KNOWLEDGE MANAGEMENT INITIATIVES IN THE CONTROL OF INFECTIONS ASSOCIATED WITH HEALTHCARE FACILITIES

C. L. Liyanage and C. O. Egbu
School of the Built and Natural Environment
Glasgow Caledonian University, G4 OBA, UK
E-mail: C.Liyanage@gcal.ac.uk

ABSTRACT: Healthcare Associated Infection (HAI) has been recognised as presenting a significant problem in terms of quality of care and cost for hospitals, governments and consumers in most countries. HAI embraces both clinical and non-clinical aspects and also takes into account the built environment facet as it is a major “reservoir” of transmission of infections. Therefore, the participation of all clinical, facilities management and construction professionals/staff is of utmost importance in eliminating the risk of infection. A recent workshop for NHS in Scotland (NHSS) estates directors concluded that all the key components of the solution to control HAI are already known but the issue lies in their better communication and implementation. So the priority should be on coordinating and disseminating the existing knowledge in a form that is consistent and accessible to all stakeholders involved in HAI avoidance. This is imperative in order to raise the awareness of pathogenic risks and ways and means of growth of infections for facilities management and construction professionals. This paper is based on a research project which aims to develop a single coordinated knowledge map of best practices and supporting documentary guidance on avoiding HAI. The paper attempts to discuss the findings of a survey (using semi-structured interviews) which was conducted as part of the main study. The findings explore the current status and KM initiatives in NHSS. It also identifies the barriers for KM initiatives. However, it was concluded that motivation and better leadership can greatly assist in avoiding challenges for managing knowledge such as non-awareness, cultural barriers and lack of integration among the staff members.

Keywords: Facilities Management (FM), Healthcare Associated Infection (HAI), Knowledge-Base, Knowledge Management (KM) and National Health Service in Scotland (NHSS)

1. INTRODUCTION

There is now a mandate at the highest levels in NHSS and Scottish Executive to tackle the HAI problem. HAI is the outcome of system failure, and has to be tackled in a coordinated manner. A prerequisite for this is a clear mapping and coordination of the available knowledge. Therefore, the project, which this paper is based on, aims to develop a single coordinated knowledge map of best practices and supporting documentary guidance on avoiding HAI. The paper will, however, present only the findings congregate through the literature survey carried out in the preliminary stages and the semi-structured interviews carried out later. The main aim of the survey is to probe the current context of NHSS in view of KM. It was intended to identify, through the literature survey and semi-structured interviews, the knowledge management initiatives instigated by the NHS in Scotland (NHSS) to reduce infections. Besides the culture of the staff and availability of infrastructure in NHSS were also explored. These are influential factors for successful implementation of knowledge management of organisations. Lastly the challenges that impede knowledge management were scrutinised. These will eventually assist in identifying enablers and barriers in implementing the knowledge base in NHSS. However, the paper will first introduce the project and will then present the findings of the survey.
2. WHAT THE PROJECT IS ABOUT?

Healthcare Associated Infections (HAI) is continuing to be a worldwide problem. It has been recognised as presenting a significant problem in terms of quality of care and cost for hospitals, governments and consumers in most countries (Department of Human Services, 1998). Treating HAI imposes an additional burden on hospitals and results in additional costs to healthcare and community services. Studies that have estimated the economic burden of HAI generally limit the range of costs examined to those that fall on the hospital sector (Management and Control of HAI in Acute Trusts of England, 2000). Last year the annual cost of HAI to the National Health Service of Scotland (NHSS) was £100M approximately (380,000 bed days per annum) which means the equivalent of a 1000 bed hospital running continuously just to handle HAI (Hinks et al., 2003).

