes a bench which will contain patient records and computers for record keeping purposes. The inside of the cupboard and draws are to be kept clean. This is where sterilised equipment and materials will be stored.

How you do get materials out of the draw during a procedure?

The inside of the draws are strictly a clean zone. You must not use contaminated hands, whether gloved or not, to get materials or equipment out of these draws. You will be required to completely de-glove, perform hand hygiene and then retrieve your required materials with clean hands.

The **contaminated working** (or "dirty") zone however will potentially have infectious agents during patient procedures. This zone is decontaminated thoroughly, between patient appointments. All the required equipment and material for a procedure, are placed in the contaminated working zone. This area will usually have a hand washing sink, a general waste bin as well as a sharps disposable bin.

Can I record clinical notes in the contaminated working area during a procedure?

You can record clinical notes in the contaminated working zone, however it is difficult if not impossible to decontaminate a writing implement. If you record notes in a contaminated working zone, you would then need to de-glove, perform hand hygiene and transfer your written notes onto the computer or into patient notes. This can also be achieved with the help of a colleague with clean hands who can transcribe your notes. Any contaminated notes and writing implements are then disposed of from the contaminated working area. The optimal way to record clinical notes is to have a dental team member with clean hands, record them at the time you are dictating them.

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Workflow

The dental clinic is a busy environment and understanding how to navigate the workplace effectively can reduce stress for the team and the patient.

Dental surgeries follow a **one way flow**. Clean materials and instruments enter into the contaminated working zone for use. These instruments strictly do not re-enter the clean zone and will only exit the working zone to then move to the sterilisation room for the decontamination process.

Dental surgeries are often optimised to ensure maximum efficiency. An example of workflow efficacy would be placing frequently used materials in a drawer that is closest to the dental assistant and operator during treatment. The dental assistant can then access this quickly beside them, rather than standing up, moving to another part of the room to open a drawer to access this material several times during a procedure.

Country context

Australia

The design of healthcare facilities in Australia are guided by the Australasian Health Facility Guidelines (AHFG). This is a comprehensive guideline compiling infection control principles and regulations with facility and design principles an Australian Standards.

This guideline specifies the requirements for building elements, physical environment and surfaces and finishes.

For example, under surfaces and finishes flooring is required to be easy to clean and repair and must not be carpeted. The Australian Standards outlined in the AHFG include:

- *Standards Australia, 2014, AS/NZS 4187:2014 Reprocessing of Reusable Medical Devices in Health Service Organizations; and*
- *Standards Australia, 2004, AS/NZS 4674:2004 Construction and fit out of Food Premises.*

Practical application to the dental environment

There are hundreds of different brands of dental chairs available. It is important to review the manufacturer's instructions on how to operate the dental chair in the local practice setting, and where possible organising a demonstration of the chair by the manufacturer's local representative .

There are similarities between the dental chairs for their operation such as:

- Handpiece control panel: Generally dental chairs bracket tables will have a control panel to adjust the handpiece speed and water volume.
- Chair recline control panel: The bracket table will have directional buttons for control of the chair position and may have pre-set positions programmed by the operator.

The operator light, dental handpieces, triplex syringe and suction unit will typically be operated in a similar way, regardless of the chair brand.

Operator light:

- The overhead operator light will have handles to move the light into position.
- Some lights have a physical switch or motion sensor to turn the light on and off.
- Some lights can be dimmed and the colour changed.

Suction:

- The suction will generally have a lever to turn the suction on and off.
- The suction in some cases may turn on automatically when lifted out of the suction holder.

Triplex syringe:

- The triplex has two buttons: water and air. When depressed the buttons will release air, water or both air and water.

Handpieces:

- The handpieces on the bracket table will usually only operate when lifted out of the bracket table. This allows for safety measures if accidentally operated.
- A foot pedal is used to activate the handpiece. The foot pedal usually has a water control switch as well.

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Key Takeaways

- A dental practice will have a separate room for the purpose of cleaning, reprocessing and decontaminating instruments.
- A 'one way flow' must be utilised to minimise infection control risks and exposure.
- Correct personal protective equipment must be worn at all times.

The authors acknowledge the contributions of Vivian Dao, Jaewoo Jang and Shamitran Prabakaran for their contribution to the drafting of initial concepts in this chapter; and Tachae Douglas-Miller and Veronica Kindaro for their assistance in filming the dental surgery tour.

Sterilisation area layout and equipment

TACHAE DOUGLAS-MILLER AND NICOLE STORMON

Learning Objectives

Appreciate the instrument reprocessing area design for facilitation of safe dental practices.

Explain the workflow of a reprocessing area.

Apply universal principles of infection control in dentistry to the dental surgery and sterilisation area layout.

Principles

Environmental controls in a dental practice design can reduce the risk of transmission of infection. Dental practices consist of a designated sterilisation area, where various instruments are processed via decontamination, disinfection and sterilisation. In this area there must be clearly segregated '**clean**' and '**dirty**' zones. To maintain these zones, it is imperative the layout or floor plan of a sterilisation room facilitates a one-way flow for the entry and exit of instruments. This flow provides operational efficiency as well as guaranteed infection control.

Instrument reprocessing area require:

- Aseptic techniques
- Instrument flow from contaminated to clean
- Adequate lighting and ventilation
- Hygienic and clean working spaces
- Suitable storage space
- Contaminated instrument sinks
- Separate clean handwashing sinks
- Cooling area for sterile items awaiting re-entrance into the operational rooms.

Workflow begins in the dirty zone of a sterilisation area and ends in the clean zone. It is a multi-step, universal process that includes cleaning, disinfection, inspection and assembly, and finally packaging and sterilisation, where applicable to the instrument.

The **dirty zone** is named as the contaminated instruments are brought from the surgery directly, to this zone in the sterilisation area. Upon entry, contaminated instruments will be placed in the **'set down' area** to then begin the process of decontamination and cleaning before sterilisation.

The clean zone contains the instruments that have been decontaminated, sterilised and/or disinfected effectively. Instruments will re-enter the surgery or operatory room, from this area.

I have contaminated instruments but I don't know where to place them in the sterilisation area. What do I do?

The dirty zone of the sterilisation area should be clearly labelled. If you are unable to locate the borders of where the clean or dirty zones begin, ask a colleague before placing your contaminated instruments in the sterilisation room.

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Work flow steps:

1. Wearing personal protective equipment, securely carry the contaminated instruments from the surgery to the instrument reprocessing area (sterilisation room)
2. Place the items in the setting down area (dirty zone)
3. After items have been adequality sterilised through several processes (discussed in later chapters) instruments enter the clean zone of the sterilisation area
4. Clean hands are used to take instruments into the dental surgery or storage areas for placing sterilised instruments and instruments packs.

Who is responsible for maintaining the workflow in the sterilisation area?

It is the responsibility of all of the dental team to appropriately provide a safe environment for patients and colleagues minimising risk of transmission of infection from patients to clinical staff, within the clinical staff and from patient to patient.

Country context

Australia

The Dental Board of Australia develops and regulates infection control guidelines within Australia. This provides a basis for practice managers, dental practitioners and clinic owners, to develop protocols for infection control specific to practice settings.

It is the responsibility of dental practitioners to implement guidelines within the practice, ensuring staff are familiar with protocols. The infection control guideline refers to other reference documents such as the National Health and Medical Council Infection Control guidelines[1] and the Australian Dental Association Infection Control guidelines[2].

The Dental Board of Australia routinely audit clinic infection control practices. This is common if there has been a complaint from a patient, member of the public or a former/ current employee. It is important to ensure all guidelines are adhered to whether or not the practice is audited.

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1. Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: National Health and Medical Research Council (2019).
2. Australian Dental Association. Guidelines for Infection Prevention and Control Fourth Edition. 2021.

Practical application to the dental environment

Practices will vary slightly, with specific design and layout of sterilisation rooms. However, the work flow from dirty to clean zones will not change. The correct workflow for sterilisation should be followed closely, to minimise risk of cross contamination and disease transmission.

There are several different types of reprocessing machines and brands which may vary from practice to practice. This will be discussed in later chapters.

Key Takeaways

- A dental practice will generally have a separate room for the purpose of reprocessing and cleaning instruments.
- A 'one way flow' must be utilised to minimise infection control risks and exposure.
- Correct personal protective equipment must be worn at all times.

Instruments

SOWMYA SHETTY AND NICOLE STORMON

Learning Objectives

Understand the general principles of using instruments in dentistry.

Know the parts of a dental instrument and their functions.

Appreciate the broad types of instruments used in dental practice.

Demonstrate the safe and correct use of common equipment and instruments in dentistry.

Principles

Dental instruments are used for various purposes, ranging from clinical examination, isolating teeth from moisture, cleaning, preparing, restoring and even removing teeth and associated tissue. These include triplex air and water, manually driven instruments, referred to as hand-instruments and handpiece driven rotary instruments. Instruments can be single-use disposable or re-useable after suitable decontamination and sterilisation.

