



Environmental cleaning in the NHS since the NHS Plan: a policy and evidence based context

MAY, Daryl and PITT, Michael

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Environmental cleaning in UK healthcare since the NHS Plan: a policy and evidence based context

Abstract

Purpose

This paper examines the policy and guidance that was issued, either as a direct result of the NHS Plan, or part of a subsequent initiative, surrounding cleaning in the NHS.

Design/methodology

A literature review of the Department of Health and related agency websites was completed. In addition there was a literature of the relevant academic journals.

Findings

There is a growing evidence base on environmental cleaning in the NHS and more specifically the relationship between environmental cleaning and infection control. This paper has examined the contradiction in the evidence in the suspected correlation between infection control and environmental cleaning. However, one thing does appear to be consistent, is that a performance measure based on an observation (visual) assessment is not a sufficient tool to evaluate the environmental cleanliness of a hospital ward.

Practical implications

Whilst the clinical community recognise the contribution of environmental cleaning and the impact on healthcare, there needs to be more to be done to have the relevant studies published in the FM domain. Conversely there also needs to be work done to allow the FM community to have a "voice" in the infection control journals. The literature reviewed suggests that a usable technological solution is required to confirm satisfactory cleaning standards in healthcare facilities.

Originality/value

There is relatively little published work on the importance of cleaning to operations in the NHS, particularly in the FM domain.

Keywords

Cleaning, NHS, facilities management, infection control, NHS Plan

Literature review

Introduction

To state a common agreed definition for facilities management is difficult and problematic (Thompson, 1990; Tay & Ooi, 2001). However, environment cleaning of the built environment is generally accepted as a core operational activity for facilities managers and the facility management discipline (Bernard Williams Associates, 1994; Binder, 1992; Park, 1994).

Cleaning is also a key operation function for facilities managers operating in healthcare environments. Facilities managers in hospitals bring together the estates and hotel services into one integrated approach (Alexander, 1993). Cleaning is usually considered a core component of the hotel services function in hospitals. In the UK healthcare is provided free at the point of care by the National Health Service (NHS). The NHS is funded publically through a national insurance scheme.

The Department of Health in the UK published the NHS Plan in 2000 (Department of Health, 2000). Following a period of consultation, where the public were asked about the priorities for the plan, it was published and contained a chapter dedicated to facilities in the NHS. Chapter Four outlined the investment that would take place in the NHS facilities. At the time this included 7000 extra beds, over 100 new hospitals and 500 new one-stop primary care centres. In addition to this, the plan also outlined how the NHS was going to tackle cleaning and food in the hospitals. Over £30 million was allocated to improve hospital cleaning, a nation-wide clean up campaign, an unannounced inspection of cleanliness for which the results would be made publicly available and a set of national standards of cleanliness which would form part of the NHS Performance Assessment Framework.

This paper examines the policy and guidance that was issued, either as a direct result of the NHS Plan, or part of a subsequent initiative, surrounding cleaning in the NHS.

Department of Health Policy and Guidance related to environmental cleaning 2000 - 2010

Clean Hospitals Programme and Patient Environment Action Teams (PEAT)

The Clean Hospitals Programme was launched off the back of the NHS Plan (2000) and initially was branded through the website www.cleanhospitals.com. One of the aims of the NHS Plan was to improve the standards of cleanliness in hospitals with financial support to the value of over £68 million being provided through the Clean Hospitals Programme to kick start the improvements (Department of Health, 2010b). The Programme had a number of aims, these included ensuring the patient environment was clean, developing new national standards for cleanliness in all hospitals, allowing patients to provide feedback on the hospital environment and to give the ward sisters and charge nurses greater control over the cleanliness and appearance of their wards.

One of the key aims of the Programme, and a proposal that is still in use throughout the NHS, was the implementation of the Patient Environment Action Teams (PEAT). The PEAT teams were established in 2000 to make independent assessments in

