

Module 7: Dental Environment and Equipment

The seventh module in the BDIA certificate in dentistry is all about the equipment used in a dental practice.

Much of the equipment discussed in this module will seem familiar to you, even if your only experience of dentistry is as a patient. There is the visible equipment such as the dental chair and the X-ray unit as well as less obvious items such as sterilisers and air compressors for powering dynamic instruments (more commonly known as drills).

The basic design of most dental equipment remains unchanged since the 1960s, but, as with cars which still have a core design of roof, bonnet and four wheels, dental equipment has evolved to have flowing curves and fewer (or even no) seams, to allow for simple cleaning, and to reduce the risk of cross-infection.

In our increasingly consumer-led culture, the overall environment of dental practices has become softer, and more welcoming to the patient. This is particularly noticeable in the public areas, like reception, but is noticeable in the dental surgeries as well. Although hardwearing surfaces and overall cleanliness are important in a waiting area, the design and materials used in the dental surgery are integral to ergonomic design and an efficient working environment.

The dental surgery

The two biggest items in a surgery are the cabinetry and the dental chair itself. The cabinetry bears a superficial likeness to a domestic kitchen, but is subject to far more wear and tear



as it will be in use all-day, every-day. The materials used are therefore more durable, as they must resist the chemicals used in the frequent cleaning required to maintain cross-infection control. Separate from the surgery, a dental practice will also have an additional decontamination room with additional cabinetry, to allow for efficient processing, cleaning and/or disposal of used dental instruments.

What patients will see as the dental chair actually consists of several distinct units: the chair itself, the dental unit, a cuspidor (a little sink to allow the patient to rinse and spit), a light, and an aspirator (to suck water, saliva, and debris from the patients' mouth during treatment).

A dental chair will have separate sections that can be adjusted (with hydraulic or electric motors) to place the patient's head in a suitable position for treatment that is comfortable for both the patient and the clinical staff, and allows easy, clear access. Modern chairs can have pre-set positions that can move a chair

into any pre-programmed position.

Due to the position clinical staff need to be in to do their work, there have been considerable developments in the design of chairs that dentists and dental nursing staff use to minimise the risks of lower back pain. A dentist's chair will frequently have a backrest (for lumbar support), and a nurse's chair will have an abdominal rest at the front (they almost seem to sit on the chair backwards), to support the different positions they need to adopt.

The dental unit is most often attached to the chair, but can be mounted into a mobile cart or onto a wall; its purpose is to house the electrics, air and water supply used in treatment, all operated by a foot pedal.

The light hanging above the chair is essential for providing a clearly illuminated working area. The wavelength of the light reflects daylight conditions, as normal lighting can change the perception of colour.



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Outside the immediate area of the chair, a surgery will also include radiographic equipment (which the BDIA certificate covers in Module 4).

Smaller devices supplement this large equipment, and may be standalone, or built into the dental unit. These can include:

- Scalers and ultrasonic scalers for removing calculus and surface staining from teeth
- Ultrasonic scalers can be used in other procedures such as endodontics using different attachments.
- Ultrasonic equipment uses either piezo (a vibrating crystal, a common brand is EMS), or magnetostrictive (using magnetic energy, a common brand is Cavitron) technologies.
- Light-curing units
- Intra-oral cameras
- Electrosurgery units (for surgery using heat)

Dynamic dental instruments

Many dental procedures require

diseased or damage hard tissue to be removed, often with burs fitted into handpieces. A wide range of handpieces are available. Air turbine handpieces are driven by compressed air at speeds of 160,000-360,000rpm, which are required to cut enamel. The spinning bur is cooled by a water spray, which can limit visibility. They are known for their familiar high-pitched whine.

Low-speed handpieces may be air or electrically-driven and are used for cutting softer hard tissue (like dentine), for polishing teeth or for restorations at lower speeds. Different gearing inside the handpieces can mean they are speed reducing, speed increasing, or direct drive and are used for different clinical requirements.

All these handpieces will use burs for cutting. The cutting tips of these can be made of tungsten carbide, diamond grit, or for lower-speed use only, steel. Burs come in a wide array of shapes and designs (shapes such as round balls, rugby balls, tulips, inverted cones and pointed needles).

Handpieces can also use a range

of polishing and/or fine cutting instruments, from abrasive discs to rubber cups and bristles.

Financing and maintaining equipment

Equipping a dental practice with a chair, cabinetry and associated equipment is not a cheap thing to do, and will run to tens of thousands of pounds. Therefore, many companies offer special dental finance plans to aid hire-purchase, and others provide leasing agreements where practices rent the equipment.

Correct installation and maintenance of this expensive equipment is important, and companies exist to provide this. The level of service provided is important, as a broken dental chair can have large implications for a practice, as they cannot work without it.

In summary, the range of equipment required to simply open up a dental practice is considerable, and varied. The maintenance and durability of this equipment is vital to the efficient and safe operation of a dental practice. Without it, much of the practice of dentistry is impossible. ■

BDIA Certificate: Introduction to Dentistry

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This self-learning course aims to fast track students with knowledge of dentistry and is an ideal learning resource for anyone in the dental industry who did not come from a clinical background.

