How hand hygiene impacts hospital infection rates

A study published in BMJ, which coincided with the World Health Organization SAVE LIVES: Clean Your Hands campaign on the 5 May 2012, reveals that the campaign played a significant role in reducing rates of some healthcare associated infections in hospitals across England and Wales.

The purpose of the study was to evaluate the impact of the Cleanyourhands campaign on the 5 May 2012, reveals that the campaign was to evaluate the impact of the Cleanyourhands campaign on rates of hospital associated infections including those for instrument decontamination, did not meet national standards.

The results found that combined procurement of soap and alcohol hand rub tripled from 21.8 to 59.8 mL per patient bed day; procurement rose in association with each phase of the campaign. Rates fell for MRSA bacteraemia (1.88 to 0.91 cases per 10,000 bed days) and C difficile infection (16.75 to 9.40 cases); however, M RSA bacteraemia rates did not fall.

Increased procurement of alcohol hand rub was independently associated with reduced MRSA bacteraemia, but only in the last four quarters of the study and the publication of the Health Act 2006 was strongly associated with reduced MRSA bacteraemia.

The study concluded that the Cleanyourhands campaign was associated with sustained increases in hospital procurement of alcohol rub and soap, which the results suggest has an important role in reducing rates of some healthcare associated infections. National interventions for infection control undertaken in the context of a high profile political drive can reduce selected healthcare associated infections.

Patients contacted over infection concerns at dental practice

Nearly 1,000 patients at a dental practice in Aberdeen have been contacted by NHS Grampian due to concerns regarding their infection control procedures.

According to a report, the patients at the Bridge of Don Dental Clinic and Research Centre in Silverburn Crescent, Bridge of Don have been sent advisory letters after an inspection in March found that infection control procedures at the practice, including those for instrument decontamination, did not meet national standards.

A spokeswoman for NHS Grampian said in a report: “The letter reassures patients that the risk of infection is low. However, any patient who remains concerned can contact NHS 24 helpline 08000 28 28 16 between 8.00am and 10.00pm where they can get further advice about health concerns including for blood borne viruses such as hepatitis B, C and HIV.

“Letters have been sent to patients registered at the independent practice between January, when it opened, and 10 April, the date of a follow up inspection which found infection control procedures were satisfactory and now followed national standards.”

She added: “Dr Xenofon Gkouzis is the only dentist now working in the practice. He is registered in the UK with the General Dental Council and is authorised to treat NHS patients in Grampian. This incident is not related to him.”

Dr Maria Rossi, consultant in Public Health Medicine at NHS Grampian, said: “We are working closely with local and national experts and have concluded there is a low risk of infection to patients. As our priority is always for the safety and welfare of patients, we felt it was important to write to inform them of this incident. The letter emphasises that no action is required by the patient, but tests will be available if anyone remains concerned having read the letter and after calling the helpline.”

Ray Watkins is Consultant in Dental Public Health at NHS Grampian. He added: “While this is an independent practice, it is expected to comply with national infection control standards. We are unable to confirm that these standards were adhered to prior to April 10 when at a follow-up visit, procedures were found to be satisfactory.

“The practice has co-operated with the investigation, and will continue to be monitored.”
By now, all dental practices must comply with the essential requirements of Health Technical Memorandum 01-05 Decontamination in Dental Practice (aka HTM 01-05). If they do not, they are in breach of CQC Regulation 12, Outcome 8. HTM 01-05 was produced (in the words of the Department of Health) “in response to emerging evidence around the effectiveness of decontamination in primary care dental practices and the possibility of prion transmission through protein contamination of dental instruments.”

In brief, the essential requirements of HTM 01-05 are that:

• Regardless of the technology used, the cleaned instruments, prior to sterilisation, should be free of visible contaminants when inspected with a magnification device. Instruments should be reprocessed using a validated decontamination cycle including: cleaning/washing (in terms of manual cleaning, this includes having a written protocol, a validated steam steriliser, and at the end of the reprocessing cycle they should be in a sterilised state).

• Reprocessed dental instruments should be stored in such a way as to ensure restraint of microbiological re-colonisation. These measures should be backed by careful controls on the storage times to which instruments that are less frequently used are subject.

• Practices should audit their decontamination processes quarterly using an audit tool (the use of the Infection Prevention Society/DH audit tool that accompanied the document was strongly recommended).

• Practices should have in place a detailed action plan on how the provision of decontamination services will move towards best practice.

