

Cleaning and disinfection of dental practice surfaces

The choice of disinfectant, the delivery format of the disinfectant and the cleaning technique all need to be taken into consideration. **Dr Tim Sandle** considers your options

Infection prevention is a critical aspect of dental practice and the effective cleaning of surfaces has a key role in infection control to help prevent microorganisms being transferred to patients and staff. The choice of disinfectant, the delivery format of the disinfectant and the cleaning technique all need to be taken into consideration.

Detergents versus disinfection

It is important to understand the difference between cleaning with a detergent and the process of disinfection. Cleaning involves the removal of soil (which includes protein-based material like pus and blood) from a surface and a detergent is required for this cleaning process. Detergents free the soil from a surface by working on the chemical bonds that bind the soil to the surface in the first place. In contrast, disinfection is about killing or inactivating microorganisms. Disinfectants are chemicals, especially selected and formulated, with proven antimicrobial activity. An effective disinfectant should be certified as having been tested against European standards¹.

One approach to cleaning and disinfection is to use a separate detergent



Dr Sandle has more than 25 years experience of microbiological research and biopharmaceutical processing. Dr. Sandle is a member of several editorials boards for scientific journals. In addition, he has written over four hundred book chapters, peer reviewed papers and technical articles relating to microbiology.

followed by a disinfectant. Alternatively, a detergent combined with a disinfectant may be used, often as a pre-saturated wipe.

Selecting disinfectants

When selecting a suitable disinfectant for the dental practice there are a number of important criteria to consider which include:

- Safety – what types of personal protective equipment is required;
- Efficacy – how well the disinfectant kills;
- Spectrum of activity – how many different types of microorganisms are killed or inactivated;
- Contact time – how rapidly the disinfectant kills microorganisms.

An ideal disinfectant should have a high inactivating capacity for a wide range of viruses, including HIV and hepatitis, as well as being effective against bacteria, including tuberculosis. It should be safe to use and suitable for frequent application¹. There are two main types of disinfection available for wiping hard, non-porous surfaces: those that are alcohol based and those which are non-alcohol based. The non-alcohol ones are usually types of quaternary ammonium compounds known as 'quats'. These two types of disinfectants have some important differences beyond their presentation and odour.

Alcohol based surface disinfectants possess some of the widest disinfectant kill ranges available. They are virucidal against 'enveloped' viruses, such as HIV and hepatitis B and against the 'non-enveloped'



viruses, such as poliovirus, rhinoviruses and hepatitis A. Alcohol based disinfectants tend to kill more microorganisms than quats. One key concern is with the bacteria that cause tuberculosis, which represent an increasing risk given the prevalence in the general population. Here alcohols can kill the pathogen², whereas quats can only inhibit the bacterium under ideal conditions³.

Some disinfectants lose their ability to work properly if the chemicals lose activity. Quats can be inactivated in the presence of hard water, where an unsuitable detergent has been used, or if it comes into contact

with items like cotton gauze⁴.

A further factor to consider when selecting a disinfectant is how the product works if soil is still present on the surface. The presence of soil can sometimes block disinfectants from reaching the microbial cell and therefore from working effectively. Some reports suggest that alcohols have poor penetrative ability due to 'protein fixation', although these studies relate to stainless steel surgical instruments not surfaces⁴.

To state that all alcohols fix protein to all surfaces in all circumstances is an over-simplification. Much of what has been written about protein fixation is based on what happens when protein is fixed to a microscope slide (here alcohol, at a higher concentration of 80%, after an extended contact time, causes proteins to precipitate). For protein fixation to occur the alcohol needs to be in contact with the surface protein for a prolonged period of time (in excess of one hour) and for alcohols of a high concentration (around 90%) to be used.

For this to happen in a dental practice when using an alcohol based disinfectant on a surface, there needs to be a special set of circumstances. The blood would need to have been present on the surface for at least an hour and the alcohol would need to be very concentrated. In reality, the alcohols sold as commercial disinfectants are of a lower concentration and leaving blood and other matter on a surface for a long time is not good practice and in reality is unlikely to occur.

