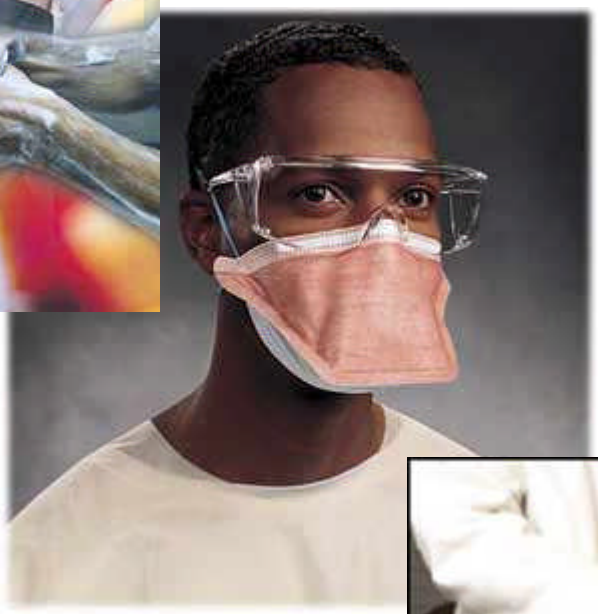
infection**control**indentistry



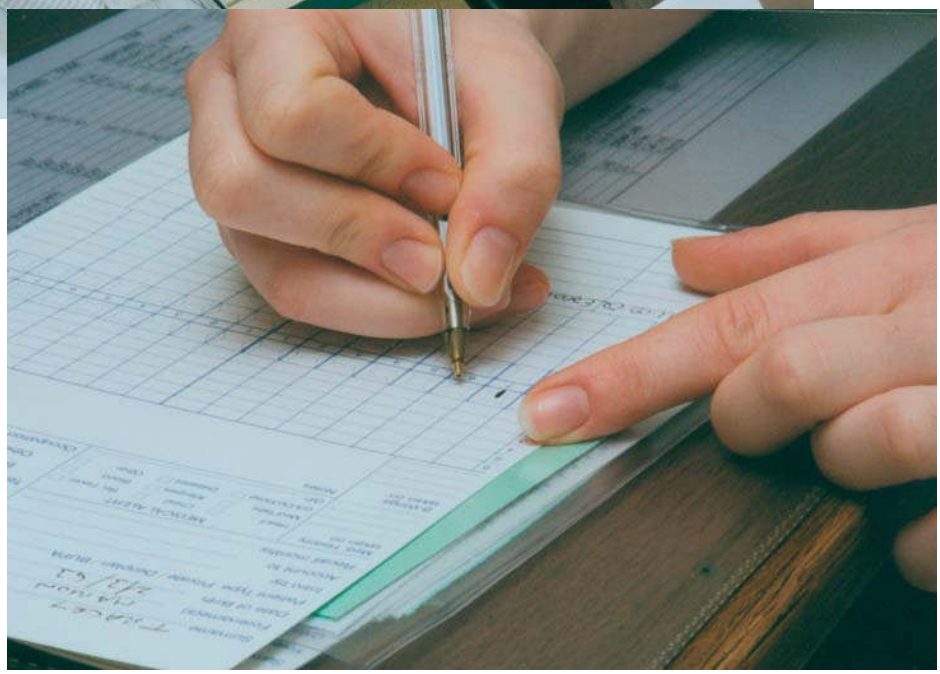
Contents

Infection control checklist

Sources

Useful website addresses for information

Introduction



Infection control in health care continues to be the subject of intensive research and debate.

Implementing safe and realistic infection control procedures requires the full compliance of the whole dental team. These procedures should be regularly monitored during clinical sessions and discussed at practice meetings. The individual practitioner must ensure that all members of the dental team understand and practice these procedures routinely.

Every practice must have a written infection control policy, which is tailored to the routines of the individual practice and regularly updated. The policy should be kept readily available so that staff can refer to it when necessary.

Routine procedures

A thorough medical history should be obtained for all patients at the first visit and updated regularly. Medical history questionnaires alongside direct questioning and discussion between the dentist and
the patient are recommended. Discussions should be conducted in an environment that permits the disclosure of sensitive personal information. The medical history information should be retained as part of the patient's dental records.