Continue raising clinical governance awareness

Considering that last bullet point in more detail, it is implicit in the guidance that merely meeting the essential requirements of HTM 01-05 is not an end in itself. Instead, practices should continue moving forward with decontamination and aim towards best practice – effectively shooting at ever narrowing goalposts.

By definition, I cannot tell you in detail what best practice is. It will continue to evolve over time as more effective processes are discovered and as better decontamination equipment is produced. Also, you may be close to achieving best practice now or you could be a long way off it.

In moving towards best practice, you may wish to consider some or all of the following upgrades to your practice:

• The use of an automated (HTM 01-05) washer-disinfector

• Separate facilities for decontamination clearly separated from the clinical treatment area. This implies the use of a separate room or rooms which should be used for the purpose of decontamination only and to which access should be restricted to those staff performing decontamination tasks.
Accessories

Yielding decontamination duties

• Organisation of the reprocessing area into a dirty/clean workflow system with best practice being dirty and clean areas as separate rooms, each with a door and individual air supply and extraction

• Provide suitable storage for instruments, which reduces exposure to air and a possible risk of further contamination

• Minimise worktops – which means less clutter and less to clean – and replace them with glass, so that patients can see immediately that the surgery is clean

To keep abreast of decontamination best practice, I suggest you link up with your PCT, that you always read Dental Tribune and Infection Control Tribune and that you keep an eye on dentistry websites. Also, check out the decontamination equipment manufacturers for new products, liaise with dentistry colleagues and visit the appropriate trade and association stands at shows.

An action plan for best practice
Decontamination best practice cannot simply be a wish list – you need to draw up an action plan for achieving it. At the moment, no timescales have been set for practices to achieve best practice. This makes developing an action plan with targets as to when things will be achieved rather tricky. Bear in mind that you will, at some stage, need to show this action plan to a member of your PCT and talk through it – so it needs to be based on sound thinking, not guess work.

Let’s take the example of separating decontamination rooms. There are many dental practices that use the same room for patient treatment and decontamination and this meets HTM 01-05 essential requirements at this time. The principals or owners of these practices need to decide how they can work towards a separate and controlled decontamination room (or clean/dirty rooms). If it’s merely a question of utilising an unused room or erecting partitions, the timescale for achieving it could be relatively short and will depend on when the finance is likely to be available.

In, for example, a listed building or premises where you are already short of space, the only solutions may be to move or rent/purchase additional premises. Clearly, this will likely be a longer-term aim.

For something a little easier to build into your action plan, consider the purchase of washer-disinfector. You will need to investigate what models are available, which will be most suitable, how much it will cost and what the installation requirements area. You will also need to consider how, where and when your staff can be trained to use it and how much this will cost. They may well also need training in the use of instrument rotation systems and working in a designated decontamination room.

Although you should check whether your PCT has funds available for the purchase of washer-disinfectors, in England there was no central funding for meeting HTM 01-05 essential requirements and there is certainly none at this time for moving towards decontamination best practice. By contrast, the Scottish Government has made funds available for decontamination improvements, for the maintenance of decontamination equipment and even provided grants for when a practice needs to relocate.

Sample test processes and procedures to evidence the level of compliance
Finally, don’t forget to maintain the daily and weekly checks of equipment and the quarterly checks specified in the Infection Prevention Society/DH audit tool.

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“Sterile” does not mean clean and safe

Dr Mikael Zimmerman discusses disinfection

Most equipment-associated infection is due to inadequate cleaning and disinfection. The most effective stage of any decontamination procedure is thorough cleaning.

Medical devices heavily loaded with microbiological material will be more difficult to sterilise than lightly contaminated and must therefore be thoroughly cleaned to reduce organic material or bio-burden before disinfection and sterilisation. Washer-disinfectors are the safest and most reliable option.

Automated processors, eg washer disinfectors and ultrasonic cleaners, improve the quality of the decontamination process and offer the safest, most reliable option, providing they are suitably monitored and maintained.

Decontamination is done most simply in a disinfectant which both cleans and disinfects in one stage. In a washer-disinfector the items are first cleaned by rinsing in washer-disinfectors the items disinfects in one stage. In a washer-disinfector the items are first cleaned by rinsing in washer-disinfectors the items disinfects in one stage. In a washer-disinfector the items disinfects in one stage. In a washer-disinfector the items disinfects in one stage.

Cleaning and disinfection of instruments should be carried out as soon as possible after use. Dried biological material is much more difficult to remove than fresh deposits. Blood, with its content of iron, acid and sodium chloride, is corrosive.

