Dental Laboratory Asepsis; Why? What can be done?

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What do we know today about disease transmission that we did not 10 years ago? More importantly, the transition from knowing to doing something about it has taken a serious amount of time.

Where were you 10 years ago in Infection Control? Where are you now?

Dental clients are very aware of disease transmission today. If a technician in a laboratory has an illness, what are the chances he could pass it on to the patient that will be wearing that prosthetic tomorrow? Or, in reverse, what are the chances that blood from an impression may contain pathogenic bacteria or viruses? We have known for years that Dental Technicians have had a greater occupational risk of Hepatitis B than Dentists or Auxiliaries.

It used to be that the word Disinfection was only heard in surgery rooms in hospitals. We all knew there were bacteria somewhere out there, but they never, ever came close to affecting our lives. Bacteria and viruses are too small to be seen, in fact, they have to be in millions before we can recognize them as a colony. We never realize the power of microbes until we are affected by them. We all can imagine someone coughing in your face, then realizing three days later that that was the source of your cold. These were the situations we tried to avoid. Then many of us started to slowly realize that some colleagues and acquaintances over time had had problems with disease that were occupationally oriented. How did they get infected? Why was it not obvious at the time?

Reservoirs of Infection

All infections have an incubation period. The most difficult concept for us to fathom is that microbes are truly invisible and that every time we have contact with microbes, we become infected. Now, becoming infected does not always lead to sickness or disease. After infection our immune system fights the invading microbes with varying degrees of success. This Incubation Period, between the time of infection and the onset of disease is different for all microbes. For example with Salmonella sp (an example of food poisoning) it is only a matter of hours after you have been infected until you know you are sick. For Influenza, it may be a few days, but the frightening aspects of incubation periods are for Hepatitis and Tuberculosis. They are in the range of 6 months. That can be a long period of anxiety if one fears that they have been infected.

Why do we get sick? There are several factors such as the type of microbial invader (how virulent or pathogenic it is), the number of microbial invaders and most importantly the strength or robustness of the host (ourselves).

We all, at different stages of our lives, mayor may not be more susceptible to disease. If we are undergoing drug treatments for asthma or cancer, we will have a suppressed immunity. Others that are in the immune suppressed group are diabetics, elderly people or even someone who has not slept well for several nights. The unfortunate reality is that we only find out several weeks or months later, that we have been exposed to harmful bacteria. We can not see them, so in our minds they do not exist *until* we *get sick.*

We have learned a lot in this past decade about long term microbial invasion of our bodies. Ulcers, once believed to be caused by acids, have been found in 90% of cases to be a bacteria from the *Spirochaete* family. Arterial sclerosis, for years was believed to be solely the deposition of fatty steroids like cholesterol, has now been found to be caused by bacterial biofilms. Even chronic fatigue in many instances has been linked to a Candida type systemic fungal infection.

Time for Preventive Action

Dentistry has perhaps the finest reputation for maintaining a serious attitude about infection control. In reality, it has had to. What other health care group is exposed to the blood and saliva of such numbers of patients? The links between the Dental Laboratory and the Dental Clinic are frequent, and the potential for transmission of disease is great. Coordination and cooperation between these groups are the keys to success in breaking the **Circle of Infection.**

What is the Practical Application?

The dental laboratory functions in three stages. They are incoming, in-lab and outgoing. Ideally, they should be functionally and physically separated.

Incoming

This area is designed for the receipt of impressions, registration materials and/or prostheses for repair or adjustment. It should be easily cleanable with surfaces that are easy to wash and to disinfect. On receipt, impressions should be sprayed with a disinfectant that is compatible with all impression material types. When in doubt, consult with the manufacturer of the disinfectant regarding the material's effect on the stability of impressions. Some disinfectants are also debubblizers. Such materials will serve two functions in the laboratory. Once sprayed, the impression should be left to sit for one minute (or a time as directed by the disinfectant manufacturer) and then after a light rinsing with tap water, can be poured using the appropriate techniques. Registration materials can be treated in the same fashion as impressions. An example of

a disinfectant that both disinfects and debubblizes is BioSURF™ from Micrylium Laboratories Inc.

Prostheses that come into the dental laboratory should be immersed or sprayed with an appropriate high-level disinfectant such as BioSURF™. After a one-minute wait time the prosthesis can then be delivered to the appropriate department for treatment.

By following these simple steps, the staff of the whole dental laboratory is protected from disease that may be carried on incoming materials.

In-lab

Not unlike a dental office, an ultrasonic bath is an essential component of dental laboratory hygiene. Most cleaning solutions designed for an ultrasonic bath have little or no antibacterial activity. As a day progresses, the bacterial load found in the ultrasonic bath continues to grow at an exponential rate, doubling bacterial counts every twenty minutes. Baths have been tested with colony forming units per mL. (cfu) exceeding 40 million. Conventional solutions must be drained daily and the ultrasonic bath must be disinfected daily. Solutions such as BioSON™, because of their disinfecting capabilities to remove pathogenic bacteria, frequently last as long as a week and require replacement less often when they become too cloudy or debris laden.