Hand instruments

Hand instruments are manufactured from medical grade stainless steel. Most hand instruments have a handle, shank and working end arrangement. They can be then broadly described as cutting and non-cutting variations.

Cutting hand instruments will normally have a blade for the working end which is made from carbon steel or tungsten carbide for increased cutting efficiency, longevity and strength. They can have different shapes such as a round or oval scoop with a circumferential cutting edge (i.e. spoon excavator), a flat surface with an angled cutting edge (i.e. hatchet, chisel) or a curved cutting edge (i.e. scaler).

Non-cutting instruments working ends can either be a blunt or pointed end such as a tyne (i.e. probe for exploring), a textured or non textured nib (i.e. condenser) or even an angled flat non-cutting blade (i.e. flat plastics).

General uses for hand instruments include examination, periodontal cleaning and scaling, removal of carious lesions and cavity preparation, placement and shaping of preventative and restorative materials, and for retaining restorative materials while placing and shaping; and also for moisture control and isolation of tooth surfaces within the oral environment.

Common hand instruments categorised by use:

 Examination:

- mouth mirror
- straight probe
- periodontal probes (examples: WHO, Williams, Naber's, Briault's)
- tweezers

Periodontal cleaning and scaling:

- Sickle scaler
- Universal scalers – anterior and posterior
- Area specific scalers – Gracey's scalers.

Removal of dental carious lesions and cavity preparation:

- Hand (spoon) excavators – large, medium, small
- Straight or hatchet chisels
- Gingival marginal trimmer

Placement and shaping of preventive and restorative materials:

- Thymosin probe (liner placing instrument)
- Amalgam gun
- Condensers (sometimes called as pluggers)
- Composite plastic instruments usually gold or Teflon coated
- Half Hollenbach carver
- Round ended burnishers
- Flat plastic
- Scissors

Retaining restorative materials while placing and shaping:

- Matrices and retainers

Isolation of teeth and moisture control:

- Dental dam clamps and forceps
- Cotton roll holders
- Suction tips
- Triplex tip

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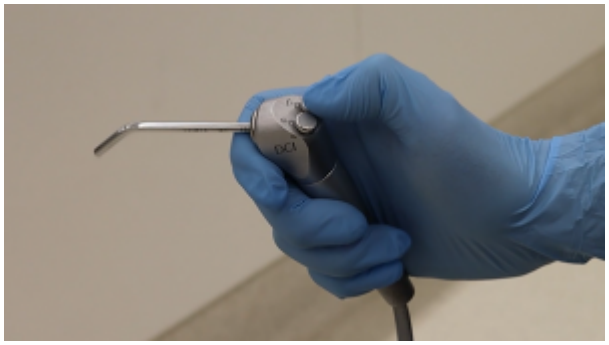
Triplex syringe



A dental triplex is an air and water syringe. A triplex can be considered an instrument as the tip of the syringe has a number of functions and uses in all dental procedures.

The triplex has two buttons. One buttons sprays pressurised air out the syringe tip, the other water. When both buttons are pressed, a combination of air and water stream out of the triplex tip.

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Rotary instruments

Small hand held electric and air turbine mechanical instruments in dentistry are known as handpieces.

There are four common types of handpieces; high speed, low speed, straight and prophylaxis.

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All types of handpieces grip small parts in a chuck. These include dental cutting burs, coarse and fine polishing discs. These handpieces are driven by compressed air for high speeds, or by a separate electric motor for lower speeds.

High speed handpieces typically spin dental burs over 180,000 revs per minute (rpm). High speed handpieces generate heat on the tooth due to their speed and use a coolant such as water to cool down the tooth during operation. High speed handpieces are versatile and can be used for cutting tooth structure, alveolar bone and restorative materials, dependent upon the bur selected.

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Slow speed handpieces operate between 600 and 30,000 rpm. As these handpieces operate slower they require burs with sharper and fluted cutting surfaces. These handpieces are typically used for burs designed for dental caries removal and polishing restorations. They have a higher 'annoyance factor'. This is because more vibrations are produced with slower rotations of the bur.

Prophylaxis handpieces are modified slow speed handpieces. The latch function of the handpiece head is modified to receive screw type prophylaxis cups and brushes.

Straight handpieces are typically used in dental laboratories. Their straight body allows for larger burs designed for cutting materials and appliances.

Handpieces are operated using a foot pedal and the speed controlled by a digital panel.

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Burs

Dental burs are small operatory bits used in handpieces to cut or polish.

Burs have a head, neck and shank. Diamond burs have varying grits, with higher course grit having the sharpest cutting ability. Burs are also made with tungsten carbide and stainless steel. Burs come in a wide range of head sizes and shapes.

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Country context

Australia

The use of instruments in a dental setting are generally universal. There may be variations in the avalibility of instruments from country to country, as well as the name used of the instrument. For example, a sickle probe may be referredto as an explorer.

Practical application to the dental environment

Often instruments are grouped together in sets, relevant to types of procedures. For example the instruments for a dental examination will be combined in a cassette, including a dental mirror, sickle probe, periodontal probe and tweezers. This is fairly consistent between practices, however, consumables may differ between single use or reusable. This will be discussed in the next chapter.

For restorative procedures, there are a variety of burs that may be used. Practitioners decide which bur/burs are necessary for the procedure.

Typical examination kit with a bur stand

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Key Takeaways

- Hand instruments, rotary instruments and burs are all used in dental settings for various procedures.
- Instruments are often grouped together relevant to the type of procedure.
- An examination kit is combined in a cassette with a dental mirror, sickle probe, periodontal probe and tweezers.

Consumables

NICOLE STORMON

Learning Objectives

Appreciate the broad types of consumables used in dental practice.

Understand the functions of various consumables in dental practice.

Principles

Consumables in dental practice are items that are single use. There are a variety of instruments, products, materials, medicaments and chemicals available. Within these broad categories of consumables the purpose varies dependent upon the procedure and discipline of dentistry.

Instruments and products

Single-use instruments and products are used where reprocessing for reuse may be difficult or not possible. Commonly used dental instruments such as examination and periodontal instruments are often manufactured for single-use. The handles are often made of plastic rather than metals such as stainless steel used in their re-processable counter parts. The shank and working end of single-use instruments are often similar quality to re-processable instruments to maintain the quality and function of the instrument.

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Consumable products are used in a majority of dental procedures. Cotton products are generally used for their absorbent qualities for moisture control. Transparent plastic barrier materials can be used to protect instruments and equipment from damage and fluids during use. A large variety of plastic consumable products are available. A plastic product may be required to be disposed after use due to the risk of melting or deformation of the plastic during high temperatures of sterilisation. Some plastic products can be reused, however this is determined by the use of the product and will be discussed further in reprocessing and sterilisation.

How can you tell if it is a consumable or an item that requires reprocessing?

Review the manufacturers instructions. The packaging and instructions will generally tell you if something should be disposed after use or if it can be sterilised or cleaned for reuse. A single use item will always be labelled as single use, sometimes with a symbol of a 2 with a slash or cross through it indicating it cannot be used a second time.

It is common in dental practice to use consumable products to dispense dental materials. Liquid dental materials are dispensed into wells such as dappens dishes and applied using round tipped applicators or brushes. Round tipped applicators are commonly known as microbrushes and come in a variety of sizes.

Various disciplines of dentistry have consumable products specific to the dental procedure. For example, the cup used to remove dental biofilm during a dental prophylaxis are generally consumables and require replacing between patients. During a dental restoration, the practitioner may use a thin metal band that has been manufactured to follow the contours of the tooth and requires disposal after use due to contamination and distortion of the band.

Examples of common consumable products:

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Materials and medicaments

Dental materials are used in almost all dental procedures. All disciplines of dentistry use pastes, gels, acids, restorative materials, chemical and medicines. The type and brand of material and medicament selected by the dental professional will vary depending on their training, preference and treatment plan for the individual patient. Many of the materials and medicaments in dental practice are hazardous and require personal protective equipment to handle safely.

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Where do I store the material or medicament?

All materials and medicaments will have storage instructions in the material safety sheet. Majority of products will also have the storage temperature written on the container. Always check if your material or medicament has specalised instructions like needing to be stored in the fridge or in a dark location.

Chemicals

Chemicals in dental practice are sometimes used in dental procedures, however a wide range are used in disinfection for infection control purposes. The use of chemical for infection control will be expanded upon in later chapters on infection control and disinfection.

If there are many consumables on the market for purchase, who choses what consumables we have in my dental practice?

The consumables in a dental practice will be determined by what procedures are being undertaken and also operators preference. That is why there is great variability in the stock in dental practices.

Country context

Australia

Materials and medicines for medical purposes in Australia are required to be approved by a regulatory body called the Therapeutic Goods Administration (TGA). The publicly accessible version of the Australian Register of Therapeutic Goods (ARTG) is the reference database of the TGA and provides information on therapeutic goods that can be supplied in Australia. If a therapeutic good is not entered on the ARTG, it cannot be supplied in Australia. There are special circumstances where individuals can access unapproved therapeutic goods.