The medical history and examination may not identify asymptomatic carriers of infectious disease and universal precautions must be adopted. This means that the same infection control procedures must be used for all patients.

All dentists have a duty of care to their patients to ensure adequate infection control procedures are followed.
Failure to employ adequate methods of cross-infection control would almost certainly render a dentist liable to a charge of serious professional misconduct.

Patient perception

As a result of frequent media coverage, the public is now far more aware of the need for dentists to practice good infection control. Displaying an infection control statement may be appropriate in your practice to help allay patient anxiety and gain their confidence. It may encourage them to ask questions, so never be too busy to give an answer. Ensure all the

members of your practice staff are confident and competent to answer patients' queries or know who to refer to when necessary.

Acceptance of patients

Whilst a health professional has the right to accept or refuse to treat a patient, it is important that the dental profession accepts the responsibility of providing dental treatment to all members of the community. Dental clinicians have a general obligation to provide care to those in need and this should extend to infected patients who should be offered the same high standard of care available to any other patient.

Those with human immunodeficiency viruses (HIV), who are otherwise well, and carriers of the hepatitis viruses may be treated routinely in a primary care setting (general dental practice, community dental service, for example). The evidence indicates that, in the absence of an inoculation injury, the risk of infection to a dental health care worker during the dental treatment of HIV-infected individuals is negligible. HIV infected individuals need a high standard of dental care when they are asymptomatic to minimize dental problems. If they subsequently develop Acquired Immune Deficiency Syndrome (AIDS) it may be appropriate for them to be referred for specialist advice and care.

It is unethical to refuse dental care to those patients with a potentially infectious disease on the grounds that it could expose the dental clinician to personal risk. It is also illogical as many undiagnosed carriers of infectious diseases pass undetected through practices and clinics every day. If patients are refused treatment because they are known carriers of an infectious disease, they may not report their conditions honestly or abandon seeking treatment; both results are unacceptable. Those who reveal that they are infected are providing privileged information.

The infected dental health care worker

All health care workers have an overriding ethical and legal duty to protect the health and safety of their patients and those who carry out exposure-prone procedures should be immune to or non-infectious for hepatitis B. A dental clinician who believes he or she may be infected with a blood borne virus or other infection has an ethical responsibility to obtain medical advice, including any necessary testing. If a clinician is found to be infected, further medical advice and counseling must be sought. Changes to clinical practice may be required and may include ceasing or restricting practice, the exclusion of exposure-prone

procedures or other modifications. An infected clinician must not rely on his/her own assessment of the possible risks to their patients. Failure to obtain appropriate advice or act upon the advice given would almost certainly lead to a charge of serious professional misconduct.

Exposure-prone procedures are those invasive procedures where there is a risk that injury to the worker may result in exposure of the patient's open tissues to the blood of the worker. These include procedures where the worker's gloved hands may be in contact with sharp instruments, needle tips and sharp tissues (spicules of bone or teeth) inside a patient's open body cavity, wound or confined anatomical space where the hands or fingertips may not be completely visible at all times.

A dentist who employs a dental nurse who is subsequently found to be infected with a blood borne virus must undertake a risk assessment to determine whether there is a risk to patients and whether the dental nurse should be redeployed within the practice. The risk assessment must take into account the duties performed by the dental nurse and the likelihood that the infection could be transmitted to a patient or another member of staff. An infected dental nurse must not undertake exposure prone procedures in order to remove, as far as is possible, the risk of transmitting infection.

Infection control in dentistry

Members of the dental team have a duty to ensure that infection control procedures are followed routinely. The mouth carries a large number of potentially infective microorganisms; saliva and blood are known vectors of infection. Most carriers of latent infection are unaware of their condition and it is important, therefore, that the same infection control routine is adopted for all patients.

Training in infection control

All dental staff must be aware of the procedures required to prevent the transmission of infection and should understand why these procedures are necessary. Regular monitoring of the procedures is essential and the infection control policy for the practice should be reviewed regularly and updated when necessary.