Control of HAI exists as a major concern, and the high frequency of infections is seen as evidence of poor quality of health service delivery, and which leads to avoidable costs (WHO, 2002). Built environment and other facilities’ services such as cleaning and catering that come under the category of support services to the main clinical process, are identified as major contributors to pathogenic risks. However, practices of healthcare staff and healthcare management processes also appear to play an important role in the incidence and control of HAI. In addition, managing knowledge is significant to retain, develop, organise, and utilise the organisation’s capability of managing HAI. The report ‘NHS Performance Indicators: A Consultation (2001b)’ states that around 15% of HAI could be avoided through strengthened arrangements for prevention and control, and better application of existing knowledge and good practice. As a knowledge intensive sector healthcare needs to adopt the latest medical and relevant support service practices. It also has to rely on the skills and expertise (knowledge) of the staff to provide a quality service (Knowledge Management Strategic Advisory Committee, 2002). Although it is largely a public and service sector, it should aim to operate and survive like a profit-oriented organisation in achieving the goals and targets, e.g. providing a better, risk free service to the general public. KM is specifically vital in achieving this due to the fact that it requires prompt attention or quick response on customer needs, i.e. patient care, with the aid of prompt and appropriate knowledge, skills and expertise of staff for excellent delivery of services. Precisely, it needs the employment of the right sets of knowledge at the right time. However, most hospitals are unaware of their acquired knowledge base although healthcare providers and policy makers produce standards, protocols and guidelines from time to time. A recent workshop for National Health Service in Scotland (NHSS) Estates Directors concluded that all the key components of the solution to controlling HAI are already known but the issue lies in their better communication and implementation. So the priority should be to coordinate and disseminate existing knowledge in a form that is consistent and accessible to all stakeholders involved in HAI avoidance. Because it is essential to track all available knowledge to alert stakeholders to existing information and knowledge which can avoid work being repeated unnecessarily. Thus, there is a need to create a single coordinated knowledge base to enhance communication and coordination among all the stakeholders involved in HAI avoidance. The on-going project discussed in this paper tries to address this issue through development of a knowledge base. The knowledge base will gather and share the available knowledge and best practices on controlling HAI. The following sections will describe the details of the project in-depth.

2.1 The focus area of the project

It is worthwhile considering what infection control involves. Tackling HAI involves addressing three inter-linked dimensions:
i. *The buildings and fittings* (the *Hard FM* aspects), such as inter-connectivity between clinical spaces, air change logistics, spatial relationships and proximities (including patient beds), the effectiveness of infection barriers and spatial separation, plus the ‘clean-ability’ of surfaces and other finishes.

ii. *The Soft FM services*, such as cleaning, catering, waste management and decontamination, laundry and linen, and food hygiene (many of which are managed by external contractors).

iii. *The clinical staffing practices and healthcare processes and protocols*, including availability and use of changing facilities, the location and use of washing facilities, and specifics of good clinical processes and linkage to support services.

Considering the aforesaid dimensions, built environment and other facilities services (such as cleaning and catering) which come under the category of support services to the main clinical process, are identified as major contributors to pathogenic risks. Therefore facilities management and built environment is more important in eradicating HAI. Facilities availability, utilization and suitability can greatly influence the healthcare setting as a whole in developing and transmitting infectious agents. For examples; lack of handwashing facilities in wards can refrain staff from washing hands in between patient contacts; improper use of disinfection agents for decontamination can result in cross infection; and unsuitable ventilation systems which does not serve the exact purpose can assist in growth of infection (Liyanage, Hinks and Egbu, 2003). All these can occur due to poor planning of healthcare settings, variances of standards or lack of specialist knowledge of FM function. It was evident from the literature survey that plethora of information is available for clinical staff/professionals where as only a handful of literature is available for Facilities Management (FM) professionals/staff to tackle the problem of HAI. And it was also identified from the semi-structured interviews that non-compliance to the standards of HAI has mostly occurred due to the lack of availability in literature including standards and guidelines for FM staff in view of infection control. Hence, the project tries to focus on the area of facilities management. It endeavours in tracking knowledge (mostly explicit) for FM staff to raise the awareness among them regarding the severity of HAI and also to educate them by providing up to date information.