The type B-cycle

Sterilisation is defined as the use of a physical or chemical procedure to destroy all microbial life, including large numbers of highly resistant bacterial endospores. The sterilisation procedures must inactivate or kill, and therefore disinfection processes lack the margin of safety achieved by sterilisation procedures.

Cleaning and disinfection of instruments should be carried out as soon as possible.

In steam sterilisers with pre- and post-vacuum processes (ie B-cycle), the sterilisation process is composed by three main phases: pre-treatment, sterilising and post-treatment. During pre-treatment the air is expelled by a number of pulses of vacuum and the introduction of steam. The temperature increases successively, up to the degree at which sterilising is to take place. The actual sterilising period, which is called holding time, starts when the temperature in all parts of the autoclave chamber and its contents (the load) have reached the sterilising...
temperature. The temperature should then remain constant, within specified temperature band, throughout the whole sterilisation phase (plateau/holding time). In the post-treatment phase, either vacuum pulses to a defined, pre-set, vacuum level.

Virtually all air must be evacuated during pre-treatment (pre-vacuum phase) so that the saturated steam can affect the goods during the sterilising phase. If pre-vacuum is not used, trapped air pockets in the goods prevent steam penetration during sterilisation of porous material such as textiles and hollow items.

Steam sterilisation of hollow instruments (with long, narrow lumina) and porous objects always requires several (at least three (3)) pre-vacuum pulses to a defined, pre-set, vacuum level.

Faster instruments, better control

The type of equipment and the type of procedures in use at the clinic will to a very high extent determine the safety margin of decontamination. A very important issue, that is often foreseen, is the logistics of instruments. A common problem in many dental offices is an overload of instruments, which will contribute to a more difficult and time demanding procedure to keep track of all instruments and to make sure that storage and sterilising deactivate as well as packaging/wrapping conditions are maintained.

An item heavily loaded with microbiological material will be more difficult to sterilise than one lightly contaminated. The most effective stage of any decontamination procedure is thorough cleaning and this should accompany or precede all disinfection procedures. The effect of cleaning, disinfection and sterilisation is affected by the design of the cassettes/trays being used. Shadow effects may easily ensue from the use of solid cassettes so that instruments are not being properly cleaned, neither in washer disinfectors nor in ultrasonic bath.

Fastened but free

Instruments should be free and fastened on trays so that ultrasonic waves, water jets and steam can reach every part to clean and inactivate efficiently during the whole procedure of disinfection and sterilisation. Even if fastened the instruments must be free and have no contact points/areas with the locking device.

An area of contact will not be properly cleaned and disinfection will result in an electrochemical cell and cause corrosion – this is often the case during cleaning, ultrasonic bath and washer disinfectors when using aluminium trays and instruments in stainless steel or when cleaning carbon burs and burs made of stainless steel in the same liquid container. However, in daily practice of dentistry we call this rust and blame the manufacturer for poor material – the actual problem is clinical routines!

Don't make it too heavy

Metallic weight is another decisive in decontamination and sterilisation. The heat energy from the ultrasonic waves in the ultrasonic bath and/or the water in a dishwasher or washer disinfector as well as the saturated steam from the steriliser shall be concentrated on the instruments that are to be processed. A load that is too heavy lessens the effect of disinfection and sterilisation.

The steam sterilisers that are most frequently used in dental clinics are adapted to loads of 4.0–4.5 kilos. A stainless steel tray with instruments for endodontic procedures has a weight of approximately 1.5–1.7 kilos! This will be an important issue to consider when using trays made out of different metals.
Luxator Extraction Instruments are now the preferred method of performing extractions.

Fig. 1: Evaluation of the handling of instruments with effective tray systems has shown substantially reduced time.

Fig. 12: Rationalisation of the handling of instruments is a good way to improve practice economy and quality.

Luxator Extraction Instruments were invented by a Swedish dentist to make extractions as trauma free as possible. He developed subtitles in the design only a practising dentist would appreciate with an acclaimed and ergonomic handle design. For this reason our Luxator instruments are discernibly different.

Often instruments made of stainless steel are supposed to be extremely strong and fit for using for almost any amount of time. But the truth is that all kinds of instruments can be harmed both by mechanical, thermal and chemical influences. Dental instruments often consist of different parts and of different kinds of metals and alloys, even in the same instrument.

It is important to maintain the tenability of the instruments with careful handling. They are not to be thrown in the process of decontamination. The instruments should be processed in trays, holders or stands so as not to clash against each other. They should also be in contact with each other as little as possible when washed, disinfected and sterilised.

Reduce the number of articles and save time and money. To have fewer instruments in use means that it will be easier and safer to locate goods that should be re-sterilised and re-disinfected and that there will always be current information on which instruments that are needed in the surgery.