All new staff must be appropriately trained in infection control procedures prior to working in the practice. Training should equip staff to understand –

- how infections are transmitted
- the practice policy on decontamination and infection control
- what personal protection is required and when to use it
- what to do in the event of accidents or personal injury

Surgery design

The layout of the surgery, which should be simple and uncluttered, is an important aspect of infection control. There should be two distinct areas: one for the operator and one for the dental nurse, each with a washbasin, which should have elbow- or foot-operated taps, and liquid soap dispensers. The operator's area would have access to the turbines, three-in-one syringe, slow handpiece, bracket table and operating light. The dental nurse's area would contain the suction lines, perhaps the three-in-one syringe, curing light, all the cabinetry containing dental materials and a designated area for clinical waste disposal and the decontamination of instruments.

Clean and dirty areas within the surgery should be clearly defined. Where possible, instruments should be decontaminated away from the surgery in a room containing the autoclave(s), ultrasonic bath(s), instrument washer(s) and sinks and a separate hand wash basin. If instruments are cleaned manually before sterilization, the sink must be of sufficient depth to enable instruments to be fully covered with water during cleaning to minimize the risk of splashing.

Ventilation

- the surgery should be well ventilated; usually an open window will suffice but, in some cases, it might be appropriate to install an extraction fan.
- ventilation systems should exhaust to the outside of the building without risk to the public or re-circulation into any public building.
- the recommended fresh air supply rate of ventilation systems should not fall below 5-8 liters per second per occupant and should not create uncomfortable draughts.
- mechanical ventilation systems must be regularly cleaned, tested and maintained according to the manufacturer's recommendations to ensure they are free from anything that may contaminate the air.
- recycling air conditioning systems are not recommended.

Floor covering

- the floor covering should be impervious and non-slip. Carpeting must be avoided.
- the floor covering should be seam-free; where seams are present, they should be sealed.
- the junctions between the floor and wall and the floor and cabinetry should cove or be sealed to prevent inaccessible areas where cleaning might be difficult.

Work surfaces

- work surfaces should be impervious and easy to clean and disinfect – check with manufacturers on suitable products for decontamination.
- work surface joins should be sealed to prevent the accumulation of contaminated matter and aid cleaning.
- all work surface junctions should be rounded or coved to aid cleaning.

Choice of equipment

When selecting new equipment, you should think about –

- what you want the equipment to do – will the equipment selected be fit for this purpose? Is there any evidence? Is it compatible with other equipment in the surgery?
- how easy it will be to use and maintain?
- how easy it is to decontaminate what are the manufacturer's recommendations? When selecting new hand instruments avoid difficult to clean serrated handles and check that hinges are easy to clean.

- can the material covering the dental chair and work surfaces be cleaned and disinfected regularly without deterioration? Check with the manufacturer.
- selecting foot controlled equipment whenever possible
- training – is it required? Will the manufacturer provide it?

Water supplies

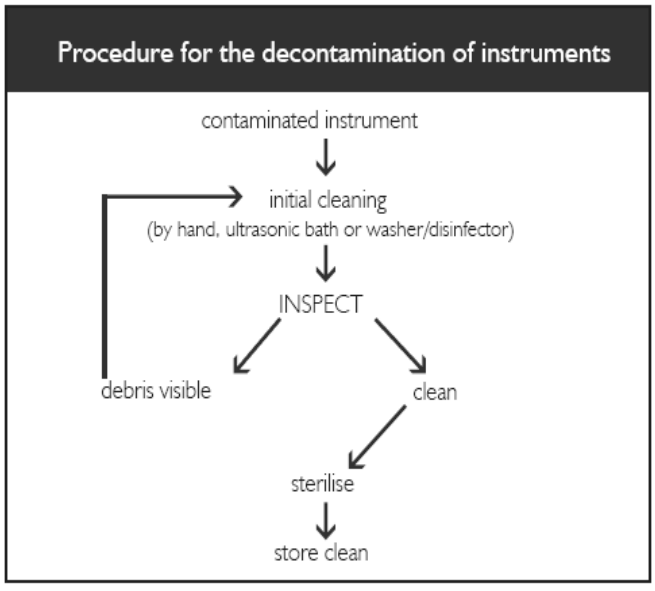
All water lines and air lines should be fitted with anti-retraction valves to help prevent contamination of the lines but these valves cannot be relied upon to prevent infected material being aspirated back into the tubing.

