

## DISINFECTING IMPRESSIONS IN DENTAL TECHNOLOGY

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**ABSTRACT:** The article begins by presenting the places in a dental technology laboratory that are most exposed to infectious agents. It then shows the qualities a disinfecting substance must have, as well as disinfection techniques by immersion (with the solutions that may be used) and by spraying. The paper ends in a few warnings for those in charge of disinfection and casting models.

**KEYWORDS:** dental impression, disinfection, self-disinfection, disinfecting substance.

### INTRODUCTION

The close collaboration between a dentist and a dental technician includes the possibility of germs being transmitted from the patient to the dental technology laboratory. There is, thus, potential danger of infection, especially from the dental practice to the laboratory. A series of statistical data published in specialized journals show that:

- After 5 years of activity, 15% of dentists become infected with B hepatitis;
- After 25 years of activity, the percentage reaches 55%.

Also, the possibility of transmitting pathogens through alginate-based dental impressions has been clearly proven. Germs are not removed by washing the dental impression with water; they remain active for a long time even after that.

### MATERIALS AND METHODS

The paper describes a few methods for disinfecting dental impressions and a series of substances that can be used to this end. It also presents a few commercial products for this same operation.

Hygienizing and disinfecting dental impressions and all other prosthetic pieces have turned daily roads between laboratory and dental practice into an increasingly stringent necessity in our days, when

infections have become so varied, and our resistance is decreasing. Likewise, the resistance of infectious agents to antibiotics develops steadily, and it is only last-generation antibiotics, administered in large doses, that can still cope with so many infectious diseases.

Any pathogen agent in the patient's oral cavity may reach the laboratory through a dental impression. It is important that dental impressions are disinfected before being sent to the laboratory in order to construct the model and/or prosthetic pieces, to protect laboratory staff from transmitting germs to the patient. Likewise, pieces that leave the laboratory must be disinfected in order to prevent the transmission of microorganisms

from the dental technology laboratory to the patient. The most exposed areas in a dental technology laboratory are:

- The gypsum table;
- The technician's work table;
- The processing place;
- The telephone.

The first step of disinfection involves carefully washing the dental impression with water, to remove blood and saliva, at a minimum pressure, in order to prevent aerosols and micro-drops from forming and spreading. Damaging the dental impression should also be avoided. Then comes the actual disinfection, by using

certain substances. The qualities that disinfecting substances must possess are the following:

- Short action time;
- Wide action specter, with an approval certificate from a recognized institution;
- Irreversible, secure effect;
- Lack of harmful effects on humans and the environment;
- Lack of tegument lesions;
- Economic advantage.

Disinfecting a dental impression raises some problems, as some materials are based on water (hydrocolloids), others are susceptible to water absorption or desiccation when exposed to inappropriate conditions (hydrocolloids and polyethers).

There are two ways to disinfect a dental impression:

1. Through external physiochemical means:
  - Thermal sterilization – dental impression materials, with the exception of gypsum, do not support this type of disinfection;
  - Sterilization by radiation – it is used only in special cases and contraindicated for alginates;
  - Gaseous sterilization (ethylene oxide) – it is not used for alginates, especially due to hygienic and environmental risks;
  - Formaldehyde solution – it can modify alginates. It can also cause allergies, dermatitis and eczema.
2. Self-disinfection: in this method the very material of the dental impression is prepared so as to annihilate contracted germs. The method uses a quaternary ammonium salt with good bacteriological efficiency but an unsatisfactory antiviral effect. Self-disinfection is especially suitable for alginates, which are difficult to disinfect by other methods. Commercial products: *Blueprint asept*, *Blueprint plus*. Disadvantages of this method:
  - The impression spoon remains contaminated if it was not sterilized beforehand or if it was not designed for single use;

- The weak antiviral effect of the method.

Technically speaking, disinfection can be achieved by two methods:

1. Disinfection by immersion – this method has been unsuccessful since the beginning, due to:
  - Causing modification in the impression material;
  - Narrow action specter of disinfection means.