Higher security will be a result from always having the right materials and instruments in the treatment area.

The time in need for handling sterile goods can be reduced, usually to half the time.

Good control of and minimising the number of instruments and materials result in less costs and gives the conditions of safer handling, decontamination and disinfection.

A tray system should facilitate the handling of instruments through the whole hygienic circle. Evaluations of effective tray systems have shown reduced time for handling the instruments at disinfection and sterilisation.

Rationalisation of the handling of instruments during all parts of work - from preparation to sterile keeping - gives the staff liberty to work with quality improvement and to take a greater part in the treatment of patients. Rationalisation of the handling of instruments is thereby a good way to improve practice economy.

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About the author

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In infection control is continually neglected in dental education

*DTT’s Ben Adriaanse interviews Dr Hans de Soet, microbiologist and expert in infection control*

In 2009, a group of microbiologists established the Association for European Safety & Infection Control in Dentistry (AESIC), an organisation that promotes European collaboration for shared knowledge and uniform legislation on infection control and dental hygiene. This March, AESIC and ACTA, an academic centre for dental education in the Netherlands, organised a conference in Amsterdam with the theme ‘Harmonising dental infection prevention guidelines in Europe’. During the conference, steps were taken towards establishing a collaborative working group to collect and share dental infection control guidelines in Europe. Dental Tribune Netherlands spoke with Dr Hans de Soet, microbiologist and expert in infection control at ACTA, and chairperson of the event.

Dental Tribune Netherlands: Dr De Soet, what are your thoughts on the conference in Amsterdam?

Dr Hans de Soet: It was a successful conference. At last year’s European Oral Microbiology workshop, we sensed a need for harmonisation in dental hygiene and infection control. Apparently, there are substantial regulation differences among European countries: in some, these regulations are set up as laws, while in other countries they are merely stipulations. The way in which these guidelines are enforced also varies.

The conference offered lectures on the current situation in the Netherlands, Ireland, Scotland, Germany and Sweden. What is the most noteworthy regarding the current situation in these countries?

I did not observe any fundamental differences. There are, of course, some minor variations. For example, in some countries gloves can be used more than once. Generally though, the regulations are quite similar.

In Scandinavia, dentists are obligated to record their activities concerning infection control according to 10 stipulations. Each requires a separate record, such as “equipment validation”.

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In Scandinavia, dentists are obligated to record their activities concerning infection control according to 10 stipulations. Each requires a separate record, such as “equipment validation”. This seems practical and logical, but it
The goal of the conference was to establish a European working group. What activities will this group undertake?

The working group is not primarily concerned with formulating European regulations. We are mainly interested in sharing our thoughts on patient safety. We can all benefit from sharing our knowledge at an academic level and performing research using data from all over Europe. The ultimate goal is to give infection control the place it deserves in academic research programmes.

Once we have finished mapping the current state of infection control, we can determine whether it is possible to formulate regulations at a European level.

You indicated that infection control in the Netherlands is of a relatively high standard. Does this mean that other countries could benefit more from an educational curricu-

lum that clearly states our mini-

mum requirements for infection control receive enough attention in dental education? No, it is substandard in all European countries. Students learn all about every possible dental treatment, but the students’ and teachers’ knowledge of infection control is minimal. ACTA has a small research department that investigates and teaches dental microbiology. However, this department was not spared in recent budget cuts. In general, infection control is continually neglected in dental education, even though poor oral hygiene leads to serious health risks.

If all experts agree on this, why doesn’t infection control take up a more prominent place in dental education?

The problem is that the risks are difficult to prove, and on a relative scale few cases can be linked to poor oral hygiene. In our opinion, however, every case is one too many.

The Lancet published a case about an 82-year-old Italian patient who died of Legionella infection after seeing a dentist. The Netherlands has never seen a similar case like this, but if infection control is neglected, we just might. As I indicated, the smaller education budgets force universities to make certain choices. Unfortunately, microbiology is not a priority for most dentists.

By the way, AESIC does not confine itself to infection control alone. We also discuss infection treatment. Antibiotics are too easily prescribed, even when not necessary or desirable. Students should also be taught the alternatives in infection treatment.

Once we have finished mapping the current state of infection control, we can determine whether it is possible to formulate regulations at a European level.
Protein contamination in the dental surgery

Peter Bacon discusses surface cleaning and disinfection

A s the dental profession is only too well aware, the challenges that disinfection processes within the dental practice are of paramount concern. Not only in relation to CQC and HTM01-05 compliance, but also with regard to staff and patient well-being – which the compliance guidelines are there to ensure and protect.