Most dental unit waterlines will harbor biofilm, which acts as a reservoir of microbial contamination and may be a source of known pathogens (Legionella spp, for example). A bottled water system can help to control microbial contamination – disinfectants can be introduced into the water supply to reduce the microbial load. The manufacturer's advice on the type and strength of disinfectant should be followed.

The design of some dental equipment requiring a water supply means that it is possible for contaminated water to be drawn back through the waterlines to the mains water supply (backflow/ backsiphonage). Interrupting the water supply to the surgery by a physical break (air gap) will prevent the possibility of backflow. Some equipment requiring a water supply is now manufactured to incorporate an air gap – check this with the manufacturer.

Decontamination of instruments and equipment

All instruments contaminated with oral and other body fluids must be thoroughly cleaned and sterilized after use. Instruments selected for a treatment session but not used must be regarded as contaminated. There are three stages to the decontamination process: pre-sterilization cleaning, sterilization and storage. Manufacturers are now required to provide instructions for the decontamination of their



equipment - these instructions should be followed. It is worth checking with the manufacturers prior to purchase that equipment can be used for the purpose intended and decontaminated by the methods used in the practice.

A systematic approach to the decontamination of instruments after use will ensure that dirty instruments are segregated from clean. The flow diagram (right) shows a possible approach.

Pre-sterilization cleaning

Used instruments are often heavily contaminated with blood and saliva and must be completely cleaned before sterilization. Instruments can be cleaned by hand, in an ultrasonic bath or using an instrument washer/disinfector – do check with the manufacturer that instruments can withstand ultrasonic cleaning and automated processing. Ultrasonic cleaners and washer/ disinfectors are preferred over hand cleaning instruments as they are more efficient and contact with contaminated instruments is kept to a minimum thereby reducing the likelihood of inoculation injuries.

After cleaning, all instruments must be examined thoroughly and, if there is residual debris, re-cleaned.

Hand cleaning of dental instruments is the least efficient cleaning method. If this method is used, however, the instruments should be fully immersed in a sink pre-filled with warm water and detergent and a long-handled kitchen-type brush used to remove debris. Instruments should be washed under water with the sharp end of the instrument held away from the body; extra care must be taken when cleaning instruments that are sharp at both ends. Thick waterproof household gloves must be worn to protect against accidental injury and protective eyewear to shield against splashing. The brush used to remove debris from the instruments should be cleaned and autoclaved at regular intervals – at the end of each clinical session, for example. Cleaned brushes should be stored dry.

Ultrasonic cleaners should be used and serviced according to the manufacturer's instructions and should contain a detergent not a disinfectant – disinfectant solutions alone can precipitate proteins and make them resistant to removal. Do check the manufacturer's recommendations. The liquid in the ultrasonic cleaners should be disposed of at the end of each clinical session and more often if it appears heavily contaminated. Ultrasonic cleaners with baskets are preferred. The cleaning cycle should not be interrupted to add further instruments. At the end of each day, the ultrasonic cleaner must be emptied, cleaned and left dry.

Washer/disinfectors designed for cleaning instruments are now available and, if used, the manufacturer's instructions should be followed. Washer/disinfectors are more efficient at pre-sterilization cleaning than ultrasonic cleaners and hand cleaning but must not be used as a substitute for sterilization procedures.

Sterilization

The method of choice for the sterilization of all dental instruments is **autoclaving**. Sterilization should be performed at the highest temperature compatible with the instruments in the load. For dental instruments and equipment, autoclaves should reach a temperature of 134-137oC for three minutes. New autoclaves should have an integral printer to allow the parameters reached during the sterilization cycle to be recorded for routine monitoring. Hot air ovens, ultra violet light, boiling water and chemiclaves are not recommended for sterilizing dental instruments and equipment.

Effective sterilization depends on steam condensing on all surfaces of the instruments in the load to be autoclaved, so it is essential that instruments be placed to allow free circulation of steam; the autoclave chamber must not be overloaded. The sterilization process is impaired or prevented by air remaining in the chamber or trapped in the load items. Air is removed from the autoclave chamber by either being displaced downwards by steam or by evacuating the air to create a vacuum before steam is introduced into the chamber. For many years, downward displacement autoclaves were the only autoclaves used in a dental surgery; they are still considered an acceptable means of sterilizing dental instruments and equipment.

