

Good infection control practice: protecting the patient

This article will examine environmental cleanliness, surface cleaning, hand hygiene and how we have a responsibility to ensure that all our staff, patients and visitors are confident that we are doing all we can to reduce health care associated infections

The 2013 edition of *Health Technical Memorandum 01-05: Decontamination in primary care dental practices (HTM 01-05)* provides great detail and guidelines for decontamination in primary dental care practices and we are all well advised with the policies within it (Department of Health (DH), 2013).

Environmental cleanliness is an important part of infection control and we will look at the evidence to support cleaning and disinfection, and give an overview on the selection and use of disinfectants in dental settings. All information in this review has been taken from national and international published best practice guidelines and peer-reviewed articles.

Infection prevention and control

Contaminated surfaces play a role in facilitating the transmissions of these organisms but this risk can be reduced by cleaning and disinfection along with adequate training and education of dental staff.

Infection prevention and control is a must for all healthcare professionals. It is accepted that improved infection control practices, such as hand hygiene, routine cleaning and disinfection of surfaces can

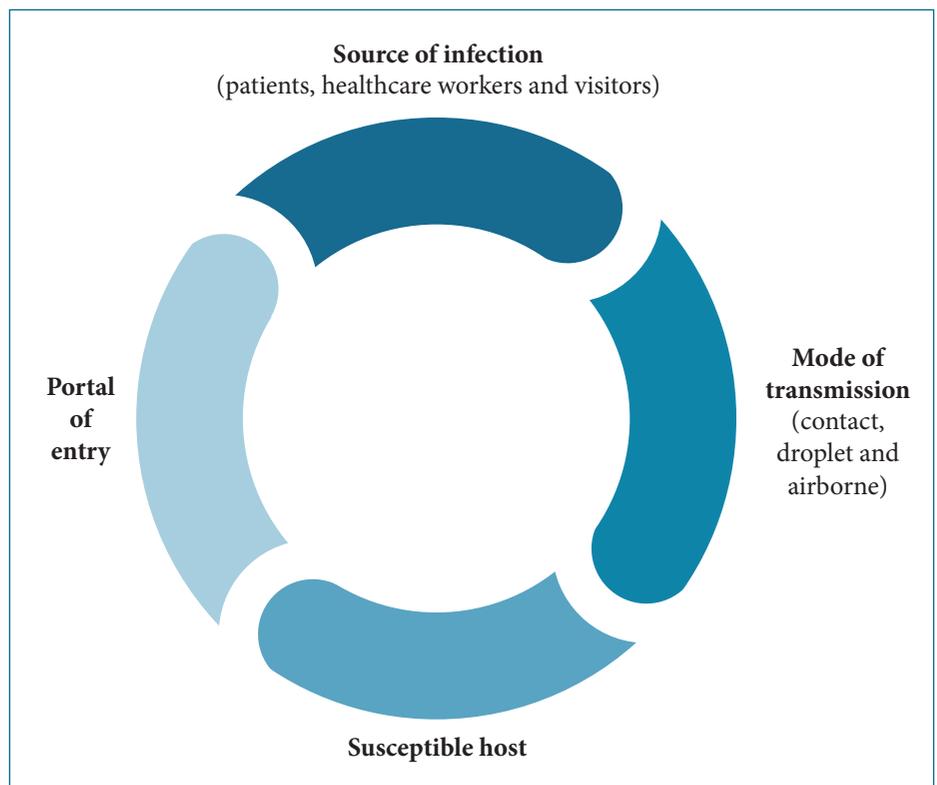


Figure 1. Chain of transmission

help break the chain of transmission and therefore reduce health care associated infections HCAI rates (Figure 1).

There have been many initiatives from the government and health care trusts that target hand hygiene, however compliance and product effectiveness can vary. Environmental surfaces can serve as a reservoir for microorganisms, which can be transferred to the hands of dental staff, visitors and patients.