NHS Hospitals (Department of Health 2010b). At the beginning the remit of the PEAT teams was to make an annual assessment of every inpatient healthcare facility in England that had more than ten beds. Each facility was awarded a rating from excellent, good, acceptable, poor or unacceptable. Effectively it was a benchmarking tool based on observational/visual evidence collected through site visits by the PEAT teams. The PEAT teams consisted of NHS staff including nurses, doctors, catering and domestic managers, executive and non-executive directors, dieticians and estates directors. The focus of the PEAT surveys were not just on hospital cleanliness, but also on catering and food and the general hospital environment, hence the inclusion of catering staff, dieticians and estates directors. In addition to NHS staff the teams also included patients, patient representatives and members of the public. Initially the PEAT teams and resulting surveys were administered by the NHS Estates who would co-ordinate and publish the scores. The responsibility for managing PEAT passed onto the National Patient Safety Agency after the NHS Estates was abolished in 2004. The National Patient Safety Agency now publish the annual results from the PEAT surveys on their website (National Patient Safety Agency, 2010). The 2010 PEAT results - for the "environment" section which includes factors related to cleanliness - show that within the NHS 25% of sites were rated as excellent, 62% of sites were rated as good, 12% of sites were rated as acceptable and less than 0.25% of sites were unacceptable.

While the obvious criticism of the PEAT methodology is that it is based on anecdotal observational evidence to provide a score for each facility (this is explored in more detail later in this paper). However, the longevity of the survey, particularly in an ever changing target culture, does suggest that the Department of Health values the scores reported as a result of the PEAT teams. Although one would assume that there should be some correlation between the PEAT cleaning scores and other factors used to rank or measure the impact of cleanliness (hospital infection rates and patient survey satisfaction towards cleanliness), yet research suggests that at best the relationship is very weak, and in some cases contradictory (May and Pinder, 2008; Eaton, 2005; Mears et. al. 2009).

National Standards of Cleanliness

The National Standards of Cleanliness (Department of Health, 2001) were developed by the NHS Estates in consultation with experts and professionals in the fields of hospitals cleanliness and infection control in order to improve the standards of cleanliness to an acceptable level throughout the NHS. The National Standards of Cleanliness were renamed as "Standards of Cleanliness in the NHS - A framework in which to measure performance outcomes" (Department of Health, 2003b). Following the publication of the Matron's Charter (Department of Health, 2004a), the Standards were replaced by the National Specifications for Cleanliness (Department of Health, 2007). The latter is discussed later in this paper.

Winning Ways: Working together to reduce Healthcare Associated Infection in England

The report from the Chief Medical Officer titled "Winning Ways: Working together to reduce Healthcare Associated Infection in England" (Department of Health, 2003a) attempted to set out the necessary actions required to tackle healthcare associated

infections. The rationale for the report was that the government claimed their investment to tackle healthcare associated infections had been substantial, yet the degree of improvement had been small. The document listed the level of investment starting with the Standing Medical Advisory Committee Report in 1998 (Department of Health, 1998) through to the new performance indicators included for infection rates into the Star Ratings for Trusts in 2003. Despite the guidance and investment, using post surgery infection rates as a benchmark, only 12% of hospitals had reduced their infection rates. 2.5% of hospitals had seen an increase in infection rates and 72% had shown no improvement. At the time this was against the backdrop of the Severe Acute Respiratory Syndrome (SARS) which had badly affected the Far East. While the healthcare acquired infection problem was not unique to England and posed a challenge worldwide, the rates were higher compared to some European countries which had made improvements. The components of the report set out key actions to be undertaken by Trusts, some directly related to cleaning regimes, others less so. These included active surveillance and investigation; reducing the infection risk from the use of catheters, tubes and cannulae instruments; reducing reservoirs of infection; high standards of hygiene in clinical practice; prudent use of antibiotics; management and organisation; research and development.

A Matron's Charter: An action plan for cleaner hospitals

The main purpose of the Department of Health publication *A Matron's Charter: An action plan for cleaner hospitals* (2004a) was to set out to all NHS staff a broad set of ten points of commitment based on cleaning principles. The Department of Health hoped that following the publication of the charter it would provide a basis for discussion, at all levels throughout trusts, on the importance of cleaning. The ten points of commitment were:

1. Keeping the NHS clean is everybody's responsibility. The principle was that having a clean and tidy environment encouraged a *"virtuous circle of good practice"* and a dirty environment encouraged *"an attitude of sloppiness and neglect"* (page 9).
2. The patient environment will be well maintained, clean and safe. Primarily the argument here was that it was cost effective to keep a ward clean and it would reduce risks to patients.
3. Matrons will establish a cleanliness culture across their units. This included personal hygiene, environmental cleanliness and clinical actions.
4. Cleaning staff will be recognised for the important work they do. Matrons will make sure they feel part of the ward team i.e. that cleaning staff should be made to feel part of the ward team and they should be dedicated to a particular ward or area.
5. Specific roles and responsibilities for cleaning will be clear. The charter stated that *"most patients don't care who cleans the ward"* and that *"complaints about 'it's not my job' can get in the way of delivering a good service"* (page 17).
6. Cleaning routines will be clear, agreed and well-publicised. They argued that an agreed and well publicised routine resulted in more efficient cleaning.