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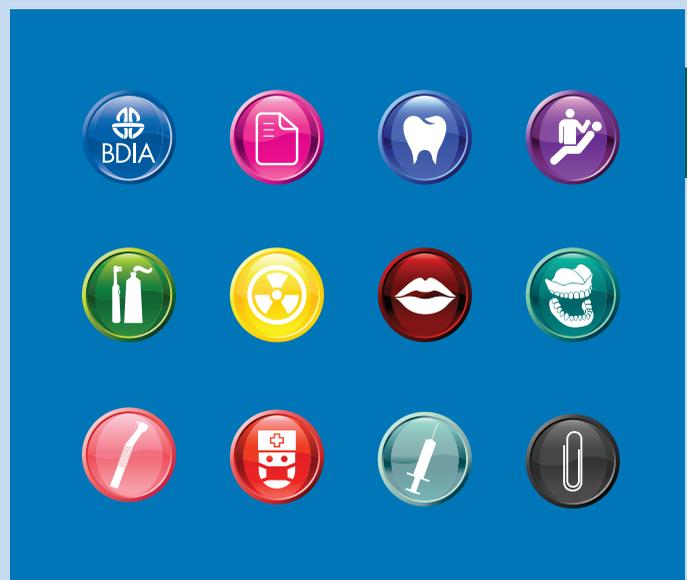
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Surgery design

Samantha Mead explains the importance of understanding the dental environment.

Module 7 of the BDIA Introduction to Dentistry course is called the Dental Environment and Equipment. This looks at the functionality of a dental surgery and the equipment within it. It also includes elements of surgery design, which are as important as the skills and technology working within the room.

The BDIA certificate training literature states that, "At the end of the module students should be able to appreciate the basic concepts of the dental environment and surgery design and be able to recognise and describe the functions of items of dental equipment."

Surgery and dental practice design is no longer just about the practical implications of design but now also about the patient (customer) experience. There is greater emphasis placed on how to make the patient feel comfortable and relaxed throughout their whole experience, from the initial telephone call, to waiting in the reception area, and through the treatment itself. Use of colour, co-ordinated tones, and materials in the whole practice, along with a carefully planned surgery will enable the patient to receive the best quality dentistry experience. Remember – first impressions count!

However, fundamentally a functional layout of a surgery is vital and is based on two key elements: ergonomics and infection control.

One of the factors influencing the way the surgery is designed is the patient's position – supine or reclined on his/her back or semi-supine position for the majority of the dental procedures – and the dentist and assistant who will be seated. Therefore, it is essential that cabinetry be at a height suitable for a seated working position.



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The way the cabinets are configured within the surgery should ensure the dentist and assistant's movements are kept to a minimum so everything needed to perform each procedure is within comfortable reach. Put yourselves in the shoes of the dentist or assistant and imagine how you would utilise the space and the functions within it.

There are also two distinct areas that must be created when designing the cabinetry for a surgery:

- The dental surgery area
- The decontamination room (LDU – 'local decontamination unit')

HTM01-05 states that any decontamination of equipment should take place in a separate room. Therefore, the decontamination room should be located as near to the surgery as possible or centrally between surgeries in a multi-surgery practice. This is where the recommended method for cleaning dental instruments in a washer disinfector or ultrasonic bath and the instrument sterilisation in an autoclave would take place.

There are four possible layouts for cabinetry in surgeries. The most common today are an L shape or straight run, but for the purpose of the BDIA exam paper, it also advises parallel runs and 'dog leg' shape layouts.

Cabinetry needs to be strong, hard-wearing, and easy to clean – surgeries are going to be used all day every day so cabinetry that is more robust than generic kitchen cabinetry is required. Surgery cabinetry also differs from kitchen cabinetry as it needs to be lower to enable the dentist or assistant to utilise it while in the seated working position, as previously mentioned. Enough space for storage within the cabinetry must be allocated,



along with clear work surfaces for the mixing of materials and to house small pieces of equipment.

Worktops are now most commonly a solid grade synthetic material, though laminate worktops are still sometimes favoured. The solid grade worktops, which are one continuous piece, reduce the risk of cross infection, are easy to clean and are highly resistant to chemical wear and tear. Solid grade worktops with integrated sinks not only maximise good infection control working practices but also look great with a wide variety of colours and styles to choose from. Remember that either elbow operated or electronic hands-free taps should be used here too.

Aside from the cabinetry, a dental surgery will typically contain:

- a dental chair
- a dentist's delivery unit (chair mounted, cabinet/wall mounted or mobile)
- an aspirator (suction device)
- a cuspidor/spittoon
- a light (chair, ceiling or wall mounted)

A dental chair will need to be connected to water, air, and electrics – the services for these will need to be taken into consideration when siting the chair within the room.

Intraoral X-rays and plant equipment (suction motor and compressor) must also be considered, including suitable radiation protection. However this is covered in module 4.

Happy studying! ■