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# CPD Article

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# Kemdent

# Breaking the Chain

Kathy Porter, Senior Dental Nurse (De-contamination) at Birmingham Dental Hospital describes the common cross infection threats faced by everyone in dental practice and "Best Practice" for eliminating them.

The threat of a Swine Flu Pandemic sweeping the national resulted in the Government's National Campaign to "Catch It!... Bin It! ... Kill It!".

However, everyday each member of the Dental Team and any visitors to their premises face other potentially harmful, even fatal, hidden threats from the various microorganisms that cover each and every surface and piece of equipment they come into contact with. The risks from these potential hazards are frequently overlooked, even ignored, even though they represent a much bigger and therefore much more dangerous threat to everyone.

The first two lines of the Department Of Health's *De-contamination Health Technical Memorandum 01-05 Decontamination in primary care dental practices* says – "Patients deserve to be treated in a safe and clean environment with consistent standards of care every time they receive treatment. It is essential that the risk of person-to-person transmission of infections be minimised as much as possible". To this could be added the risks to every member of the Dental Team too!



Picture 1

## What are these risks?

There is not a Practice in the country that is not aware of the cross contamination risks posed by inadequate de-contamination and subsequent sterilisation of the various pieces of equipment employed in dentistry. Consequently the use of ultrasonic cleaners, washer disinfectors and various forms of autoclaves/steam sterilisers is considered mandatory. However there are equally dangerous, yet hidden, threats lurking on potentially every hard surface within the practice. These often go unconsidered and therefore neglected.

Everyday we are all exposed to countless millions of micro-organisms, which are perfectly safe and pose no threats to anyone; however there are also many forms of pathogenic microorganisms, which can cause infections, also circulating in the population. The latter include:-

- Bacteria ( e.g. Clostridium difficile )

Bacteria are minute organisms about one- thousandth to five-thousandths of a millimetre in diameter. They are susceptible to a greater or lesser extent to antibiotics etc.



Picture 2. Petry dish showing microbial cultures found in the everyday environment

- **Viruses ( e.g. HIV, influenza )**

Viruses are much smaller than bacteria and although they may survive outside the body for a time they can only grow inside cells of the body. Viruses are not susceptible to antibiotics, but there are a few anti-viral drugs available which are active against a limited number of viruses.

- **Pathogenic Fungi**

Pathogenic fungi can be either moulds or yeasts. For example a mould which causes infections in humans is Tinea Corporis, which is one cause of ringworm and which can also infect nails.

- **Protozoa**

Protozoa are microscopic organisms, larger than bacteria. Free-living and non-pathogenic protozoa include amoebae and paramecium. Examples of medical importance include Giardia lamblia which causes enteritis (symptoms of diarrhoea)

- **Worms ( e.g. threadworm, tapeworm )**

Worms are not always microscopic in size but pathogenic worms cause infection and some can spread from person to person.

- **Prions**

Prions are infectious protein particles, e.g. the prion causing New Variant Creutzfeldt- Jakob Disease (vCJD).

These microorganisms can be transmitted from one person to another in a variety of ways but the most likely routes are :-

Hands. These are probably the most important vehicles of cross-infection between patients and the dental team.

- Indirect contact which occurs when an intermediate carrier (fomite or vector) is involved. A fomite is an

inanimate object which becomes contaminated with infected organisms and which subsequently transmits those organisms to another person e.g. light handles, work surfaces etc. Crawling and flying insects are obvious examples of vectors.

- Inhalation which occurs when pathogens are exhaled or discharged into the atmosphere by an infected person and then inhaled by and infect another person. The common cold and influenza are often cited as common examples, but it is likely that hands and fomites are also important in the spread of respiratory viruses.
- Direct contact which occurs when one person infects the next by direct person-to-person contact (e.g. chicken pox).
- Ingestion which can occur when organisms capable of infecting the gastro-intestinal tract are ingested. This can occur via fomites, hands, food and drink etc.



Picture 3. Microscopic view of a microorganism

Many of these routes can be eliminated by taking appropriate basic hygiene precautions (washing hands between patients etc) and by wearing appropriate protective clothing (disposable gloves, face masks, glasses, surgery clothing etc). Such precautions protect the patient from the dentist and visa versa. However, some of the routes involving fomites require the adoption of appropriate and effective cleaning regimes which, to be truly effective, need to be implemented thoroughly between each and every patient.

Storr and Clayton-Kent ( 2004 ) described the Chain of Infection which consists of the source of the infection, mode of spread, person at risk and potential portals of entry. The easiest place to break this chain, thus preventing the spread of infection, is by disrupting the mode of spread.