7. Patients will have a part to play in monitoring and reporting on standards of cleanliness. The matron's charter encouraged trusts to seek feedback from patients on the standards of cleanliness on their wards. They used the common idea that many people find it difficult to judge the quality of their clinical care but most are able to report on the standards of cleanliness.

8. All staff working in healthcare will receive education in infection control. The matron's charter suggested that the matron be responsible for making sure that all staff - clinical and non-clinical - received on-going training and education related to infection control. This could infer a relationship between cleanliness and infection control, something the Department of Health at the time were keen to suggest was not the case.

9. Nurses and infection control teams will be involved in drawing up cleaning contracts, and Matrons have authority and power to withhold payment. This was aimed at providing some authority to Matrons to ensure contracted out cleaning services delivered good practice in relation to cleaning.

10. Sufficient resources will be dedicated to keeping hospitals clean. Unfortunately this point on the charter did not actually provide additional resource to invest in cleaning services, just that NHS managers needed to consider their investment in cleaning and the advantage that it would add to overall trust performance should they score well in cleaning. The charter did refer to how some trusts could pool nursing and facilities management budgets together to introduce ward housekeepers.

While no one could argue that the ten points listed in the Matron's charter would not help to keep hospitals clean, like a lot of guidance issued by the Department of Health around the same time, there was no actual evidence collected to establish the effectiveness and impact of such initiatives. In addition, it would appear there was no review regarding the actual level of implementation amongst NHS Trusts.

NHS Healthcare Cleaning Manual and Towards cleaner hospitals and lower rates of infection

In 2004 the Department of Health also issued the NHS Healthcare Cleaning Manual and a report titled "Towards cleaner hospitals and lower rates of infection" (Department of Health, 2004b; Department of Health, 2004c). The NHS Healthcare Cleaning Manual was issued to all Facilities Directors in NHS Trusts/PCTs, also distributed as a CD-ROM with further training material. The Cleaning Manual was aimed to be used by cleaning managers and staff as a resource to assist in "*training, setting standards to help promote high quality, consistent, service levels*" (page iii). The Cleaning Manual was also designed to help ward housekeepers judge the service quality. One of the key recommendations from the National Standards of Cleanliness (see above) was that hospitals should have instructions for staff in terms of the best way to undertake cleaning. This was the objective of implementing the Cleaning Manual:

"The NHS welcomed the National Standard of Cleanliness and they are now used widely on a day to day basis. Many NHS managers responsible for

cleaning services have suggested that an operational manual that sets out 'how to clean' would complement the National Cleanliness Standards." (page 3)

In addition to the advice and guidance on general cleaning, it also covered infection control and the cleaning of patient equipment (a task normally undertaken by nursing staff).

The report called "Towards cleaner hospitals and lower rates of infection" (Department of Health, 2004c) was a broad overview of the work completed towards cleaning and healthcare acquired infections. The Department of Health called it a "campaign" and the accompanying document summarised the main work they had implemented that contributed towards cleaning and infection control. From this campaign the Department of Health advocated being open and honest with the public, therefore data on hospital infection rates would be published and publically available. It suggested giving power to patients to monitor cleaning standards and inspections, although in reality this was already going on through the PEAT visits. It also referred to the implementation of the Matron's charter and other investment such as the £3 million the Department of Health had already committed to research programmes on health associated infections.

The plethora of guidance and frameworks issued during the period 2000 - 2005 is perhaps a reflection of the work done by the NHS Estates. The effectiveness and impact of the various cleaning and infection control guidance is unclear. However, the NHS Estates was in a vulnerable position, and was later abolished through the review of the Arms Length Bodies in 2004. Therefore the amount of work produced by the NHS Estates at the time may have been a tool to demonstrate the value and effectiveness of their organisation, although ultimately this was in vain. As discussed above, it was very difficult to assess the impact of the various guidance and policy implemented around cleaning. In addition, some of the guidance was not new, but a re-issue of messages and information contained in other earlier formats, for example the Towards cleaner hospitals and lower rates of infection campaign (Department of Health, 2004c).