Under the Workplace Health and Safety Act and Regulations in Australia, Hazardous chemicals must provide a safety data sheet (SDS). Majority of the materials and chemical in dental practice have SDS's which outline:

- The chemical's ingredients
- The health and physical hazards
- Handling and storage procedures
- Emergency procedures
- Disposal procedures

Dental practices are required to have copies of the SDS's for the chemicals they store and use on premise.[1]

The prescription and use of restricted scheduled drugs and medicaments in Australia is regulated by State and Territory legislations. Regulations vary slightly between the States and Territories, however registered Dental Practitioners can generally prescribe and access the full range of scheduled drugs and medicaments relevant to their scope of practice.

1. Safety data sheets. 2021. Safe Work Australia. The Australian Government. Accessed 01/09/2021: https://www.safeworkaustralia.gov.au/sds

State or Territory	Legislation
ACT	Medicines, Poisons and Therapeutic Goods Regulation 2008
NSW	Poisons and Therapeutic Goods Act 1966
VIC	Drugs, Poisons and Controlled Substances Act 1981
SA	Controlled Substances (Poisons) Regulations 2011
QLD	Health (Drugs and Poisons) Regulation 1996
NT	Medicines, Poisons and Therapeutic Goods Act 2012
WA	Medicines and Poisons Act 2014
TAS	Poisons Regulations 2018

Practical application to the dental environment

In practice setting, the dental team decide on selection of consumables based on the practice needs as well as availability from the supplier. A decision will be made by the clinician as to which consumable is needed for the procedure. An example in dental practice is a single-use consumable and a reuable instrument for cheek retraction. Both retractors have the same purpose and either may be chosen.

Reusable

Single-use intraoral view

Side by side view. Left: reusable Right: single use

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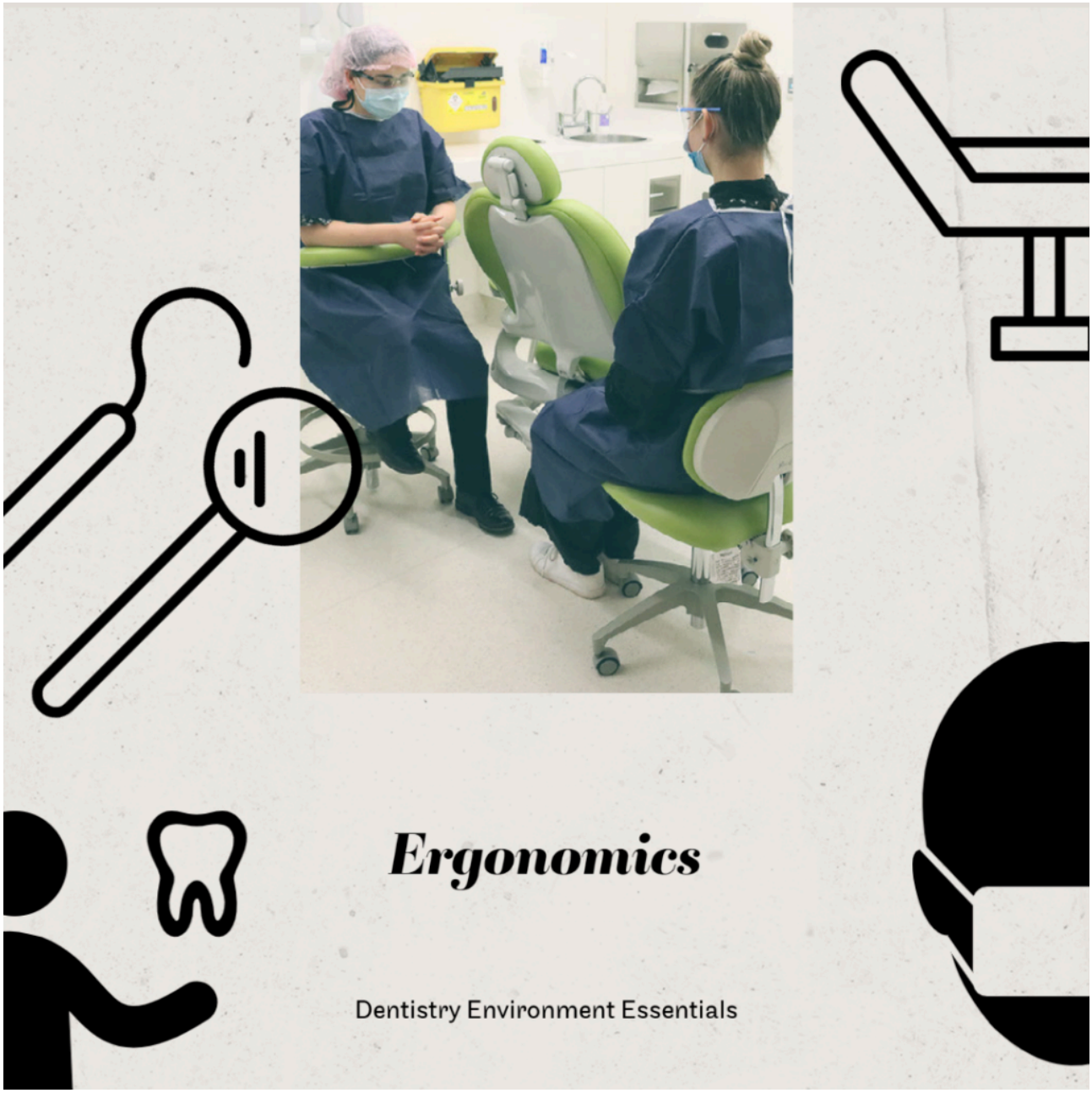
Key Takeaways

- Consumable products can be either single use or reusable. There are several variations and brands available, hence the disparity between practices. It is dependant on the buyer.
- The Therapeutic Goods Administration (TGA) is the regulatory body for medicines used within Australia and dental practice settings.

ERGONOMICS



Operator and patient positioning

SOWMYA SHETTY AND VERONICA KINDARO

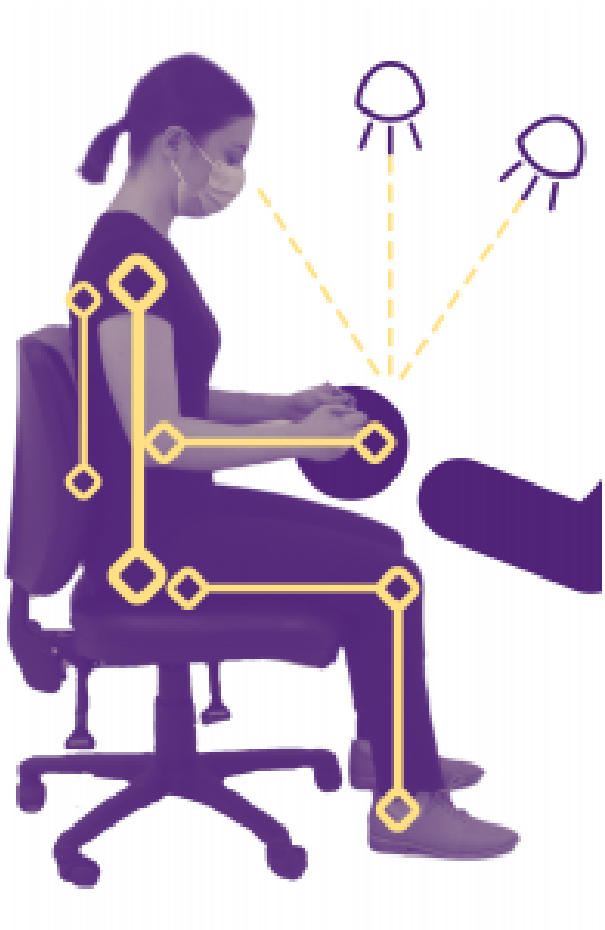
Learning Objectives

Describe ideal operator and patient positioning for optimal musculoskeletal health.

Understand the role of correct posture in dental practice.

Principles

In clinical practice, the dental operator and dental assistant work closely together. It is important for members of the dental team to understand how the other member functions in the team. For maximum and safe functionality, the dental practitioner, the dental assistant and the patient must all be positioned ergonomically with minimum distortion of the back and neck. Comfort, access and health is paramount.



Operator positioning

Ideally the operator should be seated for all dental procedures.

- The back should be straight and well supported by the operator chair.
- The upper arms should be straight with elbows bent and lower arms parallel to floor.
- The head should be as straight as possible.
    - There is additional strain applied to the neck muscles, for every inch that the head moves forward.
    - The eyes can be tilted or inclined downwards, instead of moving the whole head forward.
- Operator thighs should be well supported by the chair and be parallel to floor.
- The knees are bent at right angles and feet should be firmly on the floor.
- The operator hands and forearms will be parallel to the floor in a lower position, for non-precision work.
- The operator hands and forearms may be in a higher position, bent at elbows to achieve a smaller working distance in case of precision work.

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Dental assistant positioning

The dental assistant's seat is about 4-6 inches higher than the operator.

