

## Cleaning – on the way to evidence-based knowledge

**Walter Popp**

It is known that hand hygiene is a very important means to prevent healthcare associated infections, but it is also clear that 100% of compliance with hand hygiene is not achievable because of human psychology in addition to factors such as staffing and time shortages. For example, if a nurse on a neonatology unit has to care for three, four, five or even six (which was the case in one outbreak in Germany) incubators it may be impossible for them to perform the necessary hand hygiene. Similarly, studies have shown that compliance rates of 70% may reflect good practice.<sup>1,2</sup> This example of hand hygiene compliance is just one reason why other vectors are important for transferring pathogens from patient to patient. In turn, this demonstrates the important role that cleaning and disinfection play in preventing healthcare associated infections. One simple example demonstrating the important role of cleaning and its relationship to hand hygiene was demonstrated by Kundrapu *et al.*<sup>3</sup> The authors showed that contamination of hands could be reduced by daily disinfection of high-touch surfaces.

Environmental cleaning related articles published in *Healthcare Infection* have increased in recent times,<sup>4–6</sup> reflecting a global increase in interest in environmental cleaning in infection prevention and control. Therefore, I welcome this issue of *Healthcare Infection*, which is solely dedicated to this topic.

In this edition, Smith and colleagues investigated 18 high touch surfaces in hospital rooms by ATP measurement and quantitative microbiology. Both methods, despite measuring quite different endpoints, were in rather good agreement. From the results it seems that bedrail control panels, nurse call lights, patient phones and bedrails are the most contaminated areas. On the other hand, main light switch, mattress and bathroom interior door handle seem to be the cleanest areas. Results like these might help to define risk areas which should be more frequently cleaned and disinfected.

Mitchell and colleagues undertook a literature review on methods to evaluate cleanliness in healthcare facilities. They found papers about ATP bioluminescence, microbiological methods, visual inspection and gel markers and they describe the advantages and disadvantages of these methods. This paper is a good overview with the profound outcome that we need much more scientific knowledge about measuring cleanliness in a sensitive and specific way.

An article by Gebel *et al.* describes the environmental cleaning regulations in Germany. Interestingly, there is a recommendation by the Robert Koch Institute about cleaning and disinfection of surfaces which has to be followed by the

hospitals. One of the main points in that recommendation is that disinfection has to be done regularly on the basis of a risk assessment, e.g. all surfaces close to patient and with frequent hand contact have to be disinfected (not only cleaned) regularly. There are also regulations in Germany that all disinfectants (not only for surface, but also for hand, skin, instruments) have to be tested according to defined rules and have to be listed (VAH list) if they fulfil the criteria. Only listed disinfectants are allowed to be used in hospitals. Similar regulations exist in some other European countries like France, and also on the EU level more and more is regulated regarding efficacy testing of surface disinfectants.

An article written by Rutala and Weber provides a nice overview about the role of surfaces for transmission of bacteria, especially *Clostridium difficile*. They see growing scientific evidence that contamination of surfaces plays an important role in the transmission of *C. difficile* in healthcare facilities. According to the authors, chlorine containing products are able to reduce *C. difficile* contamination, whereas isopropanol, phenols and quaternary ammonium compounds are not effective. This is one reason why chlorine products are very much used in the US.

Stephanie Dancer and colleagues report on the effect on microbial load of regular cleaning of near-patient sites with detergents. They demonstrate that low colony counts are maintained for 24 h before increasing after this time. Dancer *et al.* conclude that daily cleaning is necessary. Problems were identified in cleaning the overbed table and a more frequent clean might be needed for this item, e.g. after every meal. These results point to the way in which investigations might have to go regarding cleaning issues: we need more knowledge about the effect of cleaning and disinfection on different surfaces. As a consequence we may need different frequencies to clean or disinfect them.

My own group (Ross *et al.*) describes two outbreaks (multidrug-resistant *Klebsiella pneumoniae* and VRE). Multimodal interventions were done, including observations on the ward, increasing training of staff, regular screening, isolation of patients, increasing staff numbers and in one case even closure of the ward and operating theatre for disinfection purposes. Of course, it is hard to decide which intervention was most effective, but the outbreaks finally stopped after this very elaborate method of cleaning and disinfection was introduced.