Essential standards of quality and safety

The Healthcare Commission was established to provide independent regulation of health and social care in England. In 2009 the Healthcare Commission ceased to exist and its responsibilities were replaced by Care Quality Commission (Care Quality Commission, 2010). The original standards provided by the Healthcare Commission were known as "Standards for Better Health," these were first published in 2004 and then updated in 2006 (Department of Health, 2006). The standards were part of the new performance framework for the NHS which set out the level of quality of care for all NHS organisations in England. The updated standards published in 2006 included two that specifically related to cleaning and infection control:

"C4 Health care organisations keep patients, staff and visitors safe by having systems to ensure that a) the risk of health care acquired infection to patients is reduced, with particular emphasis on high standards of hygiene

and cleanliness, achieving year-on-year reductions in MRSA." (Department of Health, 2006a, page 10)

"C21 Health care services are provided in environments which promote effective care and optimise health outcomes by being well designed and well maintained with cleanliness levels in clinical and nonclinical areas that meet the national specification for clean NHS premises."
(Department of Health, 2006, page 16).

Following the replacement of the Healthcare Commission with the Quality Care Commission, a new set of standards were issued known as "Essential standards of quality and safety" (Care Quality Commission, 2010a). The new standards consisted of 28 regulations (and associated outcomes) that were set out in two pieces of legislation: the Health and Social Care Act 2008 Regulations 2010 and the Care Quality Commission Regulations 2009. Regulation 12 referred to *Cleanliness and Infection Control* and providing clean environments and protecting users from acquiring infections.

The Code of Practice for the Prevention and Control of Healthcare Associated Infections

The Code of Practice for the Prevention and Control of Healthcare Associated Infections (Department of Health, 2009) came into force for NHS organisations on the 1st April 2010. The code of practice set out the criteria against which the Care Quality Commission would assess the regulations set out in the "Essential standards of quality and safety" referred to above. The document also provided guidance on how organisations could tackle healthcare associated infections. It gave specific advice to trusts to how they could meet regulation 12 related to cleanliness and infection control and what they needed to do in order to comply. The code listed ten compliance criterion ranging from systems and policies to prevent and control infection, maintaining a clean environment, relevant information available for patients and visitors and staff training and staff protection.

Clean, Safe Care: Reducing MRSA and other healthcare associated infections

The *"Saving Lives: a delivery programme to reduce healthcare associated infections including MRSA"* was initially launched in June 2005 and then revised in October 2007 (Department of Health, 2011). The *Saving Lives* programme gave birth to the *Clean, Safe Care: Reducing MRSA and other healthcare associated infections* website. MRSA (Methicillin-resistant Staphylococcus aureus) is a bacterial infection that is resistant to some antibiotics. The infection can sometimes be serious and lead to problems related to the heart, lung, blood and bone.

The programme and website were aimed at providing tools to health staff to enable them to tackle healthcare associated infections (HCAI). The website does refer to cleanliness and the importance it plays in controlling infections. There is also a link to the Department of Health's website containing the *Clean Hospitals* programme (discussed above), which at least demonstrates some attempt to join up the multitude of programmes and guidance issued related to hospital cleanliness and infection control. The actual strategy on the website is contained within the document

called *"Clean, safe care: Reducing infections and saving lives"* (Department of Health, 2008). Therefore, running alongside the tools and guidance on the Clean, Safe Care website were initiatives which included introducing screening for MSRA elective admissions by March 2009; the Care Quality Commission (discussed above), 5000 new modern matrons in place by May 2008; a new bare-below-the-elbows dress code for hospitals; every hospital to have undergone a deep clean by March 2008. Although the strategy focused on the high impact interventions on catheter and cannula care to tackle HCAs, section 5 did detail how a "Clean Environment" could contribute to controlling infections. In addition to referring to the continued use and impact of the PEAT teams, the strategy also outlined the approach to deep cleaning that was required to take place. The Department of Health was investing a total of £57 million in 2007/08 in deep cleaning *"so that the NHS can be reinvigorated with thoroughly clean buildings across the estate and increased awareness of the importance of a properly clean environment"* (Department of Health, 2008, pg 24).