Even after these fluids are spent, this type of solution can still be used in the plaster trap to keep it disinfected and smelling fresh. Diluted BioSON™ is also useful in the pumice tray in place of water as a lubricant. Using it in this fashion reduces the smell as well as the growth of moulds or bacteria in the pumice tray, protecting the staff as well as leading to a far less contaminated product that will be sent back to the dentist. Ideally the surfactants used in the ultrasonics should be biodegradeable to promote workplace safety as well as safety to the environment.

Outgoing

This area, as is incoming ,should again be functionally and physically separated from the rest of the dental laboratory. It is designed only for the packaging and shipping of completed prosthetics. As in the case of the incoming area, it should be easily cleanable and also lend itself to proper disinfection.

Most of the time, completed prostheses are the materials that are shipped from this area. Again, prior to final packaging, prostheses should be immersed in a disinfectant such as BioSURF™ for one minute. When this is done with acrylics, the ethanol has the added benefit of removing residual monomer, reducing reactions to the sensitive patient. This type of procedure also assures the dentist that the final restoration is properly disinfected and safe to insert into the patient's mouth.

There are many choices available for disinfection by dental laboratories. The technician should read the label very carefully before applying them. As a laboratory owner, the RDT has responsibility not only to the dentist and his or her patients, but as an employer to the people that work in the facility. Many disinfectants are based on known carcinogens, such as *o*-phenylphenol, or highly toxic agents such as glutaraldehyde. Some relatively safe disinfectants lose their potency on contacting protein, such as blood. Those include quaternary ammonium products.

Thankfully the practice of sending completed prostheses immersed in a bag of glutaraldehyde has ended. This practice is particularly dangerous, since the glutaraldehyde is readily absorbed into the acrylic of dentures and then is released slowly into the patient's mouth over time. The time-release nature of glutaraldehyde results in sores in the patient's mouth that often mimic denture sores caused by poor fit or poor occlusion.

Ideally, the dental laboratory will choose materials that are free of these toxic substances and will provide safe and effective asepsis in the dental laboratory. By doing this, the dental laboratory will be a safer place to work and at the same time will provide safer restorations for the patients and the dentists that they serve.

Post-test

1) Contamination of dental impressions can be removed by
   a) Thorough washing with green soap and water
   b) Soaking the impression in a strong solution of lye
   c) Spraying the impression with a good quality high level disinfectant
   d) Dental impressions are not contaminated

2) Dental technicians are at highest risk of any dental professional for
   a) Eye injuries
   b) AIDS
   c) Hepatitis B
   d) Repetitive strain injury
   e) Post-traumatic stress syndrome

3) When exposed to a disease, a person will not get sick right away because
   a) Diseases have an incubation period
   b) Exposure must be several times before that can happen
   c) The statement above is untrue
   d) Disease can be avoided with high levels of vitamin C
   e) Preventive drug use was employed.

4) Times when we are more susceptible to disease are
   a) When we are tired
   b) When undergoing drug therapy
   c) As diabetics
   d) All of a), b) and c)
   e) None of a), b) or c).

5) Ulcers are caused thought to be caused by
   a) Sour milk
   b) Eating spicy foods
   c) Spirochaetes
   d) Poor diet
   e) Unfair employer

6) Food poisoning causes can be often diagnosed by the time it takes to get symptoms. It is possible to tell the difference between Salmonella infection and Staphylococcus toxicity
   a) Salmonella takes 4 days to develop symptoms, Staphylococcus takes 1 week.
   b) Salmonella takes 8-24 hours, Staphylococcus takes 1-4 hours.
   c) Salmonella takes 1-4 hours, Staphylococcus takes 8-24 hours
   d) Salmonella and Staphylococcus take the same amount of time, this is not the way to tell the difference.
   e) It is not possible to get food poisoning from Salmonella.

7) Methylmethacrylate mononomer is removed by spraying or immersing a prosthesis in a solution that contains
   a) Soap
   b) Glutaraldehyde
   c) Ethanol
   d) Sugar
   e) BisGMA

8) When using a pumice tray, the best wetting agent for the pumice is
   a) Water
   b) Water and soap
   c) A disinfecting ultrasonic solution
   d) Glycerine
   e) Alcohol

9) A well-designed incoming area for a dental laboratory is
   a) Separated from the rest of the laboratory
   b) Has surfaces that are easily cleanable and disinfectable
   c) Is close to the back door
   d) Has a postage machine
   e) Both a) and b) above.

10) The main reason that people get sick from micro-organisms is because
   a) Virulence
   b) Host susceptibility or robustness
   c) Number of organisms for inoculation
   d) Type of organism
   e) All of the above

THE FOLLOWING QUESTIONS ARE OF THE TRUE-FALSE VARIETY

11) Glutaraldehyde is a good choice for an agent to ship dentures to the dentist.
   a) True
   b) False

12) Plaster traps smell because they often grow fungi or molds
   a) True
   b) False

13) Ultrasonic baths can have bacterial counts exceeding 40 million cfu.
    a) True
    b) False

14) Biofilm is the cause of water contamination and human diseases
    a) True
    b) False

15) All disinfectants are equally toxic to the environment and to the user.
    a) True
    b) False

Answers:

1) (c)
2) (c)
3) (a)
4) (d)
5) (c)
6) (b)
7) (c)
8) (c)
9) (e)
10) (e)
11) (b)
12) (a)
13) (a)
14) (a)
15) (b)