Some commercially available alcohol disinfectants contain additional surfactants that help to remove the protein from the surface and allow the disinfectant to kill any microbes present. Efficacy can also be improved through using good wiping methods, which are outlined later in this article.

Disinfectant format

Wipes pre-saturated with the disinfectant of choice are usually the preferred format in a busy dental practice as they are convenient

to use, disposable and require less storage space than sprays. Wipes also have the added advantage of containing the correct amount of disinfectant.

Applying disinfectants effectively

No matter how good the disinfectant is, it will not be completely effective unless it is applied correctly. The contact time, wiping technique and dilution (if required) need to be closely observed.

If a disinfectant requires diluting, the appropriate concentration as stated by the manufacturer must be prepared. Too dilute or too concentrated means that effective microbial kill will not take place⁵. To guard against this, ready-to-use disinfectants can be purchased.

Contact time refers to how long the disinfectant should be left in contact with the surface for, before the surface is used⁶. In a busy practice a rapid contact time is necessary. The time will be stated by the manufacturer and it should appear on the packaging around the disinfectant.

The wiping technique will differ depending on whether the disinfectant is sprayed onto a surface and then wiped with a cloth or whether a pre-saturated wipe is used. With spraying care needs to be taken that a sufficient amount of disinfectant is liberally sprayed to cover the surface and then effectively wiped⁷. Generally, pre-saturated wipes are easier to use and preferred by practices as they contain a fixed volume of disinfectant.

When cleaning surfaces, it is recommended that a double wipe procedure is used. The first wipe cleans the surface and physically removes any visible soil (e.g., organic and inorganic material) from the surface, as it may compromise the disinfectant process. The second wipe disinfects the surface and eliminates many or all pathogenic microorganisms, depending on the type of disinfectant used.

Gloves should always be worn before using a ready-to-use pre-soaked wipe. Each

wipe should only be used once and on one surface. It may be necessary to use several wipes for large surface areas.

Successful surface decontamination can only be achieved by closely following the manufacturer's specifications for use.

References

1. Sandle, T. (2016). Cleaning and Disinfection. In Sandle, T. (Ed.). *The CDC Handbook: A Guide to Cleaning and Disinfecting Cleanrooms*, 2nd Edition, Grosvenor House Publishing: Surrey, UK, pp1-31
2. Best, M., et al. (1988) Comparative mycobactericidal efficacy of chemical disinfectants in suspension and carrier tests. *Appl Environ Microbiol.*, 54: 2856-8
3. McDonnell, G. and Russell, A.D. (1999) Antiseptics and disinfectants: activity, action, and resistance. *Clin Microbiol Rev.*, 12: 147-79
4. MacDougall KD, Morris C. Optimizing disinfectant application in healthcare facilities. *Infect Control Today* 2006;June:62-7
5. Tirali RE et al In vitro antimicrobial activity of several concentrations of NaOCl and Octenisept in elimination of endodontic pathogens, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009;108(5):e117-20
6. Retamozo B. et al Minimum contact time and concentration of sodium hypochlorite required to eliminate *Enterococcus faecalis*, *J Endod.* 2010 Mar;36(3):520-3
7. Panousi, M. N. et al Evaluation of alcohol wipes used during aseptic manufacturing, *Lett Appl Microbiol.* 2009;48(5):648-51

HTM 01-05 recommendations

- 6.46 All work surfaces where clinical care or decontamination is carried out should be impervious and easily cleanable.
- 6.54 The dental practice should have a local protocol clearly outlining surface- and room-cleaning schedules
- 6.57 The use of disinfectant or detergent will reduce contamination on surfaces.
- 6.61 The patient treatment area should be cleaned after every session using disposable cloths or clean microfibre materials – even if the area appears uncontaminated.