More recently, however, vacuum phase autoclaves have become available to dentists in general practice. Dentists considering purchasing a vacuum-phase autoclave should ensure that it is capable of sterilizing the intended load items (various types are available and not all are suitable for processing dental equipment). The autoclave should be equipped only with cycles providing a presterilization vacuum stage to minimize the possibility of an incorrect cycle being selected – and a consequent failure to sterilize the load.

Processing wrapped instruments in a conventional downward contaminated instrument initial cleaning (by hand, ultrasonic bath or washer/disinfector) INSPECT debris visible clean sterilize store clean displacement autoclave may result in inadequate air removal and failure

to sterilize. Wrapped instruments and instruments in pouches must be sterilized using a vacuum-phase autoclave.

There continues to be some debate about the effective decontamination of handpieces. In theory, a vacuum phase autoclave will remove the air from the lumen of a dental handpiece, allowing steam to penetrate. The presence of lubricating oil, however, may compromise the sterilization process. Current opinion is that effective presterilization cleaning of dental handpieces and subsequent processing in a properly functioning downward displacement autoclave is acceptable.

All autoclaves must be regularly serviced and maintained according to the manufacturer's recommendations and periodically inspected (usually annually) to ensure the integrity of the associated pipe work. Vacuum-phase autoclaves are more complicated than conventional steam sterilizers and require more rigorous testing by the user to demonstrate that they function correctly. If you are considering purchasing a vacuum-phase autoclave, you must be aware of all the user tests that you will be required to perform and record on a regular basis. Your service and maintenance agreement should cover the anticipated response time in the event that the autoclave breaks down or malfunctions.

At the end of each day, the residual water should be drained from the autoclave chamber and reservoir, which should then be cleaned and left open to dry overnight. Many autoclaves now incorporate a facility for draining residual water. A drain valve can be retro-fitted to many autoclaves that do not have an integral drainage device. As a last resort, the high volume suction unit may be used (if it is conveniently placed). If this is necessary, the autoclave should not be moved or lifted unless it can be done safely and without risk of injury.

It is important that the water used in the autoclave should contain no minerals that may cause damage and, to ensure the integrity of the sterilization cycle, it should be free of pathogens and endotoxins (pyrogen free).

Successful sterilization depends upon the consistent reproducibility of sterilizing conditions –

- autoclaves must be validated before use and their performance monitored routinely (by periodic testing, including daily and weekly user tests)
- the equipment must be properly maintained according to the manufacturer's instructions

- correct operation of the autoclave must be checked whenever the autoclave is used by recording the readings (physical parameters) on the autoclave's instruments or printout at the beginning of each clinical session
- the readings should be compared with the recommended values – if any reading is outside its specified limits, the sterilization cycle must be regarded as unsatisfactory, irrespective of the results obtained from chemical indicators, and the autoclave cycle checked again. If the second cycle is unsatisfactory, the autoclave should not be used until the problem has been rectified by an engineer
- autoclave logs and printouts should be retained for inspection and monitoring – to demonstrate that the autoclave is performing within the recommended parameters.

Chemical and biological indicators do not demonstrate sterility of the load. Chemical indicators serve only to distinguish loads that have been processed in an autoclave from those that have not. Biological indicators are of limited value in moist heat sterilization and can only be regarded as additional to the measurement of physical parameters.

Handpieces must be cleaned and autoclaved after each patient. Presterilization cleaning machines are recommended. Those using an alcohol/disinfectant combination or a washing cycle must only be used to disinfect handpieces on the manufacturer's advice. These machines do not replace the sterilization process.

Decontamination of handpieces

If a cleaning machine is not used, the following protocol should be adopted for the pre-sterilization cleaning of handpieces:

- leave the bur in place during cleaning to prevent contamination of the handpiece earing
- clean the outside of the handpiece with detergent and water – never clean or immerse the handpiece in disinfectant
- remove the bur
- if recommended by the manufacturer, lubricate the handpiece with pressurized oil until clean oil appears out of the chuck and clean off excess oil
- sterilize in an autoclave
- if recommended by the manufacturer, lubricate the handpiece after sterilization and run it briefly before use to clear excess lubricant
- the oil used for pre-sterilization cleaning/lubrication should not be the same as used for poststerilization lubrication; either two

canisters should be used or the nozzle changed between applications.