National Specifications for Cleanliness

The National Specifications for Cleanliness (Department of Health, 2007) replaced the Standards of Cleanliness in the NHS (Department of Health, 2003b). The Specifications provided a comparative framework for hospitals to assess their technical cleanliness. The new document was issued to take into account all the changes that had taken place since 2003, for example through the Matron's Charter and the campaign Towards Cleaner Hospitals and Lower Rates of Infection. They also incorporated a specimen strategic cleaning plan, an operational cleaning plan and a cleaning responsibility framework. The specifications were required to be adhered to, regardless of how the cleaning was provided at the trust - i.e. in-house or outsourced. However what made the new specifications different from previous guidance, was the Trusts would now be assessed against them using the results from the PEAT surveys. In essence, trusts were now being audited against the cleaning guidance issued through the Department of Health.

Cleaning in UK healthcare environments

Perhaps one of the obvious criticisms of the above policy, guidance and strategies related to environmental cleaning in the NHS issued since 2000 is the lack of a review of the effectiveness. Therefore it is important to look at the empirical evidence and research related to cleaning in healthcare and attempt to establish if any supports the related Department of Health policy discussed above. Due to the scope and size of the subject area the review is confined to work in UK hospitals.

Liyanage and Egbu (2005) discuss controlling healthcare associated infections (HAI) in the context of facilities management. They set out the impact of HAIs and the associated costs, however the review is perhaps most useful because of the contextualisation within the FM paradigm. The authors state that there are many reasons why patients develop HAIs but they do highlight the vital role that FM departments play in tackling HAIs. They do go on to say that HAI is predominately considered a clinical issue by many researchers and healthcare managers, and then put forward some of the recent BBC News related headlines on HAI, however they fail to acknowledge the impact of the media in reporting HAI and the incorrect inference to cleanliness (Chan et. al., 2010). From the FM perspective in controlling

HAIs, Liyanage and Egbu (2005) argue the service can be broken down into three main dimensions: Hard FM (buildings and fittings); Soft FM (cleaning and catering) and Clinical staffing practices (availability of changing and washing facilities). Within the FM perspective the paper suggests that there is a better need for integration between clinical and FM services staff to "*carry out infection control practices effectively*" (pg 204). Furthermore within their conclusion they discuss the need to integrate FM services into clinical services to eliminate the duplication of work. Yet one of the underlying gaps of the paper is the lack of discussion of the ward housekeeper role, a role that meets this need to integrate clinical and non-clinical staff and practices (May and Smith, 2003).

Other studies on infection control are very much grounded in the clinical domain (Dettenkofer et. al., 2011; Masterton et. al., 2003; Ward, 2011; Tacconelli, 2009; Harris et. al. 2010). Alternatively, other studies focus on the management side of infection control, for example through auditing, good clinical leadership and staff retention and training (Hay, 2006; Griffiths et. al., 2009) or through risk management (Miller, 2009).

The work by Dettenkofer et. al. (2011), albeit largely clinical in nature, does refer to the impact of the environment on HAIs. The focus is on the use of alcohol hand rubs and hospital design (single rooms opposed to multi bedded wards and the sparseness of rooms). Some literature reviews on infection control, although not directly related to cleaning, are important in other ways for facilities services. For example Wilson et. al. (2007) completed a literature review on the impact of staff uniforms and the domestic laundry as vehicles for the transfer of healthcare-associated infections. Their review found no evidence to suggest that uniforms were a potential vehicle for the transmission of infection in the clinical situation. Other reviews looked at the sterilisation of clinical equipment, again not usually an FM service responsibility (Schabrun and Chipchase, 2006; Creamer and Humphreys, 2008).

Curtis (2008) carried out a non-pharmacological review of the prevention of hospital-acquired infections. In addition to looking at the morbidity rates, economic costs and infection routes the work did discuss the prevention of HAIs through interventions such as hand washing, gloving, gowning and personal items. Unsurprisingly his review of the research found that most studies reported an increase in hand-washing rates significantly reduced rates of HAIs. Also that the use of alcohol-based hand-washing solutions were considered more effective than plain soap and water. The review also discussed cleaning techniques and staff training. In terms of the cleaning staff, studies reported that they received little initial training, however after training often did a better job of eliminating pathogens through cleaning, thus demonstrating the importance of structured (and on-going) training programmes (Demirturk and Demirdal, 2006; Eckstein et. al., 2007).

