

Editorial for JHI Supplement on Environment

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The role of the environment in the spread of healthcare-acquired infection has been an important in the perception of the general public for many years. Poor cleaning has been a complaint in medicolegal cases as well from many a campaigning journalist. There was a loss of ownership of cleaning in many hospitals when in-house cleaning services were changed to commercial contractors to reduce costs. In some places, this resulted in a lowering of standards. At the same time, the focus of audit and compliance work was often upon hand hygiene rather than the environment. Hand hygiene compliance was often reported as high in order to satisfy expectations whilst actual rates of compliance when surveillance is unobserved are much lower.¹ Much less attention is afforded to hand held devices and equipment, as well as keyboards, which potentially can be contaminated at every bed space.

In an earlier study doubling the number of cleaners was associated with halving the number of surface organisms and importantly halved the number of transient bacteria on the hands of doctors and nurses.² Several studies now clearly show that prior occupancy of a room by an infected patient is associated with acquisition of the same infection by the next patient in the bed.³ Recent multicentre studies have demonstrated that reduction in contamination of the environment is associated with significant reduction in healthcare-acquired infections.⁴ Organisms survive on dry surfaces for up to 7 months depending on the species and Gram negative bacteria often persist longer than Gram positive.³ Copper and silver have been used in surfaces for their antimicrobial properties, although they are effective only when the surface is clean and the bactericidal effect can be overwhelmed by the number of contacts. In wet areas such as sinks and drains, biofilms form allowing a reservoir of Gram-negative bacteria to survive even longer periods. Antimicrobial resistance can be generated in these biofilms and resistance genes can be exchanged resulting in new pathogenic strains.⁵ Cleaning of the outlet before the tap can result in these strains spreading to hands.

The rise of multiresistant Gram negative bacterial infections, some resistant to all antibiotics, has pushed infection control to prominence as the main means of containment. The recent tracing of *Mycobacterium chimaera* infections to cardiopulmonary bypass machines has demonstrated that despite decades of work the environment continues to provide new dangers. Therefore innovation has been building in this area in recent years. Provision of single rooms in new hospitals is

gradually rising. The use of peer pressure and government incentives to improve intravascular catheter associated bacteremia through surveillance and feedback has been gaining acceptance. New disinfectants such as electrolysed water are being developed in more stable forms. Light-activated titanium dioxide is being produced that can work in the low level lighting in hospital wards.³ The nature of the surface e.g. rough or smooth, hydrophobic or hydrophilic and its effect on deposition or acquisition of bacteria from a surface has been better described. Hydrophobic surfaces are less likely to harbour organisms but more likely to give them up to hands. The ideal characteristics are being investigated, although those designing or fitting out hospitals may be more concerned with durability and non-slip properties than whether it bacteria accumulate. There has been a dramatic increase in automated room disinfection methods using hydrogen peroxide vapour and ultraviolet light in order to overcome areas of the environment missed by the cleaner's cloth. In bed bays where automated methods are rarely used, improved methods of rapid audit of cleaning have been introduced to promote comprehensive cleaning in other areas.

The healthcare environment is once again achieving the scientific attention it deserves. Cleanliness of the healthcare environment is increasing in importance as a strategic aim for government policy. Pollution of the environment with antimicrobials and the effect on emerging resistance has been recognised as a global concern. This supplement demonstrates the quality and range of work under way including disinfection, surface contamination and transmission by devices. Now the type of disinfectant and the way it which it is applied should be reassessed. The use of antimicrobial factors for surfaces and devices should evolve as repeated seeding and formation of biofilm masks the benefits. Greater awareness is needed of the risks of sinks, taps and drains in the ward as reservoirs for the resistant bacteria they are intended to remove. Much as bed spacing and hand hygiene revolutionised rates of infection in Crimea in the 1854 redesign of the clinical environment is now due to combat the rising threat from multiresistant pathogens.

References

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