

Infection Control in Dental Office

“ Two of the most important pieces of knowledge in any conflict are the identity of the enemy and the enemy’s strengths and weaknesses ... By understanding the enemy the dentist can make rational decisions about infection control.”

Sterilization vs. disinfection:

Sterilization is a process that leads to a status of an absolute freedom from variable forms of microorganisms. On the other hand, disinfection stands for the process of prevention of the multiplication of organisms and reduction in the level of contamination.

Antiseptics vs. Disinfectant:

Both terms refers to substances that are used to reduce the level of contamination. The only difference is that antiseptics are applied to living tissues (e.g. skin) and disinfectants are restricted to be used on inanimate objects (e.g. instruments, dental chair).

Methods for instruments sterilization:

These can be generally classified into either physical or chemical methods. Physical methods involve the use of heat for sterilization and this can be either as dry heat (e.g. ovens) or moist heat (e.g. autoclave). While chemical methods include sterilization by gas (e.g. ethylene oxide).

Reliability of different methods of sterilization can be tested by the ability of designated technique in the destruction of bacterial spores, since spores are the most resistant form of microbial life.

1. Sterilization with heat

- A. Dry heat: This is the most common method for sterilization, although not the most efficient, in dental offices. The necessary equipment needed in this method is only a thermostatically controlled oven (Fig.1), making it relatively easy and affordable. However, it requires considerable time to complete the cycle and can only sterilize heat resistant instruments. The guidelines for its use are summarized in Table.1.

Table 1 The guidelines for instruments treatment in heat sterilization methods

Temperature	Duration of exposure
Dry heat	
121°C	6 – 12 Hours
140°C	3 Hours
150°C	2 ½ Hours
160°C	2 Hours
170°C	1 Hours
Moist Heat under pressure (Autoclaving)	
116°C	60 Minutes
118°C	36 Minutes
121°C	24 Minutes
125°C	16 Minutes
132°C	4 Minutes
138°C	1 ½ Minutes

B. Moist heat:

This method of sterilization is more efficient than dry heat at much lower temperature, as the water can conduct heat better than air. The generated steam, when come in contact with the instruments, will condense and immediately release all the stored energy. When this steam is placed under pressure (autoclaving), it became even more efficient than regular moist heat. This occurs as the pressure increase the boiling point of water and in return the generated steam will become hotter with more stored energy.

The machine the provide steam under pressure for instrument sterilization is known as the autoclave. It has the advantage of speed and effectiveness, however, it's more expensive than conventional oven and some instrument might rust during autoclaving.



Figure 1 Sterilization with heat: Conventional oven (Left), Autoclave sterilizer (Right)

2. Sterilization with Gas

This method can be used for sterilization of heat sensitive equipment (i.e. Plastic). However large equipment is needed and the used gas (i.e. Ethylene oxide) is highly toxic and requires considerable time for the instruments to be aerated to minimize tissue toxicity. The total time of sterilization and aeration might reach between 15 hours and up to several days. Therefore its use in dentistry is limited.



Figure 2 Sterilization with Gas (Ethylene oxide sterilizer)

Methods for dental office disinfection:

Any part of the dental office can be disinfected by either wiping it with disinfectant or by placing disposable covers on it, which are changed after every single patient. This is done mainly to prevent transmission of microorganism from one patient to another. In instance, regarding the disinfection of the dental chair, the head rest, hosing and lines, light handle and instrument tray can be covered with disposable sleeves and towels. On the other hand, the other part of the dental chair can be sprayed with disinfectant solution.

Regarding the countertop, these only come in contact with the patient indirectly and required to be disinfected less frequently than the dental chair. The number of objects on the countertops should be kept to minimum, to allow the disinfection to be effective and fast.

The floor of the dental office should also be wiped regularly with hospital-grade disinfectant, as the patient blood or secretion might accidentally dripped or dispersed by the use of high-speed drilling.

The disinfection of the dental office should be carried regularly for every day general dental procedure. But regarding the invasive surgical procedure, the disinfection should be done before every single patient.

Preparation of surgical team:

The staff can be dressed in laboratory coats or dental uniforms (e.g. surgical scrubs). This might also be covered by surgical gown. The operator should also use face-mask, eye protection and head cap over their hair (Fig.3).

The hands and arms should be prepared by antiseptic soap before wearing the gloves (Fig.4). Sterile gloves should be used when invasive procedure is performed (e.g. extraction) and the operator should practice the proper way to put the gloves without contaminating the external surfaces of it (Fig.5).



Figure 3 Operator wearing surgical gown, head cap, eye protection and face mask

Preparation of patient:

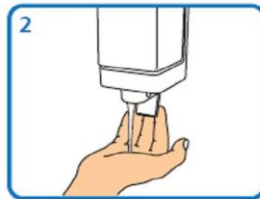
For some oral surgical procedure, it might be necessary to prepare perioral skin; this can be done by wiping it with sterile gauze impregnated with antiseptics solutions. The oral mucosa can also be prepared by using mouthwash (e.g. Chlorhexidine mouthwash). This will decrease the contamination of any surgically created wound by the microorganism that harbours the skin and mucosal membranes. Furthermore, this will also decrease the microbial load of the fluids dispersed by high-speed drilling.



Hand-washing technique with soap and water



Wet hands with water



Apply enough soap to cover all hand surfaces



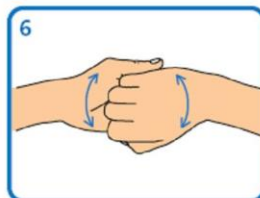
Rub hands palm to palm



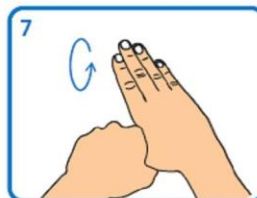
Rub back of each hand with palm of other hand with fingers interlaced



Rub palm to palm with fingers interlaced



Rub with back of fingers to opposing palms with fingers interlocked



Rub each thumb clasped in opposite hand using a rotational movement



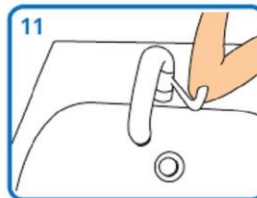
Rub tips of fingers in opposite palm in a circular motion



Rub each wrist with opposite hand



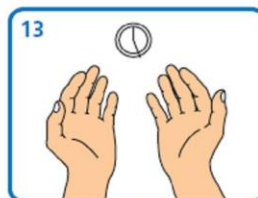
Rinse hands with water



Use elbow to turn off tap



Dry thoroughly with a single-use towel



Hand washing should take 15-30 seconds



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Adapted from World Health Organization *Guidelines on Hand Hygiene in Health Care*



Figure 4 Hand-washing technique with soap and water (NHS, 2007)



Figure 5 Proper way for self-gloving for surgical procedures

References:

Fragiskos. (2007). *Oral Surgery*. Germany: Springer.

Hupp, J. R., Ellis III, E., & Tucker, M. R. (2014). *Contemporary Oral and Maxillofacial Surgery* (6th ed.). China: Elsevier.