The disadvantages of the method are:

- It is not indicated for all types of materials;
- It does not involve rinsing before actual disinfection, and as such impurities remain on the dental impression, which may lead to deficient gypsum models;
- The efficiency of the disinfecting bath is not constant, depending on the number of disinfected impression and the length of use of the bath;
- The risk of exceeding the action time on impression may lead to size alterations.

Immersion technique: the dental impression is introduced entirely (including the spoon handle when used for impression) into a vessel containing one of the solutions used in practice. Work time amounts to 10 minutes, after which the impression is energetically rinsed with tap water. The increase in disinfection time to 20 minutes or even more results in damage to the size stability of the impression material.

Solutions used in the immersion technique:

- Peracid salts have been used for over 20 years in dentistry, with good results. They have, nevertheless, a limited area of use and may yield adverse reactions in some people;
- Alkaline glutaraldehyde solution 2% - for reversible hydrocolloids. It entails risks for staff who handle it;
- Sodium hypochlorite leads to the inactivation of most oral germs,

including HIV and HBV, size alterations in the impression being avoided. It is obtained by diluting commercial chlorine to 1:5 or 1:10, which may have the initial concentration of 5% or 10% ;

- Solutions of sodium hypochlorite and phenols – impressions taken with polyethers;
- Solutions of sodium hypochlorite, glutaraldehyde, iodoform or phenols – for polysulfide impressions;
- Sodium peroxymonosulfate is active as a 2% solution on bacteria, viruses and fungi, being indicated for all impression materials with the exception of reversible hydrocolloids.

Commercial products of ready-made disinfecting solutions that are used as such or concentrated, being then diluted upon use: MUCALGIN, IMPRE SEPT, MD 250, PRINTO SEPT, STERIGUM, etc. Produced as granules dissolved in water: SILO SEPT, etc.

2. Disinfection by spraying: It is made with special sprays that are sprayed on the impression surface, which is then sealed in a sterile bag, where it is kept for 10 minutes. This solves the issues of hygiene (inhaling the substance) and the environment. Disinfection by spraying is deemed unsatisfactory due to the possibility of avoiding certain portions in the impression, as well as the risk of inhaling strong disinfectants, in the form of aerosols.



Fig. 1. Disinfection by spraying

When casting a model one must take the following precautions:

- Protect their hands using disposable gloves;
- The model will be stored until stiffened on a piece of paper or plastic, in a less contaminated area;
- After stiffening, mold release will be carried out wearing protective gloves, glasses and a mask;
- The model can be sprayed with disinfecting solutions.

Impression material	Chlorine compounds	Glutaraldehyde	Phenol compounds
Alginates	Disinfection by immersion not recommended	Disinfection by immersion not recommended	Disinfection by immersion not recommended
Polysulfides	Disinfection by immersion recommended	Disinfection by immersion recommended	Disinfection by immersion not recommended
Silicones	Disinfection by immersion recommended	Disinfection by immersion recommended	Disinfection by immersion recommended
Polyethers	Disinfection by immersion recommended	Disinfection by immersion recommended	Disinfection by immersion recommended
ZOE pastes	Disinfection by immersion recommended	Disinfection by immersion recommended	No conclusive data
Reversible hydrocolloids	Disinfection by immersion not recommended	Disinfection by immersion not recommended	No conclusive data

Fig. 2. Choosing a disinfectant depending on impression material (according to Livia Ardelean, 2009)

In the case of patients known to be at increased risk for contamination (patients with AIDS, HIV positive

or HBV contaminated), their impressions should rather be sterilized than disinfected. Their cold sterilization involves immersion in 2%, glutaraldehyde solution for 10 hours, or in a phenol solution for approximately 7 hours. The only impression materials that have size stability in such conditions are silicones. For these patients it is necessary to use multiple work models, as they will be contaminated during the trial phases in the oral cavity, being then disposed of after each trial, the mold itself must be sterilized before being sent to the laboratory.

## **WARNINGS**

Alginate impressions, due to the porosity of this material, raise most problems in terms of disinfection.

In order to preserve its properties, the disinfecting solution must be kept in sealed containers and changed at least once a day.

If a rubber bowl is used when preparing the alginate, it must be well cleaned and disinfected. Metallic impression spoons are sterilized, and plastic ones will be used only once.

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