The single most effective way to prevent the spread of pathogenic micro-organisms is effective hand washing. This can only be carried out effectively if the nails are short and unvarnished; only plain wedding bands and no wrist watches are worn; and sleeves are short. No stoned rings or wrist ornaments, whether decorative or for religious reasons, should

be worn. Where such wrist ornaments cannot be removed, then they should be pushed as far up the arm as they will go and then covered with waterproof tape.

Effective hand washing should be carried out for at least 2 minutes when entering and leaving the treatment area, between patients, after visiting the toilet, when changing



Picture 4 . Example of a non-woven Surface Disinfectant Wipe

gloves and when hands are visibly soiled. Alcohol hand gels can be used on visibly clean hands, but if used regularly will cause a build up on the hands. They should not be used as an alternative to effective washing with soap and water, merely as an adjunct to it.

It is never acceptable to wash or gel gloves.

For detailed advice and a flow chart of the recommended hand washing procedure visit [www.npsa.nhs.uk](http://www.npsa.nhs.uk) or your local PCT Infection Control specialists.

### Best Practice for hard surfaces

Wherever possible all the basic decontamination processes for small items of equipment etc should take place separately from other activities, ideally in two dedicated decontamination rooms where there is a clearly defined pathway from dirty to clean areas. However this is not possible for larger items of equipment and fixtures and furnishings.

Consequently, wherever practicable, all work surfaces and equipment should be impervious and easily cleanable. Work surfaces and floor coverings should be continuous, non-slip and where possible seamless. Carpets are not advisable within any clinical or associated (decontamination) areas. Ideally there should be coving between the floor and wall to prevent accumulation of dust and dirt in corners and crevices. Similarly any joins should be welded or sealed where they are unavoidable.

The patient treatment area should be cleaned after every session using disposable cloths or microfiber materials – even if the area appears uncontaminated. The areas and equipment that need to be cleaned between patients include:-

- work surfaces
- dental chairs
- curing lights
- inspection lights
- computer keyboards and mice
- hand controls including replacement of protective covers
- intra-oral radiology film and digital imaging devices
- trolleys
- spittoons
- aspirators



Picture 5. Example of a disinfectant foam

N.B. Spittoons and aspirators need to be washed thoroughly at the end of a session according to the appropriate manufacturers' instructions using a surfactant/detergent

(to break down the bio film) and a non-foaming disinfectant.

Purpose-made disposable single-use protective covers are available for many of the devices mentioned above, including light handles and headrests; however they should not be used as a substitute for regular cleaning as well. Therefore these covers should be removed and the surfaces cleaned after each patient.

Practical cleaning centres upon employing simple techniques using disposable cloths wetted with either clean water or preferably a suitable disinfectant, which can either be alcohol based or alcohol-free. The latter are particularly suitable for cleaning surfaces susceptible to attack by alcohol e.g. plastics, vinyl's etc. Dry cleaning should be avoided wherever possible as this may result in dust suspension.

Areas and items of equipment that need to be cleaned after each session include:-

- taps
- drainage points
- splashbacks

- cupboard doors
- sinks

Items of furniture that need to be cleaned at regular intervals include:-

- window blinds
- door handles
- incidental chairs and other furniture

Should a blood spillage occur, for any reason, the use of 1% sodium hypochlorite with a yield of 1000 ppm free chlorine is recommended (unless PCT policy suggests otherwise), though an even higher free chlorine yield of 10000 ppm is better. Contact times should be reasonably prolonged. The process should be initiated quickly and care should be taken to avoid corrosive damage to metal fittings . The use of alcohol within the same decontamination process is not advised because alcohol binds blood and protein to metal surfaces.

### **Appropriate hard surface disinfectants**

Gone are the days when Practices need to use unpleasant smelling and aggressive chemicals (e.g. gluteraldehyde and phenols etc) in order to implement an effective cross infection protocol.

Now they can use much more environmentally friendly materials ( e.g. various Ammonium Chlorides and Ethanol), materials that are safer to use and still provide a 100% reliable cross infection protocol.

Ethanol is extremely effective against pathogens, including HBV/HIV/HCV/BVDV/ vaccinia, bacteria and fungicidal micro-organisms which are all deactivated within 30 seconds. It also facilitates effective Tuberculocidal and Hospitalism prophylaxis within 60 seconds. Ammonium Chlorides are effective against HBV/HIV/HCV/BVDV/ vaccinia, bacteria and fungicidal microorganisms within 60 seconds.

