Raising hospital cleaning standards

Many UK hospitals continue to rely on visual assessment of cleanliness, despite the fact that this can only detect gross lapses in practice. At an international conference on infection control, experts called for the UK to follow Denmark's lead in adopting an approved standard, using quantitative testing of cleaning performance. **LOUISE FRAMPTON** reports

At the 9th Healthcare Infection Society (HIS) International Conference, Lyon, France, Hygiena sponsored an educational workshop on how to assess hospital cleanliness. The symposium, *Introducing an Approved Standard for Measuring Hospital Cleanliness*, featured a panel of distinguished speakers who considered the question: 'How can we reduce healthcare-associated infection with better management and control of the environment?'

The aim of the workshop was to provide an understanding of Adenosine Triphosphate (ATP) hygiene monitoring technology in the context of the first government approved standard to be developed for cleaning in hospitals. Denmark has led the way in the adoption of the standard, followed by Sweden, but there is now the potential for other countries to follow their example, as they seek to drive improvement in hospital hygiene.

There are many applications of the ATP test that have been developed over 30 years but the most widely used is that of an objective cleaning verification test. ATP is the universal energy carrier that is present in all living things including body fluids and bacteria. When ATP reacts with the enzyme luciferase, it produces a release of energy in the form of light, called bioluminescence. This enables the presence of ATP to be detected as a light output. ATP test systems use a detection swab to collect a sample from the surface to be tested. The swab is then activated and inserted into a reader and a numeric reading (Relative Light Units, RLU) is produced.

"ATP technology is one of the few infection prevention products to be assessed by the Rapid Review Panel, for potential use in the NHS, to receive the highest level of approval, with a Category 1 recommendation. However, other European countries are ahead of the UK in terms of the standardisation of hospital cleaning – there is still an over-reliance on subjective assessment of cleanliness in the NHS, and this needs to change," commented Martin Easter, general manager, Hygiena International.

Assessing hospital cleanliness

Chaired by Dr Phil Carling, infectious disease specialist, Boston University School of Medicine, US, the symposium highlighted the high costs of failure to effectively clean the hospital environment.

Martin Easter made reference to Martin Kiernan (a former president of the Infection Prevention Society), who equated the number of deaths from healthcare-acquired infection to one jumbo jet crash per month in the EU. This level of mortality would provoke outrage in the airline industry. However, many of these deaths from healthcare-associated infection could be prevented.

Better control = Reduced risk

Martin Easter pointed out that the patient environment is recognised as a reservoir of contamination. Hayden *et al*, (2006)[1] for example, concluded that decreasing environmental contamination helps to control the spread of antibiotic resistant bacteria in hospitals. The study, which included 748 admissions to an intensive care unit over a nine-month period, found that enforcing routine environmental cleaning measures was associated with less surface contamination with vancomycin-resistant enterococci (VRE), cleaner healthcare worker hands, and a significant reduction in VRE cross-transmission.

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"Superbugs continue to emerge, but there are no more antibiotics," Martin Easter warned. "However, cleaning is a key component of infection prevention – it reduces the reservoir of pathogens and breaks the chain of cross infection."

He went on to explain that decontamination requires both effective cleaning and disinfection. Unfortunately, users do not always understand or differentiate between these two completely different processes. In addition, cleaning is often considered of lesser importance. It is given little support and attention; and is viewed as low skilled and burdensome on-cost. Around 90% of this cost is attributed to labour. Furthermore, it is delivered inconsistently and is often inadequately measured, which is a wasted resource and potential hazard.

"What other process is there, in healthcare, that has such an impact on health and infection, yet is so undervalued?" commented Martin Easter.

What and how do we measure?

He went on to point out that too many Trusts rely on visual assessment of cleanliness, which is subjective and unreliable. Carling and Bartley (2010)[2] highlighted that 89% of hospitals use visual assessment of cleaning but this can only detect gross lapses in practice. They evidenced that only 34%-40% of surfaces are actually cleaned in accordance with hospital policies. However, monitoring and interventions improve the thoroughness of cleaning from 40% to 82%.

Unfortunately, a variety of guidance documents have missed the opportunity to highlight the need for objective methods of monitoring cleaning performance. The BSI document, *Specification for the planning, application and measurement of cleanliness services in hospitals (PAS 5748)*[3], for example, focuses on visual assessment, according to Martin Easter, yet this can only provide an aesthetic assessment. There is a need for an objective measure of cleanliness, performance and risk, he asserted.

"If you want to know how well cleaning is performed, you need to be able to measure it," said Martin Easter. Setting the agenda for the rest of the symposium, he concluded with a quote by H. James Harrington[4]: "Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it."

