Hand hygiene compliance: exploring variations in practice between hospitals

This observational study examined differences in hand hygiene practice between four acute hospitals

Aim: To investigate healthcare workers’ compliance with hand-hygiene guidelines in four acute-care hospitals in Ireland and to examine factors that contributed to non-compliance.

Method: Data collectors observed healthcare workers in four hospitals.

Results: Data (n=1,737 observations) was drawn from a random sample of nurses, doctors, physiotherapists and HCAs (n=280 staff). Findings revealed that the individual hospital has a significant impact. Multivariate logistic regression analysis showed healthcare workers in centre 4 had a significantly higher likelihood of non-compliance than those in all other centres (p=0.003), irrespective of gender, discipline or area of work.

Conclusion: The findings make an important contribution to the study of healthcare workers’ hand-hygiene behaviour and control of healthcare-associated infections. A possible explanation of the results may be related to variations in organisational support and hospital culture.

Introduction

Infection control in Ireland’s health services has achieved an unenviable consensus: nearly everyone is dissatisfied with it. Patients complain about the risks associated with hospital admission and healthcare workers’ suboptimal infection-control practices. Health professionals – doctors, nurses and therapists – complain about heightened stress associated with trying to deliver care while worrying about litigation risks. Boards and managers view reports of staff members’ lack of compliance with infection-control guidelines with a sense of perplexity, while health insurance companies and lawyers complain about the lack of quality control in this area.

In the wake of yet another national hygiene ‘audit’ depicting mediocre practices in Ireland’s hospitals, the media and the Health Information and Quality Authority are talking about the role of corporate management – within hospitals – on this issue.

Some writers suggest that corporate management and organisational behaviour are synonymous. However, this is somewhat oversimplistic because there are many facets to management. Organisational behaviour does not encompass the whole of management; it is more accurately described as providing a behavioural approach to management (Mullins, 2006).

Literature review

For an infection to be acquired, there must be a source of the infectious agent (such as the patient or healthcare staff) from which micro-organisms are spread. Most commonly, staff act as the source and institutional/community influences play a central role (Pittet et al, 1999).

Hand-hygiene behaviour

Investigating compliance with hand-hygiene guidelines requires an understanding of what motivates such behaviour. For example, healthcare staff are generally aware of recommendations regarding hand hygiene but knowledge and education do not in...
take precedence over hand hygiene.

Convenience sampling was conducted due to feasibility and economic constraints. Four publicly funded hospitals were chosen. Within the areas, random sampling of staff hand hygiene was conducted. Staff were observed as they were engaged in care, attending two or three beds randomly chosen for each observational period (approximately two hours). Observation occurred between 8am and 4pm.

Data collection
Data was collected using a modified version of a structured observational schedule validated by Creedon (2005) and based on guidelines provided by the Centers for Disease Control and Prevention (CDC) (Boyce and Pitt, 2002). Inter-rater reliability (two observers) was established at 0.88.

During observations, a separate checklist was used for each healthcare worker. On the checklist, an X was placed to show discipline, area and gender. If an indication for hand hygiene was noted, a tick was placed on the checklist next to the relevant guideline, under the column ‘indication’. If hand-hygiene occurred, another tick was inserted in the column ‘occurred’. If it did not occur, no insertion was made.

RESULTS
A total of 1,737 observations were collected from 280 healthcare workers (nurses, student nurses, doctors, medical students, HCAs, physiotherapists, radiotherapists, porters and technicians).

Overall rates of non-compliance
Overall, non-compliance was 30% of indications. Non-compliance with specific guidelines varied: beginning/resuming patient care, 43%; before clinical procedures, 49%; after clinical procedures, 19%; after direct contact with body substances, 20%. Collectively, men had a higher rate of non-compliance than women: 38% versus 28%.

Overall non-compliance by discipline
Doctors and medical students had the highest rate of non-compliance at 41% of indications, followed by porters at 38%, technicians and physiotherapists at 33%, nurses and student nurses at 28% and HCAs at 21% (Fig 1).

Overall non-compliance by hospital
Collective rates of non-compliance were: hospital 1, 24%; hospital 2, 33%; hospital 3, 29%; and hospital 4, 44% (Fig 2).

Overall non-compliance by area
Hand-hygiene behaviour differed depending on people’s areas of work. Possible reasons for this may be levels of activity, patient care needs taking priority over hand hygiene, or a low staff:patient ratio. Staff who worked in A&E/trauma had the highest likelihood of non-compliance at 36%; those in ICU had the next highest level of non-compliance at 28%; staff in oncology/dialysis had the lowest likelihood of non-compliance, at 21% (see Fig 3 at nursingtimes.net).