- The assistant's hips are between their shoulder and biceps when sitting straight.
- The arm rest is placed in front of the dental assistant, under their ribs.
    - It is used as a reminder to not lean forward.
- Finally the metal ring on the dental assistant chair supports their feet, and prevents them from dangling in the air.

Patient positioning

It is important to consider patient positioning for minimising injuries in the operator and for patient comfort throughout the appointment.

- The patient chair will be at a higher position than the operator and assistant.
- The distance between the operator's eyes and the patient's tooth must be between 35 to 45 cm depending on the level of precision required.
- To ensure ergonomic positioning for the operator, allowing for maximum working area, the patient must be in a comfortable yet practical position.
- Patient positioning is dependent on the procedure type, and location of working site.
- Any existing medical conditions that the patient might have must be accommodated for.
    - These conditions may include but are not limited to vertigo, pregnancy, and geriatric patients.
    - These patients may not be able to or sustain a reclined position for appointment durations.

Maxillary arch

The ideal patient positioning for treatment in the **maxillary arch** is the **supine** position.

- This involves having the head, knees and feet at approximately the same level.
- Patient's head should not be lower than the legs for their comfort.
- The patient's maxillary occlusal surfaces should be **perpendicular** to the floor.
    - A good way to remember how to adjust the patient's head rest is that the patient will need to be in a "chin up" position.

Mandibular arch

When working in the **mandibular arch**, it is ideal to have the patient in a 45° **semi-supine** position.

- This ensures that the mandibular occlusal surfaces are at a 45° angle to the floor.
- The working area should be at elbow level or slightly higher when operating.
    - It will avoid any arm **adduction** or shoulder elevation which may result in neck and shoulder pain.
    - A good way to remember how to adjust the patient's head rest is that the

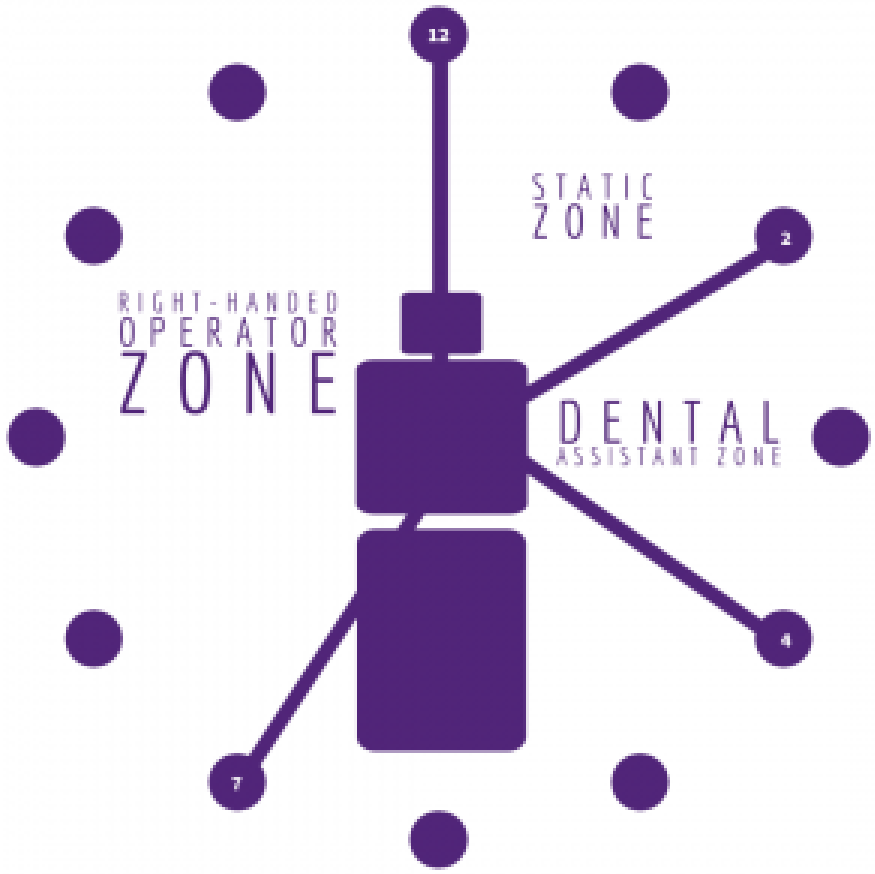
patient will need to be in a “chin down” position.

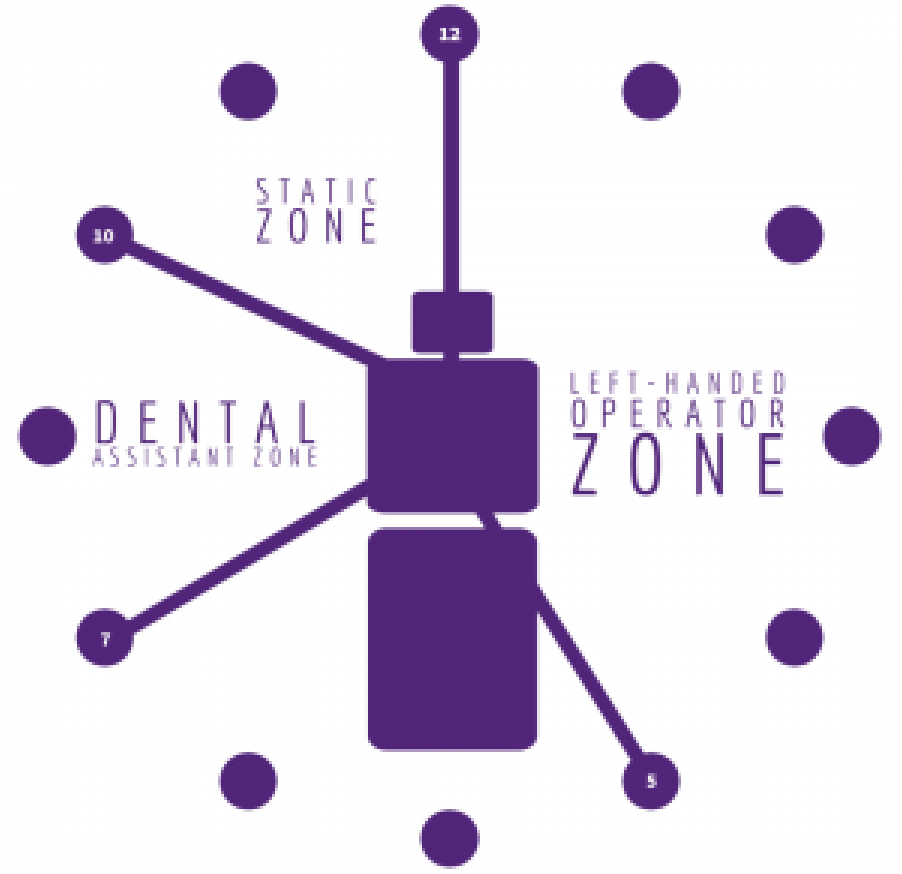
Practical application to the dental environment

Right and left dominant handed operators

Most surgeries are designed for right handed practitioners but increasingly are set up in a universal manner so both right and left handed operators can use the same chair and workstation with a few adjustments.

Depending on the operator's dominant hand and the location of the working area, sometimes, it can be beneficial to tilt the patient's head left or right for maximum vision and working space. However, this can only be done if the patient is comfortable to remain in such a position for the duration of the treatment.





Normal variations requiring adaptations

Geriatric patients may encounter some difficulty in positioning themselves in a dental chair. As most elderly patients have a defined forward head position, it may be beneficial to:

- Use neck pillows for patient comfort.
- Adjust the head rest of the chair for further support.

This will relax the patient's neck muscles and ultimately provide increased visibility for the operator. If the patient is unable to be in supine position for an extended period of time, the patient should be seated at a 60° angle or even a 90° angle. The operator may need to stand when delivering treatments in such circumstances.

The height of patients is an important consideration, particularly in shorter patients. It may be beneficial to place a pillow under their knees to allow the patient to push themselves further up in the chair.

Key Takeaways

- It is important to have correct operator, patient and dental assistant positioning to minimise distortion of the neck and back.
- Positioning will differ depending on the procedure, and if it in the maxillary or mandibular arch or an anterior or posterior tooth being treated. Making sure adjustments are made accordingly will significantly reduce the risk of injury for the operator.
- Surgeries traditionally have been designed for right handed use, making it harder for left handed operators to adjust accordingly in the past. However, increasingly, surgeries are designed for universal use and minor adjustments can be made to allow for correct positioning and posture.

Vision

NICOLE STORMON AND VERONICA KINDARO

Learning Objectives

Understand the techniques used to enhance vision and facilitate correct posture in dental practice.

Appreciate specialised tools used to enhance vision during dental procedures.

Principles

It is essential to maintain a neutral spinal position, while working to minimise musculoskeletal injury and pain. Posture and ergonomics can easily be compromised for clear vision of the **working area** during procedures.