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Why and how to assess hospital cleanliness

Professor Chris Griffith, Emeritus professor, Cardiff School of Health Sciences, went on to provide a detailed insight into: 'Why and how to assess hospital cleanliness'. Prof Griffith illustrated that opinion on the importance of cleaning has shifted over the years. During Florence Nightingale's era, it was viewed as extremely important, but, by the late 1970s and 80s, the environment came to be viewed as less important in terms of the spread of hospital infection.

Opinion has now come full circle and a number of papers by Galvin *et al* (2012)[5], Otter *et al* (2011)[6], Hardy *et al* (2006)[7] and Drees *et al* (2008)[8] have all highlighted considerable evidence linking the acquisition of nosocomial pathogens and their presence on hospital surfaces.

The management and auditing of cleaning is important from the perspective of infection prevention and patient satisfaction, as well as in terms of managing cleaning costs, he commented.

Hospital spending on cleaning has significantly increased, over recent years, with additional funds allocated during the Government's 'deep cleaning' initiative. However, there is also significant variation between hospitals in terms of the budget spent on cleaning. He presented figures which showed that some Trusts with very high spending on cleaning perform worse on infection rates, compared to other Trusts that spend less.

If hospitals do not measure the effectiveness of cleaning, they risk wasting time and money. Therefore, they need to ask how cleaning can be best managed, while saving money, as well as lives, he asserted. Prof Griffith pointed out that over 50% of care worker non compliance is due to a poor management culture (Griffith, 2010).[9]

To ensure effective management of cleaning, a cleaning policy needs to be developed, incorporating cleaning schedules and record forms. Cleanliness needs to be benchmarked and an environmental test strategy needs to be devised. Cleaning then needs to be monitored and evaluated using audit and trend analysis, and this requires some form of testing.

Prof Griffith supported the opinion that 'the key to quality is reducing variation' and emphasised the key role of measurement. Ultimately, it is important to be able to set standards to ensure a scientific approach to environmental cleaning.

Testing has further benefits, he pointed out: it helps to identify sources of contamination and difficult to clean areas; it evaluates the 'cleanability' of surfaces and equipment, as well as assisting in determining cleaning frequency and the evaluation of new cleaning techniques. However, he added that 'no amount of testing will in itself give you clean surfaces.' The real value of testing is to inform you about the effectiveness of the cleaning process, how well it is managed and to identify areas for improvement. (Griffith, 2008)[10]

Prof Griffith highlighted the fact that the *Epic 2 Guidelines* state that: "The hospital environment must be visibly clean and free from dust and soilage and acceptable to patients, their visitors and staff." (*Epic 2 Guidelines*, 2007)[11] However, he stressed that "In isolation, visual assessment is not a good indicator of surface cleanliness." (Griffith, 2005)[12]

He went on to highlight the need for effective auditing, as audits are often performed 'haphazardly' by infection and control teams due to a lack of experience and formal training, as well as a lack of resources, time and appropriate tools. (Hay, 2006)[13]

How clean are hospital surfaces?

In 2000, Griffith *et al* reported findings from a four-part study assessing cleanliness in up to 113 environmental surfaces in an operating theatre and a hospital ward. Surfaces were assessed visually, then by using microbiological methods and ATP bioluminescence.[14]

Using microbiological and ATP specifications, around 76% of sites were found to be unacceptable after cleaning. Visual assessment was a poor indicator of cleaning efficacy with only 18% considered unacceptable. Sites most likely to fail in the ward were in the toilet and

kitchen, areas which are frequently implicated in the spread of infectious intestinal disease. Operating theatre sites had lower ATP results but 61% of sites would be considered unacceptable.[14]

In his presentation at HIS, Prof Griffith highlighted the vast differences between wards assessed using visual means, ATP testing, and microbiological means – in one study, 91% of ward sites were reported to be 'visually clean', 10% were 'ATP clean' and 45% were 'microbiologically clean'.[14]

Concluding, he summarised that there is a need to manage cleaning, by improving systems and culture, and emphasised that it is important to assess surface cleanliness. There are a range of methods available, depending on what information is required, but ATP offers a number of advantages.

Monitoring cleanliness with ATP

Dennis Andersen, Andersen Control Aps, Denmark, provided an insight into monitoring hospital cleanliness with standardised ATP measurements, highlighting a new Danish standard that combines visual control with a quantitative measuring method for assessing non-visible contamination and transmission risk.

The EN/DS 2451-10 standard is the only normative standard in the world for cleaning in the healthcare sector and provides official guidance on the use of ATP testing. With this standard, it is possible to establish cleanliness levels for surfaces and to obtain recommendations for processes to achieve established hygiene levels. The standard includes a biological inspection method, ATP, as well as microbiological inspection.