### 2.2 Aims and Objectives

The aim of the project mentioned above is to develop a single coordinated knowledge map of best practices and supporting documentary guidance on avoiding HAI. The knowledge coordination challenge is to create a clear resource which signposts the available but currently under-utilised knowledge sources. A combination of research methodologies are used to achieve the aim of the project, including semi-structured interviews, archive documents/reports, topic map analysis and ontology for the development of the knowledge base. The overall objectives of the project are as follows:

1. to be acquainted with the current state of KM in NHSS
2. to identify the resources, specifically related to the HAI guide in professionals work
3. to explore the gaps in terms of availability of HAI literature
4. to identify the level of authentication given by the professionals for the literature they are referring to (this is used to assign priorities in the topic map to be developed as part of the knowledge base)
5. to scrutinise a user-friendly method to develop the knowledge base
2.3 Methodology

The first step was to gather literature on HAI. This was done using an extant document review of existing sources of material on HAI within NHSS, NHS England/health services in overseas, general academic fields, electronic sources, journals, books, conference proceedings, reports and guidelines, etc.

The initial knowledge gathering is to be validated using semi-structured interviews with NHSS stakeholders. The interviews were conducted from July to September 2003. Due to time constraint the size of the sample was limited to twenty-five (25). The sample included mainly the facilities managers/staff. Clinical professionals such as infection control doctors, infection control nurses and microbiologists were also interviewed to eliminate biasness of the data collected from non-clinical professionals. But since one of the objectives of the project is to identify the current context of NHSS in view of KM, the sample of the survey included healthcare managers and policy makers in the health sector such as chief executives and directors. The details of the participants will be kept anonymous to maintain confidentiality. The data gathered through the interviews and literature survey was mainly used to identify the sources of literature available for the professionals/staff. It was also intended to explore KM initiatives in NHSS, which are described in the following sections in detail. As the data collected was more straight-forward need of an analytical tool was not arisen.

The knowledge map is developed, first by identifying the elements of infection control and then by identifying the key priority areas according to the professional categories. The expertise of the infection control nurse of the team and semi-structured interviews stated above are the main sources to accomplish the first step. Brain-storming sessions are also used to develop and refine the knowledge map and to identify the key priority areas.

The knowledge map which is to be developed using the aforementioned methods will be published as a one-stop searchable knowledgebase. The results will be a mapping tool to support all the stakeholders who are involved in controlling HAI. They can use the tool in accessing consistent and comprehensive knowledge to support the improvement of the situation. From this it is expected to design an internet-based knowledge map as the keystone resource for controlling HAI. Other outputs will include educational fact sheets and reviews in health sector/nursing journals. A workshop/seminar will be held towards the end of the six months of the study. This will involve selected and key functionaries or players involved in control of infection. This will be useful to refine the knowledge base through views of these front-line practitioners.

3. CURRENT STATUS OF KNOWLEDGE MANAGEMENT IN NHSS – WHAT IMPINGES AND THRIVES?

As discussed earlier the crux of this paper is the findings of the survey which was conducted as part of the main study using a semi-structured approach. The interviews were carried out only within NHSS which is striving towards a ‘Healthier Scotland’. The findings, which fulfil the first objective stated in section 1.1, are presented in three strands. Firstly, the prime steps taken by NHSS to manage knowledge; secondly, the culture of healthcare workers; finally, the availability of infrastructure to share knowledge across the organisations.
3.1 KM Initiatives

The Scottish Executive has launched a number of initiatives aimed at lowering the incidence of HAI, spearheaded by the Ministerial Action Plan to reduce the risk of HAI to patients, staff and visitors to NHSS establishments (Scottish Executive, 2002) such as hospitals, general practice, day surgery centres, domiciliary nursing services, residential aged care, and community services. The following initiatives can be specifically stated as the major steps for managing and sharing knowledge, albeit, not regarded by many as KM initiatives:

1. Unified NHS board system – not specifically for infection control but for the NHSS healthcare as a whole
2. Task force for HAI
3. Cleanliness champions programme

Unified NHS Boards

The new reformations of NHSS given in ‘Our National Health: Plan for action, plan for change (2000)’, which is commonly known as ‘Scottish health plan’, are intended to formulate structural changes with changes to governance and accountability to the health service. One of the major structural changes of it is the development of a unified NHS board system (refer figure 1) in order to create coherent, robust plans for the future configuration of the services which address the current and future needs of the local population. In the previous structure of NHSS the acute and primary care trusts act independently from NHS boards. The units are more stagnated. In KM perspective this can lead to many deficiencies such as lack of sharing knowledge and lack of integration. But the present integrated structure of NHSS allows close liaison among healthcare managers, professionals and staff. It assists in acquiring and disseminating knowledge/information smoothly.