Some reviews relate to patient perspectives on cleaning and infection rates. This picks up on the issues highlighted over the impact of the media on the perception of cleaning and infection (Chan et. al., 2010). Gould et. al. (2009) undertook a literature review of the lay knowledge and perceptions of the risks of HCAs, this was in the context that opinion polls demonstrate that the fear of developing HCAs was the single greatest concern of people going into hospital. They looked at twenty-two

studies within their paper and found that the most frequently cited source was the media *"which had been blamed for sensationalist and inaccurate accounts"* (page 1). In addition they found that lay people did not appear to be able to access credible sources of information, and those that were able to find credible information were unable to understand it. Their work concluded by suggesting that research is necessary to explore the *"acceptability, comprehensibility and accessibility of the many sound and credible sources of information available to patients and the public"* (page 7). They also suggested that the answer may not lie in providing further information, rather provide more balanced information to meet lay needs. However their final point, related to the scientific community working with the media to improve the standard of reporting of HCAs, is somewhat naïve and idealistic.

Further work completed around the same time, investigated HCAI and patient experiences (Burnett, et. al., 2010). The work used face-to-face interviews with patients to explore their experiences around HCAI. The interviews were with patients who had been diagnosed with a bloodstream infection, and patients at the same hospital who had not been diagnosed. The findings centred on the lack of communication, both verbal and written, related to their infection status. A rather limited purposeful sample of 18 patients was taken and it was not clear how many patients from this total had been diagnosed with the bloodstream infection and how many had not. The study had little reference to the impact of cleaning on patients' perceptions of cleaning. The interview schedule did explore the causes/consequences of HCAs, but there was no direct question or prompt related to cleaning. In spite of this, patients did highlight poor cleanliness, lack of cleaning staff and lack of toilet and shower facilities. Although the factor that the majority referred to was the lack of nursing staff and the use of bank staff (bank staff are part time agency staff used to cover temporary absence).

Other work completed in the built environment paradigm, continues with the theme of looking at the patient perception of cleaning (Whitehead et. al., 2007). The aim of this study was to identify the key factors that would influence patients' perceptions of cleanliness and rank them in order of importance. This was in the context of patient choice, and if NHS hospitals wished to influence patients to choose them (over other hospitals to receive their treatment) then, as the literature review suggests, cleanliness will be a key influencing factor in making that choice. Therefore, it would seem important for hospitals to understand what factors lead people to decide whether a hospital is clean or dirty. The findings showed that the main themes that influence the perceptions of cleanliness could be summarised under three broad headings: appearance of the environment; physical cleanliness; staff behaviour. Although ultimately the study found that the subject was much more complex than a production of a list, however the appearance of the environment appeared to be the most important factor.

Mears et. al. (2009) rather than focusing on cleaning, looked at the interventions that were effective at controlling HCAs in acute hospitals. They used a questionnaire to establish how the hospitals were managing and controlling HCAs. The questionnaire was sent to the Director of Infection Prevention and Control and to the Chief Executive of each Trust. Out of 173 questionnaires distributed, 155 were returned giving a strong response rate (almost 90%). The data from the questionnaires were correlated with the mandatory surveillance data on infections across England. In

general their results found that lower rates of infection were linked to better management of HCAs. For example where a hospital had scored well on hand hygiene (e.g. availability of hand hygiene on wards) there was a significant correlation with lower levels of MRSA. When trusts were unable to isolate a patient with a HCAI (due to the unavailability of a single room) then there was a higher rate of MRSA. They also found a significant association between the PEAT assessment data and Clostridium difficile-associated diarrhoea (CDAD). Other measures reported during their study included bed management - where four out of the five bed management measures were found to be linked with better MRSA and CDAD outcomes (the exception was the frequency of the bed manager liaison with the infection control team which produced higher MRSA rates). The inclusion of infection control in appraisals and PDPs (personal development plans) were also associated with lower infection rates. However they did find that increased levels of staff training were related to higher levels of infection. The authors suggest this anomaly could be due to what they have termed "*reactive practice*" (page 312). Appraisals may be seen as a long-term strategic approach to infection control whereas training could be seen as a short-term operational reaction to infection; "*it is much easier to set up some training sessions than to embed infection control into the staff development process*" (page 312). They also cite the literature stating that education is often not sufficient to elicit behaviour change and that feedback and ownership through embedding it in personal growth (appraisals) are more effective (Dubbart et. al., 1990; Tibballs, 1996; Pittet, 2000; Pittet, 2004).