Direct and indirect vision

Procedures undertaken in the mandibular arch will usually be directly viewed by the operator. However, direct vision is not always possible for the maxillary arch, and a dental mirror is used to indirectly view these areas. The term "**indirect vision**" is used for the use of a mirror to visualise operating area that is not directly visualised by the operator. In indirect vision, all movements are mirrored.

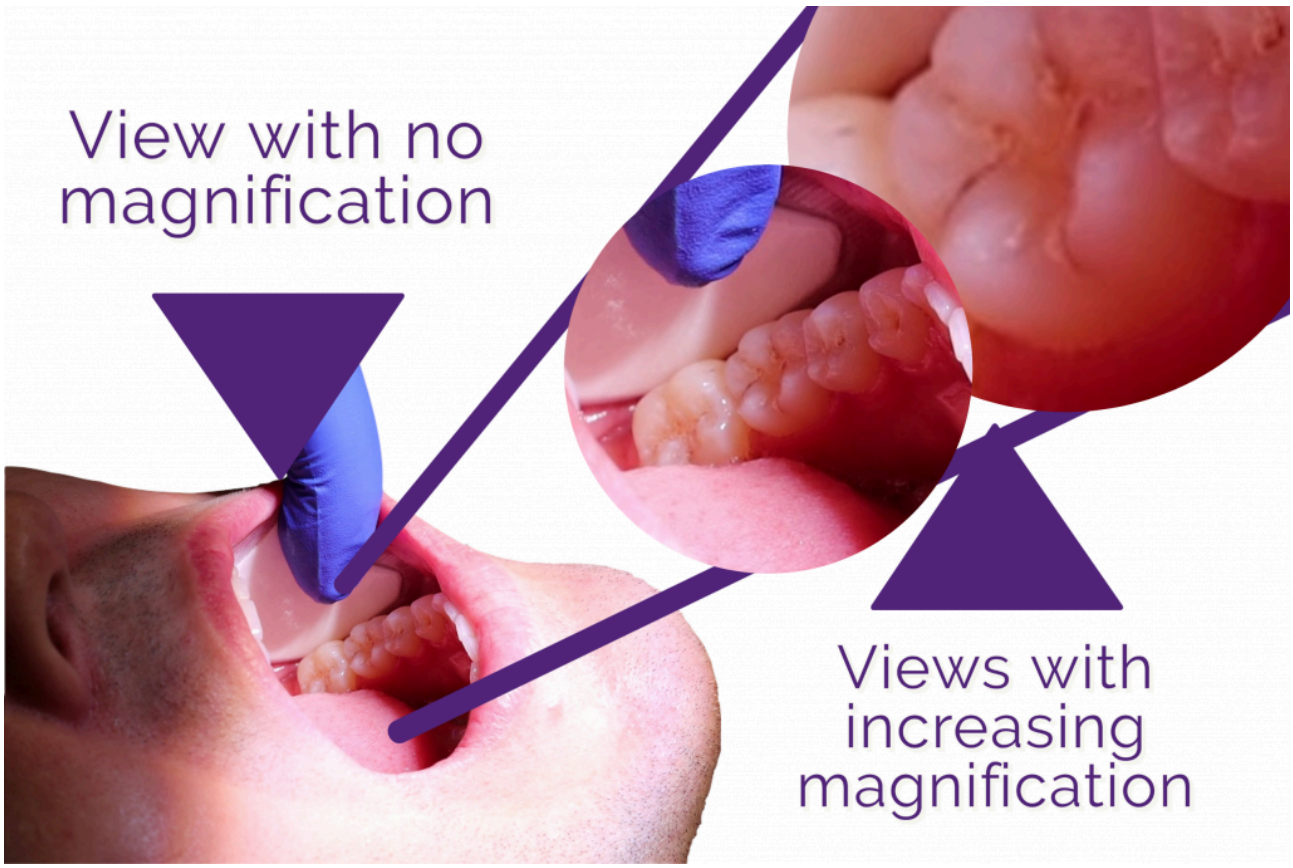
As an example, an instrument being used in the mouth will appear to move towards the midline, whilst the operator has moved the instrument away from the midline.

Retraction of the soft tissue including the lips, cheek and tongue are often necessary for adequate visualisation, regardless of whether direct or indirect vision is employed.

Adjuncts to assist with vision

Dental loupes

Dental loupes are magnifying lenses attached to eyewear for better visualisation of the working area. Loupes generally provide between 2.5 and 5.5 times magnification. They will however, restrict and narrow the **field of view** for the operator.



Dental Loupes are customised and fitted for the individual clinician to ensure optimal posture and ergonomic position.

- The telescope of the dental loupe is the lens which provides magnification. It is placed through the eyewear glass in the “Through-The-Lens” (TTL) position. The specific clinician’s inter-pupillary distance varies. This is measured, just like for normal vision correction spectacles. This is to ensure that the TTL position, is correct for the specific clinician, and prevents eye strain.
- The working distance from the clinician to the patient varies between operators due to variations in height and body types. The angulation of the telescope in the eyewear is customised to ensure the neck does not need to be angled to have a clear view of the working area.

Medical microscopes

Medical and dental microscopes are motorised and illuminated microscopes for clinical procedures. In dentistry, they are primarily used by specialised dental practitioners undertaking precise procedures. Their magnification varies depending on the manufacturer and brand of the equipment, but can provide magnification between 10 and 14 times. These microscopes are often digitalised and facilitate recording and advanced illumination techniques. They are designed to facilitate infection control measures during their operation.

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Practical application of the dental environment

Clinicans that require prescription reading glasses often have their prescription incorporated into their safety glasses, or alternatively wear safety glasses or a face shield over their prescription glasses. Have clear sight is essential in dental practice for visualisation.

Key Takeaways

- Procedures undertaken in the mandibular arch can be directly viewed by the operator, whereas, direct vision is not always possible for the maxillary arch. A dental mirror is used to indirectly view these areas.
- Indirect vision is accomplished using a dental mirror, whereby all movement aremirrored.
- Dental loupes and medical microscopes are used to assist with magnifying the field of operation. Both assist in improved visual acuity, improved posture and reduced eye strain.

Instrumentation

NICOLE STORMON AND SOWMYA SHETTY

Learning Objectives

Appreciate the components of a modified pen grasp in dentistry.
Apply ergonomic principles to safely use instruments in dental practice.

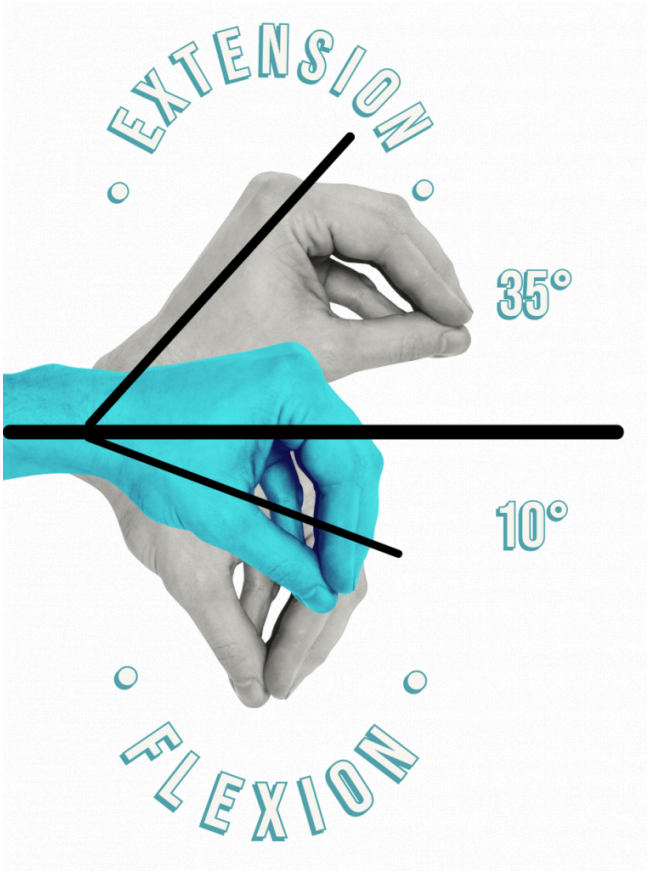
Principles

To ensure optimal safety during clinical procedures, operators employ a modified pen grasp of the instruments. This creates stable and controlled movements as well as minimising risk of fatigue.