The aforementioned action plan will also streamline the bureaucracy and will increase accountability. In view of HAI, the action plan will take steps to strengthen and monitor infection control procedures in hospitals. The new system will improve integration among the stakeholders and will reduce duplication of work. However, from the survey conducted as part of the on-going project report in this paper, it was found that many health boards have not transformed to the unified boards system as yet but are planning to implement it within the near future. In the old system, which is still in-use, the primary and acute care trusts produce their own guidelines, standards and manuals to control infection in hospitals within their remit. The infection control committee of the particular Trust and the infection control team in hospitals are mostly responsible for producing the local guidelines for hospitals. In doing this they take national policies and standards into consideration. These policies and standards are produced by the Scottish Executive or any other authority, for example Property and Environment Forum Executive (PEFEx), Scottish Centre for Infection Control (SCIEH), NHS Quality Improvement Scotland (NHSQIS), NHS Education Scotland (NES), or NHS Estate in England. However, in doing so, according to many of the views of the interviewees, they do not associate with the others; they carry out tasks separately to achieve the same target. Therefore having a unified system, which will compound a national effort in producing knowledge, possibly, will reduce the burden on the trusts and also will obliterate duplication of work. Hence, amalgamation of NHS boards can be identified as a move from a fragmented system to a holistic approach; intra-organisational focus to national focus; and a move from organisational-wide/area-wide teams to a nationally determined structure, policies and procedures.
HAI Task force

HAI is a priority issue for NHSS. The profile of prevention and control of HAI has been transformed within the past few years. As to the Chief Medical Officer’s letter (CMO) of
September (2003) to the NHSS staff, a major programme of work was laid out in the Scottish Executive Health Department’s (SEHD) ministerial action plan on HAI to improve the prevention and control of HAI across the NHSS in Scotland. This programme is now being actioned by the Scottish HAI Task force, of which Dr. E.M Armstrong (CMO) is the current Chair. The HAI Task force is both overseeing existing work in progress and commissioning several new working groups to address the many tasks specified in the action plan. Their target is to achieve reliable, repeatable, and acceptable levels of control over HAI within a minimum of three years. For the task force, multidisciplinary groups which consist of experts who are specialised in particular areas of concern are assigned to govern the HAI issue. This is a major step towards a strategic infection control perspective which fits with wider societal values and expectations.

It was identified that there is a lack of mandatory and evidence-base guidelines in NHSS for infection control, especially for the construction professionals in new builds or refurbishment projects. Lack of obligatory guidelines has led to different approaches to perform work and mainly in planning and design of hospitals, e.g. the disparity of bed space of wards, which is very much crucial in controlling cross infection. According to Horton and Parker (Horton and Parker, 2000) evidence-based practice remains one of the cornerstones of infection control practice; the classic example is Semelwe’s work (1861), which established a link between unwashed hands and cross-transmission of microbes resulting in puerperal sepsis in women following childbirth. Often, the evidence of best practice in infection control emerges from research studies, observation and, in many instances, adverse incidents. According to EPIC project (2001a) the process of producing nationally agreed evidence-based and authoritative guidelines include:

- reviewing national and international guidelines to extract key statements
- generating areas of importance for which a systematic search of the literature can then be carried out
- reviewing literature and the references from the original guidelines
- assessing and categorizing the quality of evidence
- an expert review of this technical assessment by members of a multidisciplinary professional panel