Logistic regression analysis
When the results were compared and each variable (gender, hospital, discipline and area) was analysed to determine its statistical significance (univariate analysis) on hand-hygiene behaviour, the findings showed that gender, discipline and hospital all significantly (p<0.05) affected behaviour (see Table 1 at nursingtimes.net):

- Male healthcare workers (irrespective of discipline) were less likely to comply with hand-hygiene guidelines than women;
- Staff in hospitals 2 and 4 were less likely to comply with guidelines than their counterparts in hospitals 1 and 3;
- Oncology and dialysis have a significantly lower likelihood of non-compliance compared with ICU, while A&E and trauma have a significantly higher likelihood of non-compliance than ICU;
- Irrespective of hospital, doctors/medical students were less likely to comply with hand-hygiene guidelines than nurses/student nurses.

Multivariate logistic regression analysis:
Data was further analysed to determine whether any single variable had an overall impact on hand-hygiene behaviour. Findings revealed that, irrespective of gender, discipline and area, healthcare workers in hospital 4 were significantly (p=0.001) less likely to comply with guidelines. See nursingtimes.net for Table 2 (multivariate logistic regression).

DISCUSSION
In Ireland, the most recent prevalence study of HCAIs found an overall rate of 5% (HIS, 2007). This depended on the type of hospital: regional/tertiary, 6%; general, 4%; and specialist, 2%. This variation can be explained by risk factors inherent in patients attending these hospitals. However, when infection rates are considered within similar hospital categories, the variation becomes wider. Individual hospital rates vary from 0–13% (see p33 for details). Clearly, a wide variation exists in relation to infection rates – and patient outcomes – across hospitals within the national public health system in Ireland.

Compliance with guidelines is poor nationally and internationally. In this study, the hospital with the highest rate of non-compliance overall (hospital 4, 44%) also had the highest rate of HCAIs in the national prevalence study out of the four hospitals involved.

Acquisition of an HCAI is generally regarded as an outcome of patient care, even though there is evidence of community acquisition (Moor et al, 2008). There is evidence the quality of patient care improves with higher nurse educational levels, richer nurse skill mix, and when nurses and doctors have good relationships (Laschinger and Finegan, 2005). There is also evidence that patient care improves when managers collaborate closely with, and
themselves motivate hand-hygiene behaviour (Creedon, 2005). Self-reported and observed rates of compliance with hand hygiene differ (Jenner et al, 2006). There is also evidence that staff may be unaware of their poor compliance when their intention to perform hygiene is there (O’Boyle et al, 2001).

Hand-hygiene behaviour results from a complex interaction of many factors and no single behavioural theory has, as yet, reliably predicted behaviour. Most interventions have targeted individual practitioners and been unsuccessful. Examples of theories used to underpin interventions include: PRECEDE (Predisposing, Reinforcing, Enabling, Constructs in Educational Diagnosis and Evaluation health education model) (Creedon, 2005); theory of planned behaviour (Clayton and Griffith, 2008); and role modelling (Lankford et al, 2003). None of these interpersonal/intrapersonal theories have been successful in raising compliance.

With the exception of Larson et al (2000), there is a paucity of research in relation to application of community/organisational behavioural theories related to hand-hygiene practices. Organisational behavioural theories focus on the associations between the following: active participation in organisations; development; social support; networks; and individual behaviours such as hand-hygiene practice.

Larson et al (2000) applied Schein’s framework for changing organisational culture to design an interventional programme delivered in one of two hospitals. Hand-hygiene behaviour was measured by product usage (soap). While soap usage rose in both hospitals during the intervention period, it was more than double in the study hospital at six months’ follow up. MRSA rates were similar in both hospitals but vancomycin-resistant enterococcus (VRE) rates were significantly reduced in the study hospital at six months (p=0.002).

The Geneva programme (Pittet et al, 2000), which reported a sustained increase in hand hygiene and reduced infection rates, encompassed a number of interventions likely to affect hand-hygiene behaviour, for example provision of alcohol handrub, posters and feedback on practice. However, the effective component may have been support from high-level administrators and clinicians, which led healthcare workers to actively identify with, and participate in, optimal hand-hygiene behaviour.

THE IRISH CONTEXT
Despite the rise in attention paid to healthcare-associated infections (HCAIs) in Ireland, there is a paucity of published research around healthcare workers’ hand-hygiene behaviour in Irish health settings.

There is evidence that patient outcomes, that is, prevalence of infection rates, differ even between hospitals caring for patients of similar acuity (Hospital Infection Society, 2007). For example, infection rates were in the 2–8% range in the regional/tertiary hospitals category (n=10). In general hospitals (n=28), rates were 0–13%. In specialist hospitals, rates were 0–7%.

Given the causal relationship between hand-hygiene behaviour and infection rates, it is reasonable to consider whether healthcare workers’ behaviour differs at a hospital level. It is plausible to suggest that, if this behaviour does differ between hospitals, then such differences may very well have contributed to differences in infection rates in similar hospitals in the national survey reported in 2007.

AIMS
This study’s main aim was to examine healthcare workers’ non-compliance with hand-hygiene guidelines in four hospitals in Ireland. A second aim was to identify predictors of non-compliance during routine care and a third was to examine whether the same predictors applied to each hospital.