The guidelines outline stated hygiene levels for critical risk points, expressed in femtomole units. Dennis Andersen explained that 'femtomole' is often converted into RLU. The conversion factor depends on the measurement equipment. However, the SystemSURE Plus luminometer from Hygiena has a conversion factor of one femtomol ATP to one RLU – using a luminometer where the scale of RLU corresponds to the amount of femtomol eliminates the need for conversion.

Five hygiene levels are outlined in the standard. Level five includes care/treatment areas and production areas requiring a particularly high degree of cleanliness. Level four and three are primarily patient-related areas, while there are no patients present in the two lowest levels (one and two). If a result of between 25 and 50 femtomol is obtained at a hygiene level five location, further observation is required. A result over 50 femtomol requires intervention. If a result of between 50 and 100 femtomol is obtained at a hygiene level four and three location, this requires further observation – while a result over 100 femtomol requires intervention.

Speaking to *The Clinical Services Journal*, after the HIS symposium, Martin Easter commented that the UK should follow the example of Denmark. Other organisations, such as the CDC in the US, also incorporate ATP technology as part of their tool kit for evaluating environmental cleaning.

"A great deal of pioneering work has been carried out in the UK and there is increasing adoption of the technology, but we should now be implementing a standardised approach like the Danes."

He added that, despite the recent acknowledgement by infection control experts that the patient environment is a reservoir for pathogenic bacteria, there is a lack of understanding of the importance and benefits of hospital cleaning in the UK.

"Some infection control specialists want to try to measure specific pathogens in the environment which is like trying to detect a needle in a haystack (or an ant on a tennis court), but these bacteria get there in traces of body fluids which also protect and nourish the bacteria so they can survive for long periods," Martin Easter continued.

"Testing for bacteria takes days – it only measures bacteria and tells you nothing about the presence of soil in which the bacteria are transported, deposited and reside. Ultimately, effective cleaning removes soil and bacteria so disinfectants can work properly. Objective measurement is the catalyst for change; it improves communication, understanding, restores pride and ownership, and enables behaviour change."

Productivity and cost benefits

He pointed out that there are also benefits to be gained in terms of productivity and achieving value for money. Only 40% of hospitals are cleaned according to policy, so 60% of the cleaning budget is effectively being wasted. He explained that there is a significant productivity dividend (valued at $300m) to be gained from effective management of cleaning, which costs the UK over £500m per annum. Continued improvement of cleaning is also associated with lower infection rates, which are a significant cost burden to Trusts (each infection costs £4k - £10k+).

North Tees and Hartlepool Trust, for example, has been championing the use of ATP technology for nearly a decade, and has reduced ATP average scores, which in turn has helped to reduce infection rates through improved cleaning – along with a host of other infection prevention interventions.

Integrated approach

The symposium highlighted the superiority of quantitative testing over subjective visual inspection. However, a recent paper by Whitely *et al* (2015)[15] developed this further by considering the various strengths and weaknesses of a variety of different monitoring methods – including visual inspection, microbial recovery, fluorescent marker assessment and rapid ATP bioluminometry.

The authors highlighted the 'failure risks' associated with each of the approaches, pointing out that each monitoring method generates different types of information. Visual inspection was associated with the highest risk of failure; however, the authors suggested that an alternative method, such as ATP, could mitigate the risk rating. The use of a rapid method such as ATP, which takes around 15 seconds, could also address issues around delays in obtaining microbial results.

The authors further suggested that the use of ATP could be supported through concurrent use of fluorescent marker or microbial recovery (during any outbreak of disease), along with training, to mitigate risk. Ultimately, the authors concluded that the strengths of each approach can compensate for the weaknesses in others. Therefore, the approaches work best in combination.

Commenting on the paper, Martin Easter said: "The ATP test is not a replacement for a bacteria test. However, there is a direct and concurrent relationship between ATP and bacterial contamination. Effective cleaning simultaneously removes both organic soiling and bacteria such that the percentage of ATP failures increases as bacterial contamination increases."[10,16]

He concluded that ATP can complement the use of microbial testing and fluorescent UV marking, as part of an overall integrated approach to improvement – Leeds Teaching Hospitals NHS Trust, for example, is using Hygiena's technology as part of a three part process that draws on visual, ATP and UV monitoring. However, the fluorescent marker method is primarily a qualitative auditing and training tool, whereas the ATP method is an independent, quantitative monitoring tool. It can have many applications, including training, investigative and monitoring.

"Ultimately, cleaning is a fundamental principle that provides the keystone that binds the elements of infection prevention and control together. Effective cleaning produces a safe, pleasant environment for patients, clinicians and healthcare workers. Maintaining a good environment reinforces and encourages good, safe practices." ✚

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