The NHSS can adopt this approach as suggested by EPIC project through HAI task force to address the issue of lack of evidence-based guidelines. However, to make the outcome more effective, during the consultation period of the documents produce, the task force should make sure that they acquire an extensive input from the bottom line staff who gives a hands-on service in the healthcare delivery process. Because tacit knowledge of the healthcare workers on work and experience is a major source in identifying the practicality and realism of the issues raised and methods suggested by the task force in the consultation documents. Many respondents of the survey conducted as part of the on-going research project suggested that the experts selected for the task force groups should have at least a superficial knowledge on overall matters apart from their area of specialisation. For the reason that HAI is an outcome of combination of errors in both clinical and non-clinical processes task force has to make sure that they do not overlook even the trivial issues. Above all, there should be frequent revisions of the guidelines to provide up-to-date guidance on infection control since HAI is ever-changing in the environment because of advancement of medical technologies, use of antibiotics and changes in the built environment.

Cleanliness champions programme

The introduction of cleanliness champions to promote the prevention and control of HAI in NHSS is one of the steps taken by the Ministerial action plan. All the respondents who were
aware of the champions programme considered this as an essential change. They, including NES, believe that education and introduction of cleanliness champions into the service will give NHSS a major resource to control HAI. One of the salient features of this programme is that it selects staff from a range of areas from clinical and non-clinical (facilities management) to prepare for the new role. The main aim of appointing cleanliness champions is to ensure good practice in preventing HAI in fundamental areas such as ensuring safe practice and maintaining a safe environment. As to NES (2003), this requires skills and knowledge and hence the workers adopting the role will have to take the education programme and become role models for their colleagues. These educational programmes include web-based learning, virtual learning environments (partnership arrangements with higher educational institutions) and life long learning through Personal Development Plans (PDPs). This also includes mentorship programmes, infection control team discussions and improvement of IT skills. All these will ultimately help the cleanliness champions to perform work as ‘knowledge workers’ to develop their skills as well as to act as role models to support the other staff members who work in similar areas.

3.2 A glimpse of KM initiatives

The approaches stated in section 3.1, i.e. unified NHS boards, task force HAI and cleanliness champions programme, per se are steps to boost sharing and managing knowledge within NHSS. If summarised what has been described above, the initiatives can be depicted as shown in figure 2. All these approaches will subsequently improve integrated planning, coordinated decision making and close liaison among staff members.

3.3 Culture of healthcare organisations

The next objective of the survey which was carried out as part of the project was to identify the ‘cultural issues’ of NHSS staff. Culture is an important factor in managing and sharing knowledge as it always relates to values, beliefs, attitudes and behaviour of workers of an organisation. In healthcare, culture of the workers always matter in controlling infection. Numerous studies have shown that the major reservoir of nosocomial infection in the hospital is the infected or colonised patient and the major mode of spread of organisms between patients is on the hands of medical personnel. Hygienic hand washing in the hospital, to remove transient contaminants acquired from patients or the environment and prevents cross-infection to vulnerable patients, is regarded as one of the most fundamental infection control measures, yet it is done infrequently by personnel in most hospitals (Maki, 1989). This needs a good understanding of what infection control means and how it can be prevented through their practices.

Facilities Management (FM) services play an important role in infection control. Poor integration of the FM function to the clinical process is a major factor in causing HAI. It was recognised that there is less coordination between clinical staff and support staff in NHSS. It is evident from staff’s perception on cleaning of ward beds that they regard the cleaning of the upper part of the bed (pillows, bed linen, etc.) as a duty in clinical staff and underside cleaning (cleaning of equipment underneath the bed, floor, bed frame, etc) as the duty of the domestic staff. This segregation of tasks related to the same component or same domain by the staff members can be changed through an attitudinal change and a behavioural change within the system. The cleanliness champion’s programme stated above is one of the solutions for this. The staff should be educated on the value of sharing knowledge among the
staff members, across the organization and beyond organisational boundaries. At the same time they should be encouraged to share their experiences so as to learn lessons from those and specifically to avoid repetitions of errors, e.g. by sharing their mistakes. Besides recognition of the key role played by support staff is too crucial so as to decrease the high turn over rate of domestic staff.