Instrument grasp

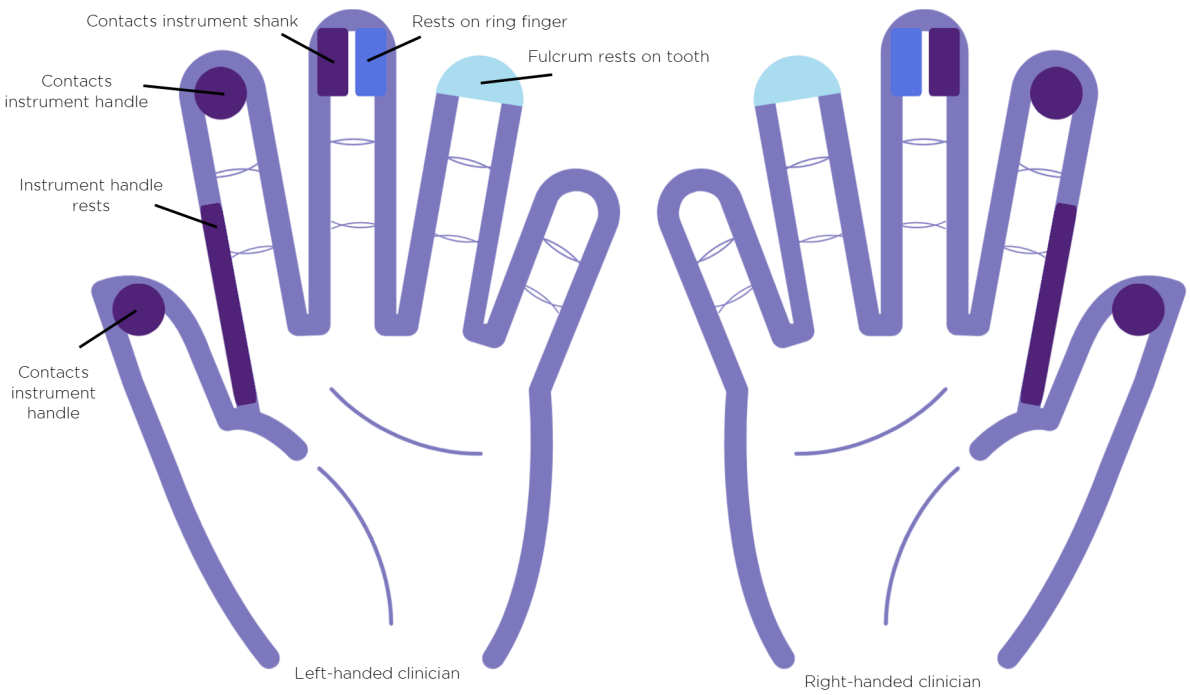
The optimal grasp of dental instruments have been employed for the safety of the operator and patient during technical procedures. Dental instruments often have sharp working-ends, therefore stable and confident use of instruments are essential. Safe instrumentation of dental instruments begins with optimal posture (explained in previous chapters) and correct arm and wrist positioning. Upper arms and elbows should be against the side of the body. Forearms parallel to the floor and wrists in a natural position.

Flexion is the bending movement of a joint that decreases the angle between the bone and the limb. **Extension** is the bending movement that increases the angle. Natural positioning of the wrist minimises the pressure in the carpal tunnel during movement. Extension outside of neutral positions increases the risk of injury in the wrist and hand. Any movements required outside of optimal wrist flexion and extension ranges should be achieved by moving the entire hand, wrist and forearm. Normal flexion should not exceed 10° and extension 35°.



A **three-point pinch grip** is utilised when grasping dental instruments. Hand strength is stronger when assuming a pinch grip position and can alleviate and minimise the force required from wrists and arms. A three-pinch grip is when the thumb is placed on one side of the instrument and index and middle finger on the other side. To minimise injury, the operator should apply minimal pressure when gripping the instrument. During instrumentation the grip on the instrument can be increased.

A pen grasp is a type of pinch grip used for writing implements. The thumb, index and middle fingers are placed in a tripod position to grasp the pen/pencil. In dentistry a modified pen grasp is used. The middle finger is modified and the side of the finger placed on the shank of the instrument. The index finger is bent at the second joint and is positioned above the middle**modified pen grasp** finger on the same side of the handle. The pad of the thumb is placed midway between the middle and index fingers on the opposite side of the handle.



Fulcrum

A fulcrum is a support at a point in which a lever turns. A fulcrum is always used during dental instrumentation. The fulcrum anchors the hand and instrument to the area which it is being used. This minimises unintentional movement of the instrument when undertaking precises procedures. The fulcrum should ideally be as **fulcrum**close to the working area as possible, however this is not always possible. Intra-oral fulcrums are within the mouth and extra-oral outside of the mouth, usually on the face.

Fulcrum	Description
Intra-oral reinforced	The fulcrum is placed on an adjacent tooth to the working area.
Intra-oral cross arch	The fulcrum is placed on a tooth in the quadrant opposite to the working area
Intra-oral opposite arch	The fulcrum is placed on a tooth in the opposite arch to the working area.
Intra-oral finger-on-finger	The fulcrum is placed on another finger of the non-dominant hand.
Extra-oral palm up	Back of the palm is placed against the face for stability.
Extra-oral chin cup	The dominant hand cups the chin, generally for instrumentation in the maxilla

Dominant and non-dominant hand

Dental procedures often require the utilisation of instruments in both the dominant and non-dominant hand. The dominant hand will hold and use the instruments for treatment and procedures. The non-dominant hand will typically hold a mouth mirror for indirect visualisation of the maxillary arch and retract soft tissue. Both the dominant and non-dominant hand use a modified pen grasp and fulcrum for instrumentation.

Practical application to the dental environment

Clinicians may use their left or right hand as their dominant hand for procedures. Regardless of the dominant hand, the principles of instrumentation will be applied. The major difference between a right and left-handed clinician will be in their positioning around the patient. The positioning around the patient is mirrored depending on the dominant hand and this is explained further in other chapters.

Instrumentation and fulcrums are dynamic and adapt to the procedure and area where working. Movements are always made with purpose and fulcrums adapted prior to the use of the instrument. Below is an example of periodontal probing. Watch the demonstration of this procedure to see the fulcrum change position as the clinician measures the different areas of the gingiva.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uq.pressbooks.pub/dentistryenvironment/?p=152#oembed-1

Key Takeaways

- Instrument grasp in dental settings is adopted to enable optimal safety for the patient and operator, as the instruments often have a sharp working end.
- Correct grasp aids in posture, minimising risk of injury.
- Flexion is the bending movement of a joint that decreases the angle between the bone and the limb. Extension is the bending movement that increases the angle.
- A fulcrum is always used during dental examination. This is important to anchor the hand and minimise unintentional movement during precise procedures. There are two types of fulcrums, intraoral (inside the mouth) and extraoral (outside the mouth).
- Both dominant and non-dominant hands are used during dental examination. The dominant hand typically holds the instrument used for

treatment and procedure, whereas, the non-dominant will hold a mirror for indirect vision of the maxillary arch and often aid in retraction of soft tissue.

Common musculoskeletal injuries in dental practice

LELIA LUI AND BONNIE CHUNG

Learning Objectives

Explain theoretical foundations underpinning common musculoskeletal injuries in dental practice.

List common musculoskeletal injuries in dental practitioners.

Principles

Dental practitioners often maintain static and uncomfortable positions to perform procedures requiring great precision. Prolonged static posture, repetitive movements and poor positioning can result in musculoskeletal disorders (MSD). **MSDs** are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs. These cumulative microtrauma and repetitive use of awkward positions may result in muscular imbalance, neuromuscular inhibition, pain and dysfunction. Other factors influencing **MSD's** include genetic disposition, stress, physical health and environmental factors such as dental chairs, equipment, lighting and availability of a dental assistant.

Natural curvature of the spine

It is important to appreciate that the spine is made up of four natural curvatures: cervical lordosis, thoracic kyphosis, lumbar lordosis and sacral kyphosis. Movement in the sacral kyphosis is limited due to the fused vertebrae, however, the lumbar and cervical spine are quite mobile and can be easily affected. Changes in any part of the curvature of the spine affect the other areas. If one curvature becomes more exaggerated or flattened, the alignment of the vertebrae can no longer be assisted by gravity to rest on top of each other in a balanced manner. The spine begins to depend on its associated muscles, ligaments and soft tissue to maintain erect.

In the cervical spine, for every 2.5 cm the head moves forward, it gains 0.45 kg in weight for the muscles in the upper back and neck to support its position. Similarly, another study calculated the weight of a full-grown head in different angles of cervical flexion. The head weighs almost 5 kg in the neutral position. Forces on the neck more than the double to approximately 12kg when the head is tilted to 15◦. Vasavada et al. also found that mechanical demand on extensor muscles increases 3-5 times during seated tablet computer use versus seated neutral posture.[1]

1. Valachi B, Valachi K. Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders. The Journal of the American Dental Association. 2003 Dec 1;134(12):1604-12.

Prolonged static postures

A **static posture** is when more than half of the body's muscles contract to hold the body in a motionless position against gravity. Static positions require more effort from muscles compared to dynamic movements. Prolonged static posture leads to muscle fatigue and imbalance between the stabilising and dynamic muscles.

