Introduction:

A thorough medical history of the patient is taken during his first dental visit, which is updated and reviewed at subsequent visits. Not all patients with infectious diseases can be identified by medical history, physical examination or readily available laboratory tests. This limitation has introduced the concept of Universal precautions. This term refers to a method of infection control in which all human blood and certain human body fluids(saliva in dentistry) are treated as if known to be infectious for HIV, HBV, and other blood borne pathogens. Universal precautions means that the same infection control procedures are used for all patients.

In a dental clinic, the patient’s saliva, dental plaque, blood, pus, and crevicular fluid are aerosolized and spattered. Microorganisms are always mixed with these body materials and they cause infectious and transmissible diseases, the most common of which are common cold, pneumonia, TB, herpes, hepatitis, and AIDS.

By adhering to some basic procedures, the dental staff can safe guard their own health and prevent cross infections.

**Barrier techniques:**

1. **Gloves** must be worn when skin contact with body fluids, mucous membranes or contaminated items and surfaces is anticipated. Between patients, the gloves must be removed and hands must be washed and re-gloved. Latex or vinyl gloves should be used for patient examinations and procedures.
2. **Heavy rubber** (utility) gloves are meant to be used while cleaning instruments and environmental surfaces.
3. **Hand washing** Hands should be washed at the start of the day, before gloving, after removal of gloves and after touching any contaminated surface. Hand washing with water and plain soap is adequate for patient examination and non surgical procedures. For surgical procedures, an anti-microbial hand scrub should be used .
4. **Face masks** protect the oral and nasal mucosa from body fluid spatters. They should be changed when visibly soiled or wet.
5. **Protective eye wear** is indicated to shield the eyes from spatters.
6. **Protective clothing** Aprons, either reusable or disposable, must be worn in the dental clinic. They should be changed when visibly soiled or penetrated by fluids and they should not be worn outside the work area.
7. **Limiting contamination** can be done by three methods.
   1. Proper patient positioning
   2. Use of high volume evacuation
   3. Use of rubber dam.

Post-exposure management of needlestick and other contaminated-sharps injuries is an important component of infection control. Sterilization and disinfection are the basic steps in instrument processing and surface asepsis. Sterilization refers to the use of a physical or chemical procedure to destroy all forms of microorganisms, including the highly resistant spores.

It is mandatory to sterilize all instruments that penetrate soft tissues and bone. Instruments that are not intended to penetrate the tissues, but that may come into contact with oral tissues should also be sterilized after each use. If, however, such an instrument would be damaged by heat, it can be disinfected. Disinfection is less lethal process and is intended to kill disease producing microorganisms, but not bacterial spores.

Let’s take a look at the currently available sterilization methods.

1-Steam autoclave-at 250؛ F(30psi), total time about one hour. There is good penetration and it maintains integrity of liquids, like handpiece lubricants, due to the 100% humidity within the chamber.

**Disadvantages :**Non stainless steel metal items corrode, use of hard water may leave deposits, and it may damage plastic and rubber items. Sharp instruments get dulled.

2-Rapid steam autoclave- at 275؛ F(35psi), total time is 15-20 minutes. It is very convenient and easy to operate.

**Disadvantages:** Requires use of distilled water and small chamber size necessitates frequent  cycles.

3-Chemical vapour chemiclave-at 270؛ F(25psi), total time is 40 mts. It is very efficient, and items dry quickly after cycle.

**Disadvantage :** May damage plastic and rubber items. It requires the use of a special solution, which is difficult to dispose off once used. Instruments have to be pre-dried. It emits odour which some find irritating.

4-Dry heat oven 320؛ , total time about two hours. There’s no corrosion of instruments, emits no odour, and it is easy to operate.

**Disadvantage:** May damage plastic and rubber items, longer sterilization time, instruments are hotter and require longer to cool.

5-Rapid dry heat-375؛ F, total time about 30 mts. The cycle is short, items are dry after cycle and there’s no corrosion.

**Disadvantage :**May damage plastic and rubber items, small capacity per cost, and instrument emerge very hot.

6-Ethylene Oxide Gas- kills microorganisms. Total time from start of cycle t end of degas is 14 hours. It can be used for heat sensitive items. The instruments are cool and dry at the completion of cycle.

**Disadvantage :**Very long cycle time. If the cycle is interrupted before completion, there can be possibility of ethylene oxide exposure. It requires the use of several single use items that can be purchased only from the manufacturer.