Instrument storage
Sterilized instruments should be stored in dry, covered conditions – trays with lids are now available for this purpose. Sterilized instruments should not be stored in a disinfectant or antiseptic solution. Pouches can be useful for storing infrequently used instruments such as extraction forceps and elevators. Pouches with a clear side allow instruments to be easily identified before opening.

The instruments necessary for treatment should be selected prior to the treatment session. If additional instruments are needed during treatment, care must be taken to avoid the cross contamination of other instruments. Tray systems can help with this.

Single use (disposable) items

Equipment that is described by the manufacturer as 'single use' should be used whenever possible and discarded after use, never reused. 'Single use' means that a device can be used on a patient during one treatment session and then discarded. These items include, but are not limited to, local anaesthetic needles and cartridges, scalpel blades, saliva ejectors, matrix bands, impression trays and beakers. Disposable towels are recommended. Items such as three-in-one tips are difficult to decontaminate effectively and can now be bought as disposable items.

Surface cleaning and disinfection

Surfaces of dental units must be impervious as they may become contaminated with potentially infective material. When selecting equipment, consider the ease with which the surfaces can be cleaned and disinfected. Check with the manufacturer that the surfaces are resistant to common disinfectants. The manufacturer may recommend the use of a particular disinfectant; ensure that it will destroy or deactivate all viruses, bacteria and fungi.

Protect light and chair hand controls with disposable impervious coverings and change between patients. If these are not used, the controls must be effectively decontaminated between patients as described below.

A strict system of zoning aids and simplifies the decontamination process. In practice, this means defining the areas, which will become

contaminated during operative procedures; only these areas need to be cleaned and disinfected between patients. A surgery can, as a result, be cleaned rapidly. In addition, between clinical sessions, all work surfaces, including those apparently uncontaminated, should be thoroughly cleaned and disinfected.

Effective surface decontamination is a two-stage process of cleaning and disinfection to reduce the microbial load to a minimum –

- clear the work surface of instruments, materials, patients' notes etc,
- cleaning is achieved by applying a detergent liquid to the surface and physically wiping the area with a generous application of elbow grease
- the surface can then be disinfected with a disinfectant that will destroy or deactivate all microbes. Disinfectant solutions must be made up and used according to the manufacturer's instructions
- disinfectants containing alcohol may be flammable and should not be used near a naked flame
- protective gloves must be worn and eyes must be protected
- good general ventilation will help to minimize inhalation.

All aspirators, drains and spittoons should be cleaned after every session with a surfactant/detergent (to break down the biofilm) and a nonfoaming disinfectant. Portable aspirators with reservoir bottles are not recommended; they are not fitted with filters and pose a considerable hazard when disposing of the contents.

Decontamination of instruments and equipment prior to service or repair

There is a statutory duty to ensure instruments and equipment are safe for repair. In practice, this means that handpieces and other instruments must be cleaned and sterilized before being sent for repair and a statement confirming this must accompany the equipment.
Equipment that cannot be sterilized must be thoroughly cleaned and disinfected in accordance with the manufacturer's instructions.

Decontamination of impression materials and prosthetic and orthodontic appliances

The responsibility for ensuring impressions and appliances have been cleaned and disinfected prior to dispatch to the laboratory lies solely with the dentist –

- immediately on removal from the mouth, the impression or appliance should be rinsed under running water to remove saliva, blood and debris
- continue the process until it is visibly clean. If an appliance is grossly contaminated, it should be cleaned in an ultrasonic bath containing detergent and then rinsed
- the impression or appliance should be disinfected according to the manufacturer's recommendations. Generic materials such as sodium hypochlorite (household bleach) may no longer be suitable for disinfecting impressions unless specifically recommended by the manufacturer
- disinfectants should not be sprayed onto the surface of the impression; it lessens the effectiveness and creates an inhalation risk. Immersion of the impression is recommended
- the impression or appliance should be rinsed again in water before sending to the laboratory accompanied by a confirmation that it has been disinfected.