Protein contamination in the dental surgery is an obvious area for serious concern, since residual soiling on surfaces can harbour pathogens.

Blood has the potential to carry and transmit viruses such as HIV, HBV and HCV. The risk of transmission of communicable bloodborne viruses might be considered to come only from high risk areas such as accidental sharps injuries, but greater research and advances in the sphere of microbiology now provides evidence that many microorganisms can survive on a variety of surfaces, making the danger of disease transmission from contaminated surgery surfaces or equipment a genuine threat to patients and staff. In addition, an increasingly mobile population including greatly increased economic migration has resulted in a resurgence of diseases such as TB, which are associated with overcrowding and poor standards of general health.

In order to overcome the potential issue of surface decontamination and the prevention of transmission of pathogens, dental practices must have rigorous infection control policies which establish clear protocols for cleaning and disinfection and document the practice’s adherence to the procedures laid down.

Decontamination is defined as a reduction in the risk of contamination to a level that is acceptable, ie controlling the number of microorganisms in an environment. Within a dental surgery, both cleaning and disinfection are required but although the terms are often confused they are not the same thing. Cleaning involves physical removal of soil matter from surfaces while disinfection is inactivation of pathogens. Cleaning must take place before disinfection to ensure that bacteria, proteins and other contaminants are removed from surfaces before disinfection takes place, unless a suitable single stage process is in use.

Decontamination of a specific area is aided by the use of commercially available products and many of these agents are based on alcohol. In dentistry, alcohol has been widely adopted as a disinfectant for many years and its efficacy in this role is well documented.

The widespread use of alcohol as a disinfectant in dentistry has been largely driven by its low cost and quick drying properties, where its rapid drying is perceived as essential in achieving a short turn-round time between patients. However, rapid evaporation of alcohol based products also means that by the time the treatment of a surface has been completed, most of the alcohol has evaporated from the wipe or surface, so the areas wiped at the end of the process will be neither cleaned nor effectively disinfectened.

A fact frequently overlooked, but one that is highlighted by the HTM 01-05 guidelines, is that alcohol is not effective as a cleaner, particularly where protein based soils are present as is likely to be the case in medical and dental environments.

Section 6.57 of HTM01-05 states: Evidence suggests that the use of commercial bactericidal cleaning agents and wipes is helpful in maintaining cleanliness and may also reduce viral contamination of surfaces. Care should be taken in the use of alcohol wipes, which – though effective against viruses on clean surfaces – may fix protein and biofilm. However, the careful use of water with suitable detergents, including those CE marked for clinical use, is satisfactory provided the surface is dried after such cleaning.

NOTE: Alcohol has been shown to bind blood and protein to stainless steel. The use of alcohol with dental instruments should therefore be avoided.

Some of the limitations of alcohol are as follows:

- Protein fixation
- Materials incompatibility (particularly PMMA)
- Rapid evaporation
- Flammability

If we consider the ideal properties of a combined disinfectant and cleaning agent, most “experts” would agree that the following would be a reasonable, though not exhaustive list:

- Excellent cleaning action
- Broad spectrum microbicidal action – some microbes present present in oral health challenges than others, for example TB
- Non-toxic – or at least selectively toxic
- Short contact time – driven by time pressure and the need for short turnaround between patients
- Stability – some agents have a very short shelf life
- Ease of use – no complicated making-up requirements
- Competitively priced

As stated in HTM 01-05, alcohol does not clean effectively but will disinfect clean surfaces, therefore, a two-stage process is required when using an alcohol based disinfectant.

- Clean to remove physical soiling
- Disinfect with alcohol to inactivate pathogens

This process however is less than desirable from an operational point of view due to the additional time required to carry out two procedures between each patient as well as the additional cost of buying two products and the additional inventory required.

Therefore we have seen in recent years a growing demand for water based combined cleansers and disinfectants. The ideal solution is a carefully formulated water based product that can both remove soiling and disinfect in a single process, greatly reducing the time taken and providing an effective solution.

The properties required in such a combined cleaner and disinfectant would be:

- Broad spectrum efficacy
- Wide surface compatibility
- Effective cleaning
- CE marked Class 2a (required if a product is to be used to disinfect medical devices)
- pH neutral
- Two-year shelf life
- Low residue
- Supplied in all formats (ready to use, concentrate and wipes)

The ability to deliver all the required features and their associated benefits in a single product will answer the demands of the market and provide a means of ensuring complete compliance with current guidelines.

About the author

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