Figure 2 shows a typical dental surgery and highlights the high-touch

surfaces that have been found to harbour microorganisms, increasing the risk of infection.

Other frequently contaminated areas used by patients are toilets, sinks, taps, handles, door knobs, reception area—in fact any area that is frequently used and touched by visitors and patients.

Risks from patients

As dental staff already protects themselves and patients through personal protective equipment (PPE), it is the patients and

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and disinfecting to minimise the risk of infection in patients. *Table 1* illustrates how long these organisms can live for.

Hand hygiene

While *HTM 01-05* clearly defines the hand hygiene policy (DH, 2013), not all staff in a dental environment will clean their hands if they have not touched patients, even though they have touched the same surfaces. Hand hygiene is crucial in safeguarding patients. However, it is equally important for patients and visitors to carry out correct hand hygiene as it is for our employees. Patients and visitors who are educated and aware of proper hand hygiene can take an active role in their own safety. Hand hygiene products should be readily accessible to patients and visitors and patients should be made to feel comfortable to ask and remind staff to sanitise their hands. Signs near sinks and on entry and exit points should be on display as a reminder of protocols and the importance of sanitising hands. Following this simple practice is an important step in reducing HCAs and reduces the risk of transference of harmful microorganisms.

Products that reduce the risk of infection

There are many products on the market that profess to reduce the risk of infection, so how do we choose the right product? In the United States, surface disinfection is commonly achieved with the use of disinfectant and detergent combinations, while the UK guidance recommends the use of detergent for the cleaning of low-risk environmental surfaces (e.g. floors, walls, table tops), and a disinfectant solution of 10 000 parts per million (ppm) available chlorine for surfaces contaminated with blood and other body fluids. The justification for and against detergent and disinfectant use is summarised in *Table 2*, which illustrates that there is growing evidence that the use of disinfectants should be considered more widely.

In all health care settings, a number of disinfectants are available either as

visitors themselves that are the most common source of microorganisms; infected patients and visitors shed bacteria, viruses and spores into the environment. While a direct link between HCAs and the presence of microorganisms on dental surfaces has not been established, studies have reported many organisms responsible for HCAs, including methicillin-

resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile*, norovirus and vancomycin-resistant enterococci (VRE), survive and persist on medical surfaces in sufficient numbers that they can be transferred to patients and the hands of health care workers. These organisms can persist on surfaces for long periods of time, hence the importance of frequent cleaning

Table 1. Persistence of microorganisms on dry surfaces

Organism	Persistence (range)
Acinetobacter spp.	3 days to 5 months
Carbapenem resistant Enterobacteriaceae	19 days
<i>Clostridium difficile</i> (spores)	5 months
Enterococcus spp. Including VRE and VSE	5 days to 4 months
<i>Escherichia coli</i>	1.5 hours to 16 months
<i>Klebsiella</i> spp	2 hours to 30 months
<i>Mycobacterium tuberculosis</i>	1 day to 4 months
<i>Pseudomonas aeruginosa</i>	6 hours to 16 months; on dry floor: 5 weeks
<i>Salmonella typhimurium</i>	10 days to 4.2 years
<i>Shigella</i> spp.	2 days to 5 months
<i>Staphylococcus aureus</i> , including MRSA	7 days to 7 months
Adenovirus	7 days to 3 months
<i>Haemophilus influenzae</i>	12 days
Influenza virus	1 to 2 days
Norovirus and feline calici virus	8 hours to 7 days

Table 2. Justification for using detergents and disinfectants

Justification for detergent use	Justification for disinfectant use
Surfaces contribute minimally to endemic nosocomial infections	Surfaces may contribute to the transmission of epidemiologically important microbes (e.g. VRE, MRSA, C. difficile, viruses)
There is no difference in infection rates of floors cleaned with detergent versus disinfectant	Disinfectants are needed for surfaces contaminated by blood and other potentially infectious material
No environmental impact associated with disposal	Disinfectants are more effective than detergents in reducing microbial load on floors
Lower costs	Detergents become contaminated and result in seeding the patient's environment with bacteria
No occupational health exposure issues	Some newer disinfectants have persistent antimicrobial activity
Use of antiseptics/disinfectants selects for antibiotic-resistant bacteria	Advantage of using a single product for decontamination of floors and equipment

single use products or in combinations. The choice of disinfectant will depend on its intended use, thus the manufacturer's instructions should be followed to ensure correct application. Incorrect selection and use of a microbicide can result in transference of microorganisms to clean surfaces.