It is clear that we need cleaning in hospitals and healthcare settings to reduce infection rates.<sup>7</sup> Opinions on whether disinfection of surfaces is needed varies in different countries.

In Germany, for example, disinfection of surfaces has been undertaken for decades and there are numerous recommendations regarding this issue. Different papers show that cleaning may not be enough and that disinfection is needed, at least in outbreak situations.<sup>8,9</sup>

In deciding what action we should take, one very simple question and answer may be helpful – ‘If I were the patient, what would I expect from the hospital?’ I believe many would respond to this question in a manner which demonstrates they were unhappy about what is currently occurring in their own hospital. So, why should we accept that the room in my hospital may be more ‘dirty’ than my living room at home?

It is a welcome development that healthcare managers, professionals and clinicians are again caring more and more about the standards of cleanliness in hospitals and more broadly about the issue of cleaning. I fully agree with Dancer who states that ‘there is a lot of work still to do to establish cleaning as an evidence-based science’.<sup>7</sup>

As a whole, this special issue of *Healthcare Infection* provides a good overview of the role which surfaces play in the transmission of germs, methods to evaluate cleanliness and presents topics related to the need for cleaning and disinfection. Some articles are reports, others reviews, but seen as a whole we can conclude that there is an urgent need for further research and discussion about cleaning, disinfection of surfaces and, more generally standards, of environmental cleanliness. The role of disinfection is seen differently in different countries but we can only get more knowledge about this issue when we do more scientific work. It is not only hand hygiene, it is also cleaning and disinfection (and maybe some more factors!) that we have to be concerned about if we truly want to reduce healthcare associated infections.

## References

1. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, *et al.* Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet* 2000; 356: 1307–12. doi:[10.1016/S0140-6736\(00\)02814-2](https://doi.org/10.1016/S0140-6736(00)02814-2)
2. Hugonnet S, Perneger TV, Pittet D. Alcohol-based handrub improves compliance with hand hygiene in intensive care units. *Arch Intern Med* 2002; 162: 1037–43. doi:[10.1001/archinte.162.9.1037](https://doi.org/10.1001/archinte.162.9.1037)
3. Kundrapu S, Sunkesula V, Jury LA, Sitzlar BM, Donskey CJ. Daily disinfection of high-touch surfaces in isolation rooms to reduce contamination of healthcare workers’ hands. *Infect Control Hosp Epidemiol* 2012; 33: 1039–42. doi:[10.1086/667730](https://doi.org/10.1086/667730)
4. Murphy CL, Macbeth DA, Derrington P, Gerrard J, Faloon J, Kenway K, *et al.* An assessment of high touch object cleaning thoroughness using a fluorescent marker in two Australian hospitals. *Health Infect* 2011; 16(4): 156–63. doi:[10.1071/HI11024](https://doi.org/10.1071/HI11024)
5. Whiteley GS, Derry C, Glasbey T. The comparative performance of three brands of portable ATP-bioluminometer intended for use in hospital infection control. *Health Infect* 2012; 17(3): 91–7. doi:[10.1071/HI12021](https://doi.org/10.1071/HI12021)
6. Wilson F, Wells A. Evaluating environmental cleanliness in hospitals and other healthcare settings. *Health Infect* 2012; 17(2): 70–70. doi:[10.1071/HI12016](https://doi.org/10.1071/HI12016)
7. Dancer SJ. The role of environmental cleaning in the control of hospital-acquired infection. *J Hosp Infect* 2009; 73: 378–85. doi:[10.1016/j.jhin.2009.03.030](https://doi.org/10.1016/j.jhin.2009.03.030)
8. Engelhart S, Krizek L, Glasmacher A, Fischnaller E, Marklein G, Exner M. Pseudomonas aeruginosa outbreak in a haematology-oncology unit associated with contaminated surface cleaning equipment. *J Hosp Infect* 2002; 52: 93–8. doi:[10.1053/jhin.2002.1279](https://doi.org/10.1053/jhin.2002.1279)
9. Exner M. Divergent opinions on surface disinfection: myths or prevention? A review of the literature. *GMS Krankenhaushygiene Interdisziplinär* 2007; 2(1): Doc19.