3.4 Availability of Infrastructure

Infrastructure such as technology (e.g. information technology) can greatly assist in implementing knowledge management practices. Thus, it was intended to identify the availability of infrastructure in NHSS for KM initiatives. All the main Scottish organisations which deal with certain aspects of infection control such as SCIEH, PEFEx, NHS QIS, Auditor General Scotland, Scottish Executive, etc. have their own websites to publish their documents and information. Besides, the ‘SHOW website’ (Scottish Health on the Web) and e-library are pools of knowledge which give a vast amount of literature for all healthcare professionals and staff. However, although healthcare staff has basic facilities such as faxes and telephones to communicate with each other, many do not have computer facilities or access to internet facilities. Therefore, many large hospitals are in the process of setting up arrangements to provide IT facilities for all the staff due to the fact that they feel it is a major source of retrieving information and knowledge in aspects of healthcare.

3.5 Challenges – what impedes?

- From the survey it was identified that there is a lack of evidence-based explicit knowledge. This can impinge on raising the awareness of infection control throughout the healthcare. Hence, organisations such as SCIEH, NHSQIS, PEFEx, NES, etc should accentuate in developing guidelines based on evidence following the steps stated in EPIC guidelines (2001a).
- Clinical and non-clinical staff’s perceptions on work practices have led to less integration and coordination among staff members. One of the main reasons for that is their attitude. With this, staff tends to be or often become pigeon-holed with their own specialities, and only when necessary are they backed up by ad-hoc team work. Therefore, management should educate the staff to emphasise on what they are working towards and why they should work as part of a team.
- High turn over rate of FM staff due to less salaries and wages has also led to non-awareness of infection control practices. This can be overcome through implementing reward and motivation schemes for the staff and by creating a “coherent” environment.
- The use of Internet as an effective tool is not yet fully exploited in healthcare organisations. Clinical professionals have access to internet and computers but other healthcare workers, it seems, do not. Hence, healthcare management should take steps to remedy this so as to:
  - improve practices of staff, especially staff ‘on-call’, since it allows the staff to acquire updated/new knowledge at the right time
  - increase of communication through e-mails
  - increase input/feedback to the consultation or any other policy documents via on-line access
  - allow the staff to perform tasks with increased confidence
4. CONCLUSION

Hospital infection is one of the major burdens in terms of cost and quality of healthcare. NHSS has taken several initiatives to eliminate infections from the hospital environment.
Unified NHS Board system, cleanliness champions programme and HAI Task forces are all recent developments headed for this. It is anticipated that there is a move towards KM in NHSS though it is not categorized as such. KM is specifically vital in healthcare due to the fact that it requires prompt attention or quick response on customer needs, i.e. patient care, with the aid of prompt and appropriate knowledge, skills and expertise of staff for excellent delivery of services. Precisely, healthcare needs the employment of the right sets of knowledge at the right time. The restructuring activities and initiatives in the NHSS, vigorously, can enhance sharing of knowledge through healthcare institutions. This can lead to learning organisations. It can be further strengthened by promoting staff development programmes. In spite of this, essentially the value of the resource of tacit knowledge should not be underestimated. Experience and skills obtained by others should be fed back in to the work environment to enable efficient working by learning through mistakes. Initiation of task forces is a means of codifying the explicit knowledge to a greater extent and capturing the implicit knowledge to a considerable extent. During the consultation of documents management should make sure that sufficient time is given for wider consultation and feedback from many stakeholders and many healthcare workers. Also they should publicise it through public media to get feedback from all perspectives and from many healthcare settings. It was evident from the survey which was conducted as part of the on-going project reported in this paper that staff has positive insights on reformations of the NHSS; which means they prefer a ‘change’. However, steps should be taken to reduce the high burden on the healthcare workers. High workloads will cause in lessening their time on learning and developing new knowledge. Sometimes they will not be able to update themselves to suit the changes in the “current system”. High burden can also affect disseminating, transferring or sharing of knowledge. Thus, healthcare managers should draw attention on these matters. However, providing solutions for everything is impossible because capturing the knowledge of the healthcare personnel and codifying it, which is of utmost importance, still remains a challenge.

5. REFERENCES