In laboratory simulated conditions, studies have demonstrated the transfer of microorganisms from contaminated cleaning cloths (commercial wipes and microfibre cloths) to clean surfaces. The changing and/or cleaning of cloths and the wiping of surfaces from clean to dirty is crucial to limiting microbial transference. Also by cleaning the surface in an 'S'-shaped motion (Figure 3), the entire surface can be cleaned while ensuring there is no overlap between clean and dirty areas.

Wipes

Wipes are increasingly being used to clean and/or disinfect surfaces and equipment. Two types of wipes currently exist: detergent wipes for general purpose cleaning of visibly soiled areas, and disinfectant/detergent combination wipes

for the removal or reduction of infectious agents. Disinfectant only wipes, such as alcohol wipes, are now rarely used in the UK.

If using a detergent product, the surface should be dried after cleaning, as moist surfaces, coupled with a warm, humid environment, can harbour microorganisms. In contrast, disinfectant products should be allowed to air dry to allow maximum contact with the surface.

Along with growing evidence that the use of disinfectants should be considered more widely, there is now evidence of the benefits of using disinfectants rather than detergents in a ready to use wipe. One study shows that disinfectant wipes were three times more effective at reducing bacterial burden than detergent wipes, and disinfectant wipes have been proven to reduce microbial fomites to finger transfer.

The added value of ready to use disinfectant wipes has been proven to increase cleaning compliance, resulting in a more rapid cleaning and disinfection process, plus potential cost savings.

Evaluating effectiveness

Standard efficacy tests for disinfectant wipes are inconsistent and information of the effectiveness of a product can usually only be gleaned from laboratory tests conducted using non-standard tests. This can lead to the use of wipes that might not be appropriate for applications in a health care or dental environment. Because of this, Dr Peter Hoffman (consultant clinical specialist at the Antimicrobial Resistance and Healthcare Infections Reference Unit of Public Health England) made recommendations of how to best select disinfectant wipes in a presentation at the Infection Prevention Society Conference 2013, London. In his presentation, *Wipe it out: the evidence for selection and use of disinfectant wipes*, he recommended the following checklist, which should be used to help evaluate potential products:

- **Effective formula.** It is important that the manufacturer adequately explains how the formula works. They must explain what the active compounds are and outline their relationship with common bacteria. How the formula reacts with different wipe fibre compositions is of equal importance, especially when discussing solutions and sprays: 'Sometimes the fabric of the wipe can inactivate the disinfectant'
- **Relevant testing.** It is vital that the claims made and advertised are from tests on liquid expressed from the wipe and not on solutions to be applied to wipes: 'Suspension tests simulate specific use situations (none of which are wipes)'
- **Realistic contact times.** 'A disinfectant test is a single, repeatable, highly controlled situation. Real life is not.' All data should be readily available and relevant. European standardised tests are often performed under unrealistic contact times and conditions. The data should reflect achievable contact times and conditions, not just headline method and results. 'Tests can be done either in "clean" or "dirty" conditions. "Clean" is easier to pass. "Dirty" is more difficult but simulates user conditions