Instruments and equipment’s intended for sterilization or disinfection procedures must first be carefully prepared. Patient debris and body fluids must be removed from the instruments and surfaces. This was being done by scrubbing them with hot water and soap, but this method forces someone to touch contaminated items when organisms are most likely to be viable. So cleaning should be done with a disinfectant. For this pre-disinfection step, the used instruments can be placed directly into 3.2% glutaraldehyde for 40 mts and rinsed.

Transfer the instruments to an ultrasonic cleaner, which is excellent for cleaning but should not be considered a sterilizer. The "cleaned" instruments will still be contaminated and the cleaning solution will be contaminated with live microorganisms. The solution should be changed at least once a day, using gloves, mask, protective eye wear and clothing.

The ultrasonic cleaner should be operated at least 1.5mts per instrument for loose instruments and at least 15mts total for instruments within a cassette.

Now the instruments are ready for sterilization or final disinfection. They are rinsed and dried, before sterilization in dry heat sterilizer or in a chemiclave.

Instruments should be prepackaged before processing through the sterilize to protect them from contamination after sterilization. Use only the wrapping material designed for the particular method of sterilization e.g. Muslin, clear pouches or paper. Wrapping material should be either self sealing, heat sealed, or double folded and sealed with the appropriate tape. Staples and metal clips should be avoided. The effectiveness of sterilization procedures should be routinely verified during office use by spore testing once a week.

Instruments which can not be heat sterilized, are immersed in 2% glutaraldehyde to final disinfect or for 10 hours to sterilize.

It is important to realize that all disinfectants are not equally effective. Currently there are seven major active ingredients used for disinfectants in dentistry worldwide.

They are

1. Ethyl alcohol,
2. Isopropyl alcohol
3. Chlorine
4. Iodophores and iodines
5. Glutaraldehyde
6. Phenolics
7. Quaternary ammonium compounds.

CRA tests data show that only high ethyl alcohol/phenolic formulations and greater than or equal to 2% glutaraldehyde give consistent kill both in the absence and presence of blood.



These two active ingredients have opposite clinical indications. The indications for ethyl alcohol/ phenolic formulations (Greater than or equal to 70% w/w or greater than or equal to 80% v/v with less than or equal to 1% phenolic) is for environmental surfaces. Since the alcohol volatalizes in containers that are not airtight, leading to the loss of antimicrobial activity, it should not be used for instrument immersion. Glutaraldehyde, on the other hand, is indicated for instruments soaking, it should not be used on environmental surfaces because it can produce hypersensitivity reactions and release aldehydes. The concentration active ingredient and the contact time are critical factors in the efficiency of the disinfectant. Over dilution has always been a serious problem. Contact time varies for different formulations. High ethyl alcohol/ phenolic formulations are very rapid acting, and will even kill the resistant tuberculosis bacteria and polio virus in 2-3 minutes. Glutaraldehydes(greater than or equal to 2%) also kill polio virus rapidly, but require extensive time periods to kill the tuberculosis bacteria(40 to 60 plus mts).

## Hand piece asepsis:

Although no documented cases of disease transmission have been associated with dental hand pieces, sterilization between patients with acceptable methods that ensure internal as well as external sterility is recommended. The inside lines of high speed hand pieces may become contaminated when patient fluids retract back through air- water opening. If the hand piece is not properly processed, the retracted fluids may enter the mouth of the next patient. Dental units manufactured after the middle 1980s have anti-retraction valves already installed. Since these valves fail periodically, retraction must be routinely checked and the valve replaced when necessary. Retraction is checked by observing the tip of the water line opening at the hand piece connection when the water is turned on and then off. If a drop of water ‘hangs’ on the tip, retraction is not occurring. If the water is drawn back into the line, the retraction is occurring.

For proper sterilization of hand piece, the manufacturer’s instructions must be followed. First, the hand piece should be flushed with water by running it for 20 to 30 seconds, discharging the water into a sink or container. If recommended by the manufacturer, use ultrasonic cleaner to remove any adherent material, otherwise, it should be scrubbed thoroughly with a detergent and hot water. Lubricate high speed hand pieces when indicated by the manufacturer and spray out excess lubricant. Depending upon the hand piece, some must be lubricated before, after, or before and after sterilization or not at all. Package for sterilization in steam or unsaturated chemical vapour following the manufacturer’s directions.

If disinfecting a hand piece that cannot be heat sterilized, spray or saturate with disinfectant recommended by the manufacturer.





The End… 

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Infection Control & Incipient Carious Assignment

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