In a prolonged static posture, synovial fluid production is reduced which results in joint hypomobility. The function of synovial fluid is to provide joint lubrication. A loss of mobility can lead to degenerative changes. A flexed seated posture increases loading on the facet joint of the lumbar vertebrae which leads to degenerative changes such as it contributes to lower back pain. The spinal disks provide movement and transmits forces in between vertebrae. Unsupported sitting increases the pressure in lumbar disks by 40% compared to standing, but in a flexed forward and rotated posture, the pressure increases by 400%. The spinal disc is made up of several areas with the nucleus pulposus in the centre encircled by the annulus fibrosis. The posterior portion of the annulus fibrosis is the thinnest. A repeated forward flexed posture would lead to the nucleus pulposus to push against the posterior annulus fibrosis. This can lead to weakening and tearing of the annulus fibrosis and eventual disc bulge or herniation. As only the outer

third of annulus fibrosis is innervated, by the time pain is felt, it means that the damage would have exceeded two thirds of the structure.

Forward posture

Repeatedly forward leaning leads to overuse of lower back extensors but weakens the deep stabilising abdominal muscles such as the transversus abdominis which has a protective role in low back pain prevention. The increased use of lower back extensor muscles such as the lumbar erector spinae leads to ischaemia due to the decreased muscle oxygenation as the muscle needs to contract harder to maintain the posture. The tendon stretches and compresses the vascular supply leading to depletion of nutrients and oxygen. The increased contraction also leads to lactic acid and other metabolite accumulation leading to inflammation and pain. Without allowing these muscles to rest in a prolonged static posture, the body utilises muscle substitution as a protective mechanism which can lead to joint hypomobility, nerve compression and disorders of the spinal disc. Ischemic areas are likely to develop trigger points which are groups of muscle fibres that are in a constant contracted state that feels like a knot within a muscle. When these trigger points are pressed, it may cause local or referred pain.

Practical application to the dental environment

Common MSDs in dental team members involve the neck, shoulders, arms and wrists. Previous studies have suggested that more than half of the workforce experience some type of pain due to MSD and it leads to loss of work and productivity for dental practitioners. Common injuries include low back pain, tension neck syndrome, trapezius myalgia and rotator cuff impingement and carpal tunnel syndrome. In Australia, the prevalence of MSD for the dental professions was 82%, and over two thirds reported experiencing pain.[2] The majority of dentists (87.2%) reported experiencing at least one MSD in the last year and one in ten reported taking sick leave for an MSD. MSD is a significant occupational health issue for the dental profession.[3]

Hand and wrist injuries develop when musculoskeletal structures cannot withstand the cumulative work activity stresses. An example of this includes constant flexion and extension or awkward movements of the wrist and the fingers. In severe cases, muscle atrophy and pain can prevent an individual from working. A significant wrist and hand MSD includes Carpal Tunnel Syndrome, which is the compression of the median nerve within the carpal tunnel of the wrist causing volar wrist pain with numbness and tingling in the distribution of the median nerve (thumb, index finger, middle finger and radial side of the ring finger). The pain can radiate to the forearm, elbow and shoulder. Repeated movement at the wrist or sustained pinch-gripping an instrument with inadequate rest.

A common awkward posture dental practitioners assume is the forward bending and repeated upper body rotation to one side. Right handed operators often rotate their neck to the left and side bend to the right for better visibility. The muscles on the side of the body rotate and becomes stronger and shorter, whereas the opposing muscles become ischemic and painful. The imbalance in forces is also exerted onto the spine leading to reduced range of movement in one direction.[4]

Operators may place themselves into a forward head posture with rounded shoulders, as the patient is in front of them below eye-level. This prolonged static posture may elongate and weaken the stabilising shoulder muscles which include middle and lower trapezius, rhomboid and serratus anterior muscles. This further reinforces pulling of the shoulder blades away from the spine which achieves a rounded shoulder posture long

2. Marshall ED, Duncombe LM, Robinson RQ, Kilbreath SL. Musculo-skeletal symptoms in New South Wales dentists. Aust Dent J 1997;42: 240–246.
3. Leggat PA, Smith DR. Musculoskeletal disorders self-reported by dentists in Queensland, Australia. Aust Dent J. 2006 Dec;51(4):324-7. doi: 10.1111/j.1834-7819.2006.tb00451.x. PMID: 17256307.
4. Bhandari SB, Bhandari R, Uppal RS, Grover D. Musculoskeletal disorders in clinical dentistry and their prevention. Journal of Orofacial Research. 2013:106-14.

term. Similarly, the head is pulled forward because the anterior “mover” muscles, such as the scalenes and sternocleidomastoid, become shortened and overactive, while deep neck flexor muscles are weakened. A cycle of muscle imbalance is created when the ligaments and muscles adapt to this new position which makes it uncomfortable to return to the correct position.

Nerve entrapment disorders

Disorder	Description	Mechanism
Carpal Tunnel Syndrome	Compression of the median nerve within the carpal tunnel of the wrist.	Repeatedly bending hand up, down or from side to side at the wrist and continuous pinch gripping an instrument without resting the muscles.
Ulnar Neuropathy	Compression of ulnar nerve when it passes through the wrist.	Bending hand up, down and from side to side at the wrist and holding the little finger a full span away from the hand.
Pronator Syndrome	Compression of median nerve at the elbow between pronator teres.	Holding the arms away from the body.
Thoracic Outlet Syndrome	Compression of the brachial nerve plexus and vessels between the neck and shoulder.	Forward head tilting, forward shoulder hunching and continuous overhead reaching.

Disorders of the neck and back

Disorder	Description	Mechanism
Tension Neck Syndrome	Pain, stiffness or tightness in the neck, shoulders or upper spine.	Prolonged static posture, forward flexed posture, repeated extreme arm reaching, elevated arms and tensed shoulders.
Cervical Spondylosis	Age-related wear and tear of the cervical spinal disc relating to formation of bony overgrowths.	Prolonged, repeated forward flexed posture.
Cervical Disc Herniation	Tearing of the annulus fibrosis of the disc leading to the herniation of the nucleus pulposis which could impinge on the spinal cord	Prolonged, repeated forward flexed posture.
Lumbar Radiculopathy	Compromise of the lumbar spine nerve root, with majority of the cases caused by herniated disc.	Poor ergonomics, prolonged static posture or sitting.
Non-specific/ Mechanical Low Back Pain	It can develop without a clear mechanism of injury and often a pathoanatomical diagnosis could not be made. Pain, distress and disability can be associated with repeated strain or even in the absence of any tissue strain.	Poor ergonomics, prolonged static posture or sitting.

Disorders of the shoulders

Disorder	Description	Mechanism
Trapezius Myalgia	Pain, stiffness or tightness in the upper trapezius muscle.	Static and prolonged elevation of shoulders, forward head posture.
Rotator Cuff Tendonitis	Inflammation of tendons in the shoulder region.	Holding the elbow above waist level and holding the upper arm away from the body.

Tendonitis

Disorder	Description	Mchanism
De Quervain's syndrome	Stenosing condition of the first dorsal compartment which comprises the extensor pollicis brevis and the abductor pollicis longus tendons at the base of the thumb and wrist.	Constant tight gripping, repetitive thumb abduction.
Tendonitis	Inflammation of the tendons of the wrist resulting from strain.	Repeatedly extending the hand up or down at the wrist.
Tenosynovitis	Inflammation of the tendons on the side of the wrist and at the base of the thumb.	Hand twisting, forceful gripping, bending the hand back or to the side.
Epicondylitis	Inflammation of the tendons that bend your wrist backward away from your palm.	Holding elbows constantly in acute angle away from torso.
Extensor Wad Strain	Injury of the extensor muscles of the thumb and fingers.	Extending the fingers independently of each other.

Key Takeaways

- Prolonged static posture, repetitive movements and poor positioning are the crux for injury risk and the cumulative damage caused leads to muscular imbalance, pain and dysfunction.
- In dentistry, the most damaging habits are forward bending with upper body rotation to one side as well as repeated wrist movements with constant pinch gripping of instruments.
- MSDs can lead to reduced productivity and can lead to loss of work for dental practitioner

Injury prevention strategies

LELIA LUI AND BONNIE CHUNG

Learning Objectives

Implement strategies for prevention of musculoskeletal injuries in dental practice.

Principles

Maintaining optimal ergonomic positions can help clinicians to achieve optimal performance with minimal physical burden or fatigue. For every articulating joint, there is a neutral zone of movement that does not require high muscle force. Musculoskeletal problems or injury may develop with awkward or deviated working postures in repetitions or a sustained period of time outside the neutral posture.

It is more efficient to maintain a neutral and basic operating posture which permits balance between muscle activity and relaxation. This can be achieved by better positioning of both the operator and patient. Better sitting posture can be adopted, such as adjusting to an appropriate chair height with and having the back supported to ease load on musculoskeletal structures. Suitable instruments and gripping technique should be utilised to maximise force production efficiency, vision and ultimately help with physical demands from work.

Dental practitioners experiencing pain or deviation from normal movement in practice should seek advice and care from qualified health practitioners. Dental practitioners should aim to prevent musculoskeletal injury, however the diagnosis and management of injuries will require professional intervention.