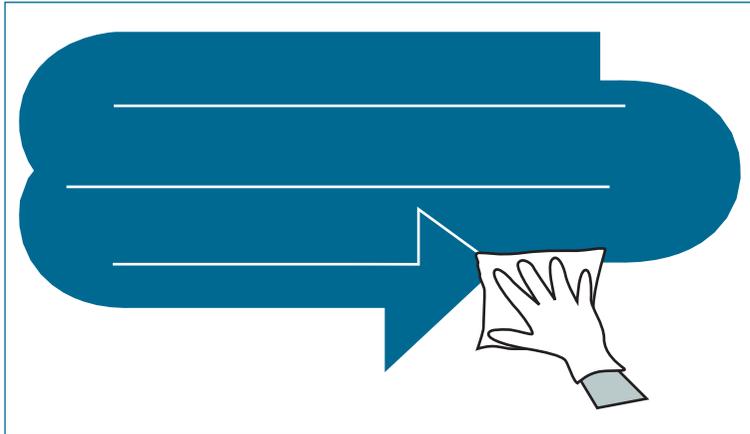


Figure 3. Elimination of transference using 'S' shaped cleaning motion

As all healthcare professionals are under greater pressure to reduce their HCAI rates and at the same time having to do this under greater public scrutiny and tighter budgets, choosing the right products and right company is even more important.

At Revive we use Clinell. Clinell is continuously investing in new research and testing to better understand HCAs and how to reduce them. Clinell provide an industry leading data package and maintain full transparency on their formula and efficacy. Clinell wet wipes are proven to consistently deliver a stable, effective dose of disinfectant which kill microorganisms within realistic contact times and conditions.

There are a wide range of products in the Clinell family, the most popular being Clinell Universal Wipes consistently which delivers a stable, effective, pre-measured dose of disinfectant which is proven to kill 99.999% of germs and are effective from 10 seconds. These are also fast becoming the product of choice in many dental groups and my own dental nurses say that they have given them added confidence in our infection control procedures due to the wider range of germs and bacteria that they kill. They are also saving us time and money with their multipurpose action, as we no longer have a need for other detergents, water, cloths and wipes. We have used the wipes on chairs, worktops, in surgery and in our cross-infection room. I would have no hesitation in recommending them to other dental practices for similar use.

Conclusion

In summary, education is the key factor in reducing HCAs. It is our responsibility to ensure that correct hand hygiene procedures are adhered to and our patients are made fully aware of the protocols within our environment.

better'

- **Scientifically validated.** It is important that the manufacturer has an experienced and reputable microbiologist who is available to explain the importance of all aspects of the formula and relevant testing, from culture preparation to neutraliser validation
- **Training.** Training on the correct use and best practice for products should be made available
- **Published user studies.** Reputable companies should be able to undertake and publish practical user results for their products
- **Compliance with regulations.** All products should comply with current product safety regulations and occupational health considerations and guidelines.

Currently, there are no guidelines or standardised methods for monitoring environmental cleaning. Given that high touch surfaces are implicated in the transmission of HCAs, validating and assessing the thoroughness of cleaning is justified. The most generally accepted method is by visual assessment, despite this being an unreliable indicator of contamination. A surface may be 'visually clean' but this will not reflect that the surface is free of microbes. Fluorescent markers, such as gels, powders and lotions,

are used to demonstrate the cleanliness of high touch surfaces. The marker is easily removed with light abrasion after wetting and is only visible under an ultraviolet lamp. The marker is applied to the surface, which is subsequently evaluated following cleaning. As well as highlighting surfaces that have not been cleaned, they also demonstrate the potential for transference of microorganisms to clean surfaces. Fluorescent markers are a useful tool in determining how thoroughly a surface is wiped and mimics the microbiological data.

Education and training

Environmental cleaning and disinfection form a fundamental part within good infection control and prevention practice. Integral to this is the appropriate education and training of all dental personnel (medical and non-medical staff) and users (patients and visitors). However, there appears to be a disparity in the provision of education and training provided to key health care personnel in the NHS. Effective education and training can contribute to reductions in HCAs, hence a greater emphasis must be placed on educating all dental personnel. **Studies have shown** training tools such as monitoring of environmental cleaning can have a positive impact on the thoroughness and level of cleaning achieved.