They can be utilised in either alcohol-based or alcohol-free solutions depending upon the type of surface they are to be used on. Many brands are available either odourless or with a choice of fragrances and in either disinfectant spray, mousse or wipe presentations.

The alcohol-based materials are suitable for disinfecting alcohol resistant surfaces and handpieces etc. The alcohol-free disinfectants are designed for use on alcohol sensitive surfaces and equipment, including leather and synthetic upholstery. They are also recommended for use on acrylic glass, hard surfaces, inventory and medical products.

Nowadays some brands of Disinfectant Wipes are manufactured from non-woven material rather than paper which easily tears and disintegrates. Such wipes hold the disinfectant on the surface of the wipe, enabling Practices to clean surfaces effectively and without the mess and inconvenience associated with soggy paper wipes. They facilitate fast cleaning and disinfection of non-sensitive surfaces and objects. However, they must be disposed of after every use and not retained for use after subsequent patients.

Likewise, some disinfectant brands are available as a non-drip foam mousse which stays exactly where it is applied eliminating the waste, mess and hassle associated with aerosol cleaning sprays.

### **Conclusion**

In order to implement Best Practice for infection control within Practices it is essential to consider all the potential sources of infection and transmission routes, and to implement appropriate protocols to "break the chain". To ensure these protocols are implemented properly it is imperative that all new members of staff are adequately and appropriately trained in this vital aspect of Practice life. Such training must be documented along with the Practice Infection Control Policy and available for external audit. Both the Policy and the training must be updated and reviewed regularly, at least yearly and such reviews documented. The correct implementation of these protocols should also be regularly monitored to ensure that standards are maintained throughout the Practice, this should involve undertaking audits and assessments which should be filed for inspection if requested. These audits should be carried out in compliance with local PCT policies.

### **Sources of further information**

For further information I suggest you read or visit the following books and websites:-

[www.bda.org.uk](http://www.bda.org.uk)

[www.badn.org.uk](http://www.badn.org.uk)

[www.dh.gov.uk](http://www.dh.gov.uk) (Put HTM 01-05 into the search box)

HTM 01-05 document (downloadable from DOH website [www.dh.gov.uk](http://www.dh.gov.uk))

Dental Nurses Guide to Infection Control and Decontamination - K Porter – Quay Books 2008

Unfortunately I cannot give the full string for the web addresses because they are too long and complicated. Anyone accessing the BDA and BADN sites need to be members to get through to all the information.

## **Disclaimer.**

The pictures used to illustrate this article show examples of some of the many products available in this field. The author does not endorse these or any other product, this must be a decision made by the user.

## **About the Author**

Kathryn (Kathy) Porter has been a qualified and now registered Dental Nurse for 38 years mainly spent in various guises at Birmingham Dental Hospital. Her title now is – Senior Dental Nurse (Decontamination). She is a member of the editorial board of the "Dental Nursing" Journal and also writes articles for them. She has had a book, entitled "The Dental Nurses Guide to Infection Control and Decontamination", published in the spring of 2008.

Kathy is a trained Infection Prevention and Control Link Practitioner and co-ordinates the group of Link Practitioners at Birmingham Dental Hospital. She is a Fellow of the BADN.

## **Key Learning Points**

- An appreciation of the hidden risks associated with contamination of hard surfaces
- An understanding of the types of pathogenic microorganisms involved
- An understanding of the most likely routes for transmitting such microorganisms between individuals
- An understanding of practical procedures and suitable protocols to prevent such cross contamination



Idea CPD Questions

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1) A common example of a pathogenic bacterium is:-

- a) Tinea Corporis
- b) Giardia lamblia
- c) Clostridium difficile
- d) HIV

2) An example of a fomite is:-

- a) a light handle
- b) an insect
- c) a hand
- d) chicken pox

3) The "Chain of infection" was first described by:-

- a) Louis Pasteur
- b) Storr and Clayton-Kent
- c) Sir Alexander Fleming
- d) Ferdinand Cohn and Robert Koch

4) Effective hand washing should last for at least:-

- a) 2 minutes
- b) 3 minutes
- c) 5 minutes
- d) 10 minutes

5) Ethanol will deactivate HBV/HIV/HCV/BVDV/ vaccinia, bacteria and fungicidal microorganisms within :-

- a) 10 seconds
- b) 20 seconds
- c) 30 seconds
- d) 60 seconds

If you wish to claim verifiable CPD please ensure that you add and sign the following declaration when submitting responses by post or by email (email type your full name). I certify that the answers hereby submitted for these questions are completely and wholly my own work and have not been copied in part, or in whole, or otherwise plagiarised from the work of others.

Name:

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Signed:

Date:



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