Prevention strategies

Dental practitioners should take breaks whenever possible, such as between appointments, to mobilise the different joints through range and stretch muscles that are shortened or tight. This would help practitioners maintain adequate flexibility, which is the ability of a joint to move freely. Enhanced joint flexibility may improve muscle balance and function, improve posture, reduce injury risk, and reduce the incidence of low back pain.[1]

Active lifestyle (regular physical activity and aerobic exercise) and strengthening exercises should be performed to increase the capacity to load and work demands so that injury risk can be reduced. Holding a static stretch to the point of feeling tightness or slight discomfort for 10-30s is recommended for each of the stretch. Each of the stretch should be repeated three times on both sides. Ballistic or jerky stretching movements should be avoided.

1. Amako, M., Oda, T., Masuoka, K., Yokoi, H. and Campisi, P., 2003. Effect of static stretching on prevention of injuries for military recruits. Military medicine, 168(6), pp.442-446.

Neck flexion, extension, lateral flexion, rotation

Stretches neck extensors, flexors and lateral flexors

1. Turn the neck slowly into flexion, extension, rotation and hold.
2. For lateral flexion, slight additional force can be added with the hand.

Anterior cross-arm stretch

Stretching of the upper back muscles and posterior deltoid.

1. Hold the right arm in front of the chest across the body.
2. Bend the left elbow and slowly pull the right arm to the direction of the left shoulder.

Wrist flexor/extensor stretch

Stretching of the wrist flexor/extensor muscles.

1. Start the exercise with the palm of the hand facing downward, extending the right arm.
2. Put the left thumb over the dorsal side of the fingers and the other four fingers over the palm side of the fingers for support.
3. Stretch the flexor muscle group pulling the fingers backward (dorsal flexion).

Seated hamstring stretch

Hamstring muscles is the group of muscles at the back of the thigh.

1. Sit at the edge of the chair and maintain a upright back spinal posture throughout the stretch.
2. Then extend your left leg out and slowly lean forward by folding at the hips while maintaining the spine neutral.

Standing wall calf stretch

Stretching the plantar flexors.

1. Face the wall and step one leg back and the other bends at the knee.
2. Extend the back leg and lower the heel to the floor.

Arms above head stretch

Stretches the upper back muscles.

1. Stretch the arms in front of the torso and interlock fingers with the palms facing out.
2. Straighten arms above the head and reach upwards and back. Hold the position.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uq.pressbooks.pub/dentistryenvironment/?p=156#h5p-26

Practical application to the dental environment

While it is common to hear about the importance of maintaining a “perfect posture”, it is important to avoid static postures. Maintaining a single perfect posture may be physiologically inappropriate and may increase injury risks. Some studies have suggested that adopting different positions may be more desirable.

A previous study found dentists who worked only in a seated position had more severe low back pain than those who alternated between standing and sitting.[2] Switching working positions frequently also allows different muscle groups to share workload and prevent fatigue. Dental practitioners should take the chance to alternate between sitting and standing whenever possible, and avoid static postures to reduce the demands on the particular groups of musculoskeletal structures.

A dental saddle chair is a chair that has been ergonomically adapted to facilitate maintaining neutral postures during dental practice. The seat has been adapted to form a saddle shape with the aim of engaging the lower back and optimising a natural posture. While a saddle chair can assist in maintaining a neutral posture, the practitioner can still slouch, maintain static postures and move into uncomfortable positions.

Dental practitioners should have a holistic approach to their ergonomics and maintain a number of good habits to prevent injury:

1. Keep appointment length to a reasonable minimum
2. Alternate between a seated and standing position
3. Don’t hold anything for prolonged period of time
4. Don’t grip instruments too tightly
5. Put instruments down while not in use

2. Valachi, Bethany, and Keith Valachi. "Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders." The Journal of the American Dental Association 134.12 (2003): 1604-1612.

Key Takeaways

Type your key takeaways here.

- Musculoskeletal problems and injury can occur with repetitive awkward or deviated positioning. It is important to allow break periods between appointments, maintain an active lifestyle and incorporate static stretches to daily routine.
- It is important to have a holistic approach to practitioner ergonomics. Creating good habits may prevent lifelong injury.

Book contributors

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Dr Nicole Stormon is an Oral health therapist and Lecturer the University of Queensland. As an early career researcher, Nicole has published in high quality journals, numerous conference presentation and research collaborations. Nicole observed in clinical practice and research that many people are denied adequate oral health care which can have a significant impact on daily life.

Nicole has worked on a variety of topics in the field of Dental Public Health research. Nicole is passionate about improving the oral health of populations such as the socially disadvantaged, people with special needs and Indigenous Australians through research. Health service research is a key theme of her research, with ongoing collaborations to develop evidence-based and cost-effective models of dental care for children and disadvantaged groups.

Ms Tachae Douglas-Miller

Tachae Douglas-Miller is a Dental Science student at the University of Queensland. She is a proud Ngunnawal woman and is passionate about the oral health and wellbeing

of Indigenous communities. ‘Dentistry Environment Essentials” is Tachae’s first co-authored textbook. She is proudly representing the wisdom and culture of indigenous peoples and wishes to continue student staff partnerships throughout her studies. Tachae works in private practice as a dental assistant whilst studying and brings knowledge of the dental environment and the practicalities of infection control in dentistry.

Dr. Sowmya Shetty

THE UNIVERSITY OF QUEENSLAND

Dr Sowmya Shetty is Lecturer in Dentistry at The University of Queensland, School of Dentistry. She has served in a range of roles within UQ Dentistry, including as Course Coordinator for several courses over the last ten years, Research Higher Degrees Coordinator, Teaching and Learning Chair, Program Coordinator, External Engagement Coordinator and Placements Coordinator. She is focussed on student partnerships for improving course design, assessment and feedback.

Additionally, she is motivated to understand and improve clinical and observational placement experiences for students, especially focussing on interprofessional education. She is currently working on several open educational resources in collaboration with year 1-3 course coordinators to create custom designed open access textbooks for UQ dentistry courses. Some of these are being developed with student partner contribution and feedback, via Student Staff Partnership grants.

Her research interests stemming from her PhD primarily focussed on dental materials testing, especially methodology. She worked to understand dentine permeability and links to bonding mechanisms as well as sensitivity, virtual surface mapping in tooth wear, CAD/CAM, fatigue test design and evaluation, fracture surface analysis and failure forecasting.

Terms

Adduction

The movement of a limb or other part towards the midline of the body or towards another part.

Bracket table

A moveable unit with a control panel for the operation of the dental chair and storage of operatory instruments.

Clean areas

Clinical areas which are not contaminated by potentially infectious materials.

contaminated working (or "dirty") zone

Clinical areas which potentially have infectious agents and are treated as if they do have contaminants.

Cutting hand instrument

An instrument with a blade for the working end which is made from carbon steel or tungsten carbide.

Dental Assistant chair

A chair on wheels with a bar located above the seat at waist height used to rest arms on.

Dental bur

Dental burs are small operatory bits used in handpieces to cut or polish.

Extension

The bending movement that increases the angle.

Field of view

The area which a clinician can see in the oral cavity.

Flexion

The bending movement of a joint that decreases the angle between the bone and the limb.

Fulcrum

A support at a point in which a lever turns.

High speed handpiece

A pen like instrument that grips a small chuck for drilling teeth. Runnin gon compressed air it typically spins dental burs over 180,000 revs per minute (rpm).

Indirect vision

A technique used to visualise operating area that is not directly visible by the operator.

Mandibular arch

The dental arch formed by the teeth of the mandible.

Maxillary arch

The dental arch formed by the teeth of the maxilla.

Modified pen grasp

The pinch grip used to hold instruments in dental practice.

Musculoskeletal disorders

Injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs.

Non-cutting instrument

Instruments with a working end that can either be a blunt or pointed end.

One way flow

Clean materials and instruments enter into the contaminated working zone for use. These instruments strictly do not re-enter the clean zone and will only exit the working zone to then move to the sterilisation room for the decontamination process.

Operator chair

A chair or stool on wheels, with or without back lumbar support.

Overhead light

The operatory light to direct light onto the operating field.

Patient chair

The reclining chair where the patient sits for treatment.

Perpendicular

At an angle of 90° to a given line, plane, or surface or to the ground.

Prophylaxis handpiece

Similar to a slow speed handpiece, however the handpiece head is modified to receive screw type prophylaxis cups and brushes.

Semi-supine

Positions where the upper body is tilted (at 45° or variations) and not completely horizontal.

Set down area

The areas where contaminated instruments will be placed in the sterilisation room to then begin the process of decontamination and cleaning.

Slow speed handpiece

A pen like instrument that grips a small chuck for drilling teeth. Running on an electric motor it typically spins dental burs between 600 and 30,000 revs per minute (rpm).

Static posture

When more than half of the body's muscles contract to hold the body in a motionless position against gravity.

Straight handpiece

Similar to a slow speed handpiece, however their straight body allows for larger burs designed for cutting materials and appliances.

Suction unit

The unit that has the equipment for saliva evacuation.

Supine

Lying face upwards.

Three-point pinch grip

The thumb, index and middle fingers are placed in a tripod position to grasp the pen/pencil.

Working area

The area where the operator is undertaking a procedure in the oral cavity.