Products that are suitable for the disinfection of impressions or appliances are CE marked to demonstrate conformity to European Directives. The manufacturer's recommendations for the dilution of the disinfectant and immersion time must be followed.

Disposal of clinical waste

All waste in the practice should be segregated into clinical and nonclinical waste –

- clinical waste is waste that is contaminated with blood, saliva or other body fluids and may prove hazardous to any person coming into contact with it.
- clinical waste sacks must be no more than three-quarters full, have the air gently squeezed out to avoid bursting when handled by others, labeled and tied at the neck, not knotted.
- sharps waste (needles and scalpel blades) must be sealed in UN type approved puncture-proof containers, which must be labeled before disposal.

- local anaesthetic cartridges, whether partially discharged (hazardous) or fully discharged must always be disposed of via the sharps container.
- sharps containers should be disposed of when no more than two-thirds full.
- clinical waste and sharps waste must be stored securely before collection for final disposal - usually by high temperature incineration.
- clinical waste must only be collected for disposal by a registered waste carrier who holds a certificate of registration.
- when waste is collected for disposal, a transfer note must be completed and signed by both parties. The transfer note provides the dentist with evidence that the waste will be disposed of in the correct manner.
- repeated transfers of the same kind of waste between the same parties can be covered by one transfer note for up to one year but a copy must be kept for two years.

Some primary care trusts have local arrangements for the collection and disposal of clinical waste; otherwise arrangements for the collection of clinical waste should be made with a private contractor.

Partially used local anaesthetic cartridges
are regarded as hazardous waste and are subject to additional disposal controls; when the waste is collected, consignment notes must be completed and kept for three years. If a local anaesthetic cartridge is fully discharged, however, it is not regarded as hazardous waste and can be disposed of as clinical waste via the sharps container. If partially discharged local anaesthetic cartridges are disposed of via the sharps container, the container must be disposed of as hazardous waste.

Amalgam filled extracted teeth
cannot be discarded via the sharps container, as amalgam must not be incinerated. These teeth should be disposed of with waste amalgam but care should be taken as the teeth will be contaminated with blood. Waste collection agencies often produce special containers for the disposal of amalgam filled teeth. It is possible to send amalgam filled teeth (and non filled teeth) through the post to universities for teaching and research purposes but the patient's consent must be obtained first (and recorded in the clinical records). It is important to ensure that extracted teeth that are sent through the post are first decontaminated and packaged securely to avoid the package being split open during transit. Some dental schools provide a container and disinfectant suitable for decontamination, storage and transport.

A dentist who fails to dispose of waste in a safe manner will face prosecution by the authorities (Environmental Health Departments, Health and Safety Executive etc) and may be liable to proceedings for serious professional misconduct before the General Dental Council. Clinical waste and hazardous waste must never be disposed of at local refuse tips or landfill sites.

Blood spillages

If blood is spilled – either from a container or as a result of an operative procedure – the spillage should be dealt with as soon as possible. The spilled blood should be completely covered either by disposable towels, which are then treated with 10,000 ppm sodium hypochlorite solution or by sodium dichloroisocyanurate granules. At least 5 minutes must elapse before the towels etc are cleared and disposed of as clinical waste. The dental health care worker who deals with the spillage must wear appropriate protective clothing, which will include household gloves, protective eyewear and a disposable apron and, in the case of an extensive floor spillage, protective footwear. Good ventilation is essential.

Biopsy specimens sent through the post

Dentists using Royal Mail to send patients' **non-fixed specimens** to pathology laboratories for diagnostic opinion or tests must comply with the UN 602 packaging requirements. The 602 packaging requirements ensure that strict performance tests (including drop and puncture tests) have been met. In practice this means –

- the outer shipping package must bear the UN packaging specification marking. Only first class letter post, special delivery or data post services must be used. The parcel post must not be used
- every pathological specimen must be enclosed in a primary container that is watertight and leak proof
- the primary container must be wrapped in sufficient absorbent material to absorb all fluid in case of breakage
- the primary container should then be protected by placing it in a second durable watertight, leak proof container
- several wrapped primary containers may be placed in one secondary container provided sufficient additional absorbent material is used to cushion the primary containers