As discussed above, although Mears et. al. (2009) found that there was a significant association between PEAT and CDAD, they did find that MRSA bacteraemia rates were *not* linked to measures of environmental cleanliness - hand hygiene was more important (Eaton, 2005). May and Pinder (2008) does in some cases support the findings from Mears et. al. (2009). Although other research using different measures to assess cleanliness (non-PEAT) does reveal "*widespread contamination of the hospital environment with MRSA*" and it "*highlights the complexities of the problem of contamination, and confirms the need for more-effective cleaning of the hospital environment to eliminate MRSA*" (Hardy et. al., 2006, page 127). This provides further evidence to question the validity and effectiveness of the PEAT measures to assess environmental hospital cleanliness on a national scale.

In recent years there have been a number of studies focusing on and evaluating cleaning regimes and standards. This may have been a reflection of the multitude of guidance and policy issued on cleanliness and infection control, combined with the increased media attention in HCAs. Griffith et. al. (2000) was completed immediately before the publication of the NHS Plan (Department of Health, 2000) and therefore prior to the PEAT inspections being implemented. While they discuss the contradictory evidence surrounding a link between surface contamination and infections, perhaps more interestingly their study looked at the issue of using a "visual assessment" to indicate cleanliness. The authors recognised that a visually unclean environment "*gives a poor impression of healthcare institutions*" (page 19), yet their results found that visually clean surfaces may be contaminated and therefore a poor indicator of cleanliness. After cleaning 82% of the ward sites were assessed as visually clean, yet only 24% were considered clean using adenosine triphosphate (ATP) bioluminescence (a common technique used in the food industry to monitor cleaning). The sites most contaminated in the ward were the kitchen area

and toilets. Overall their data suggested that a visual assessment of cleanliness had a limited value, adding further question marks to the validity of using PEAT assessments.

Further opinion suggests that an integrated and risk-based approach should be adopted to assess surface hygiene. Such an approach is already established by the food industry to manage cleaning in a cost-effective way. To achieve this assessment of surface hygiene a preliminary visual assessment should be used alongside *"rapid sensitive tests for organic deposits and specific microbiological investigations"* (Dancer, 2003, page 11). Further work in this area (Sherlock et. al., 2009), compared four methods for determining hospital cleanliness: visual assessment; ATP bioluminescence monitoring; microbial load (ACC) and MRSA detection on the pretext that monitoring cleaning efficacy alone on visual assessment can lead to overestimations. The study concluded *"that the use of chemical tests such as ATP may provide additional information of cleaning efficacy and ATP trends allow identification of environmental surfaces that require additional cleaning or cleaning schedule amendments"* (page 140). More recent work has confirmed these findings (Mulvey et. al., 2011).

Perhaps of more direct interest and relevance for facilities managers or those responsible for domestic duties was the work completed by Griffith et. al. (2007) looking at existing and modified cleaning regimens. The study took one general surgery ward in a modern hospital and monitored infection rates over three periods (each period lasting 14 days). One period used the existing cleaning protocols, one used a modified cleaning protocol with the same detergent and a third used a sanitiser. An in-house team performed the cleaning protocols and the existing regimen *"lacked detail and related more to frequency of cleaning rather than how it was undertaken and implemented"* (page 353). The modified cleaning protocol provided more detail, for example that each surface be initially wiped with a damp paper towel followed by a clean rayon cloth for at least 15 seconds. The second revised protocol used a *"cationic detergent in place of the non-ionic detergent"* (page 353). In addition to the basic visual assessment after cleaning the researchers also tested the surfaces for ATP. Both modifications to the cleaning protocols showed significantly lower bacterial counts. Incorporating the revised sanitiser produced a further slight improvement in cleaning efficacy, although this was not significant. Although not looking at cleaning regimes per se, related work in this field is concerned with establishing a framework or effective method to assess microbiological standards for surface hygiene in hospitals (Al-Hamad & Maxwell, 2008).

The majority of the work related to environment cleaning and infection control discussed above is situated in the clinical literature and the predominant view is that visual inspection of cleanliness is ineffectual, yet there is conflicting evidence on the link between cleaning and infection control. None of them formally assess the guidance issued by the Department of Health related to cleanliness and infection control. It is now worth discussing environmental healthcare cleaning in the FM domain. Considering that the cleaning service is often thought of as a core facilities management element, it is surprising how little work has been published on the subject in healthcare environments from an FM perspective. Early opinion published

on cleaning focused more on the operation aspects such as training for cleaning staff (Campbell, 1990).