METHOD
The study design was observational. Data was collected in four acute-care hospitals in Ireland. Ethical approval was received.

Each hospital was publicly funded and operated on an equitable patient/staff care ratio as directed by the Health Service Executive of Ireland. Three were general hospitals (hospitals 2, 3 and 4) and one was regional (hospital 1). General and regional hospitals in Ireland provide many services such as ICU, A&E, medical, surgical and other services such as oncology or dialysis. They differ in that regional hospitals offer more specialist services on site.

The bed capacity for each hospital was:
- Hospital 1: 395 beds;
- Hospital 2: 94 beds;
- Hospital 3: 68 beds;
- Hospital 4: 88 beds.

Areas chosen were ICU, A&E and either dialysis or oncology. Choice depended on either (i) risks associated with HCAI in the area type or (ii) known predictors of non-compliance with hand-hygiene guidelines in that area. For example, prevalence of HCAI is higher in patients in ICU than in other areas because of risk factors such as use of invasive devices. Patients in oncology or dialysis units are at high risk due to levels of immunosuppression. Additionally, due to the type of care required in A&E, care may have been successful in raising compliance.

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foster, clinical autonomy in staff (Nedd, 2006).

Among the best-known models for effective management in hospitals is the ‘magnet hospital’ model in the US. The essence of a magnet hospital stems from exemplary professional practice among its healthcare workers, particularly nurses. Strong leadership, exemplary practice and empowered professionals are vital building blocks for magnet recognised organisations (American Nurses Credentialing Center, 2008). Outcomes of patient care, organisational outcomes and worker outcomes are measured to attain ‘magnet’ status, conferred by the ANCC. Better patient outcomes associated with magnet hospitals are: lower mortality (Rafferty et al, 2007) and mortality in ICU (Baggs et al, 1992); reduced nosocomial infections (Laschinger and Leiter, 2006), increased patient satisfaction (Donahue et al, 2008) and fewer medication errors (Laschinger and Leiter, 2006).

Research on magnet hospital characteristics have identified that hospitals that support unit-based decision-making, have a powerful nursing executive and promote professional nursing practice are more likely to provide superior patient care (Aiken et al, 2000). Lake (2002) identified aspects of the nurses’ work environment that define magnet hospital nursing settings: nurse participation in hospital affairs; nursing foundations for quality of care; nurse manager ability, leadership and support of nurses; staffing and resource adequacy; and collegial nurse–physician collaboration.

Findings from this study make an important contribution to the knowledge surrounding healthcare workers’ hand-hygiene practices. The factor that affected behaviour most significantly was the environment/hospital in which they worked. As these hospitals were organised on a similar basis by the Health Service Executive of Ireland, a range of factors may need to be considered to explain why one hospital was different from the others in terms of hand-hygiene practices. These factors include inter-hospital differences in healthcare staff perceptions of institutional support, autonomy, interdisciplinary collaboration, organisational behaviour and hospital culture.

Interpersonal and intrapersonal behavioural theories have been unsuccessful in predicting healthcare workers’ hand-hygiene behaviour. Community/organisational behavioural theories may be more successful, especially given the positive relationship between concepts such as institutional support, autonomy, interdisciplinary collaboration, organisational behaviour, hospital culture and patient outcomes. Kanter’s organisational behavioural theory encompasses these concepts (Kanter, 1977) and has been used in many studies to investigate these relationships, for example those by Laschinger and Leiter (2006) and Davies et al (2006).

A follow-on study is planned to investigate the relationship between healthcare workers’ perceptions of support, hospital culture, hand-hygiene practices and infection rates in Ireland.

**Study limitations**

A limitation of this study was the Hawthorne effect as healthcare workers were conscious of the data collector’s presence and the study’s purpose. While every attempt was made for data collectors to be in the unit for as long as possible before the start of data collection to help healthcare workers become comfortable with their presence, the study’s duration was constrained by funding. Nevertheless, any conclusions drawn are consistent with true findings as it is expected that, due to the study’s observational nature, compliance rates of all staff in all centres and areas were systematically affected by roughly the same proportion by the Hawthorne effect. Therefore, the conclusions hold.

**CONCLUSION**

The variable that contributed most significantly (p=0.003) to healthcare workers’ non-compliance was the hospital they worked in, irrespective of gender, discipline or area of work. Not much has been written on the impact that hospital organisational behaviour/culture may have on healthcare workers’ hand-hygiene practices.

It may be timely to investigate whether a relationship exists between organisational behaviour/hospital culture, staff hand-hygiene practices and infection rates. The central question is whether hospital-based healthcare workers who perceive they are working in a supportive environment comply more fully with hand-hygiene guidelines and, whether, as a consequence, those hospitals report lower infection rates.

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**KEY REFERENCES**


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**FIG 2. OVERALL NON-COMPLIANCE BY HOSPITAL (%)**