Research completed before the widespread adoption of the multi-skilled facilities worker role (Akhlaghi & Mahony, 1997) or latterly the ward housekeeper role looked at the health care assistant (HCA). The HCA role was introduced as part of the United Kingdom Central Council for Nursing, Midwifery and Health Visiting "Project 2000". This wasn't the first type of unqualified nurse to be used by the health service, but at the time there was concern that management was leaning towards "cheaper" staffing by using HCAs to replace nurses and therefore giving rise to poorer quality care for patients (Roberts, 1995; Edwards, 1997). The HCA role, like many unqualified nursing roles, did contain an element of cleaning, assessing hygiene and tidying rooms. This is in addition to other duties such as admissions, care plans, discharging, ward clerking and bed-making. Other research published in the FM domain discusses hospital cleaning, specifically the impact of the ward hostess role or generic worker, in the context of in-house versus outsourced services (Smith, 1995).

Whilst not necessarily related to cleaning directly, the importance of hospital design is also understood to be a factor in controlling HCAs (Ulrich & Zimring, 2004). Additionally innovative designs for hospital furniture and equipment have been used to help make items easier to clean (Anon, 2009). The "Design Bugs Out" project which is part of the Department of Health's "HCAI Technology Innovation Programme" has developed new furniture prototypes and also looked at how they can redesign everyday equipment in order to make them easier and quicker to clean. The new furniture prototypes included a commode (portable toilet) that was easy to take apart for cleaning and storage. In order to eliminate the hard-to-clean corners, internal spaces and inaccessible surfaces that can harbour dirt and bacteria, new designs have been put forward for patient bedside systems and cabinets. These utilise new materials and shapes that aid cleaning. The everyday equipment included an "intelligent" mattress that changed colour when compromised by body fluids and required to be changed.

Griffith (2006) discusses the importance of controlling HCAs in a quality management context, and although it is not published directly in the FM related press, it does help raise the profile. The paper attempts to draw parallels between hospital cleaning and cleaning in the food industry a number of years earlier.

As discussed previously, there is little evidence available to directly evaluate the government policy and guidance related to the cleaning and infection control initiatives. Macdonald et. al. (2009a), the authors attempted to investigate why some trusts achieved consistently high PEAT scores in the context of leadership in the NHS. This was following a desk top study that discounted some suggested main external factors to influence the trusts in their ability to deliver the required patient environment standards e.g. the type of trust, size of trust and age of the trust; organisational arrangements (in-house versus outsourced), geographic spread; demographics of the local catchment population (Macdonald et. al., 2009b). Ten themes were identified as common traits amongst the, albeit small, sample of six NHS FM senior staff who took part. The ten themes were:

1. Pride and Commitment.
 2. Personal Style.
 3. Luck and other factors.
 4. Opportunity for personal development.
 5. Maximising the contribution from FM staff.
 6. Contractor's team.
 7. Stability, experience and change.
 8. Integration with clinical teams.
 9. Integration with the corporate agenda and the top team.
 10. External perspective.
- (Macdonald, 2009a, pg 146-147).

Conclusion

There is relatively little published work on the importance of cleaning to FM operations in the NHS. There is however a growing evidence base on the environmental cleaning in general, and more specifically the relationship between environmental cleaning infection control. These studies are generally published in clinically focused journals. Whilst the clinical community recognise the contribution of environmental cleaning and the impact on healthcare, there needs to be more to be done to have the relevant studies published in the FM domain. Conversely there also needs to be work done to allow the FM community to have a "voice" in the infection control journals.

This paper has examined the contradiction in the evidence in the suspected correlation between infection control and environmental cleaning. Although the impact of the media and the attention this brings cannot be underestimated when considering this potential correlation. However, one thing does appear to be consistent, is that a performance measure based on an observation (visual) assessment is not a sufficient tool to evaluate the environmental cleanliness of a hospital ward. It suggests that a usable technological solution is required to confirm satisfactory cleaning standards in healthcare facilities.

Finally, the lack of either a formal review sponsored by the Department of Health, or local empirical studies to assess the effectiveness of the cleaning and infection control guidance since the NHS Plan is a cause for concern. Since 2000 there has been a significant investment in the co-ordination and guidance related to cleaning and infection control. There has been very little done in the way of a review of the impact and cost effectiveness. Further research should focus on the impacts of the cleaning/infection control related policy and guidance issued by the Department of Health. This should inform the future cleaning related initiatives.

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