Fact or infection: do surgical trainees know enough about infection control?

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ABSTRACT

INTRODUCTION There exists a high level of non-compliance with basic infection control measures by medical staff. One explanation may be a lack of familiarity with contemporary infection control guidelines. As surgical trainees represent a key group of stakeholders responsible for the delivery of recommended infection control practice, we assessed knowledge of infection control guidelines amongst current UK surgical trainees.

MATERIALS AND METHODS Without warning, during the annual meeting of the UK Association of Surgeons in Training (ASiT), participating surgical trainees were asked to complete a questionnaire examining their basic knowledge of infection control and methicillin-resistant *Staphylococcus aureus* (MRSA) based on recently published guidelines.

RESULTS A total of 52 trainees (13 higher surgical trainees [HSTs]; 39 basic surgical trainees [BSTs]) returned completed questionnaires in the study. BSTs demonstrated a higher level of knowledge of infection control, outperforming the HSTs in 7 out of 11 questions. Of surgical trainees, 61.5% were misinformed regarding the prevalence of MRSA blood-stream infections and 69% were unaware of policies for transfer of MRSA-positive patients. Analysis revealed areas of concern in regards to an adequate general level of knowledge of infection control in surgical trainees, particularly in some key areas.

CONCLUSIONS To ensure patient safety and reduce hospital-acquired infections, it is vital that focused, co-ordinated programmes of education, in this rapidly changing field, are prioritised and formalised into surgical training, selection and assessment.

KEYWORDS

Infection control – Surgeons – Knowledge – Education – MRSA

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Despite both national and local government initiatives aimed at reducing rates of methicillin-resistant *Staphylococcus aureus* (MRSA) infection, the desired results remain elusive. Recent reports suggest that the governmental target for England (set in 2004) of halving MRSA infection rates by 2008 was overambitious, and local management by a number of trusts has made little progress.¹ Several reviews have suggested increased emphasis and formal assessment in infection control;^{2–4} however, full implementation of these plans will require further co-operation between the Department of Health and those designing training curricula (*i.e.* the Royal Colleges), if optimistic targets are to be achieved.⁵

Hospital-acquired infection represents a major burden to the NHS in terms of financial cost and detrimental patient outcome. In 2001, it was estimated that the cost of hospital-acquired infections to the NHS in England was around £1 billion, including additional community costs of over £50 million.⁶ The detrimental impact to local patient outcome

has been clearly demonstrated in the consistent mortality rates from hospital-acquired infections in Scotland, where 457 deaths per year are directly attributable and 1372 deaths per year are indirectly attributable to hospital-acquired infection.⁷ Surgical site infection accounts for 15–20% of all hospital-acquired infections and, using data from the Scottish Audit of Surgical Mortality (SASM) in 2006, it was found that almost 18% of patients who died following surgery had developed a hospital-acquired infection.^{8,9}

Despite the continuing impact of hospital-acquired infections on the NHS, consistent reports suggest that medical staff have poor compliance with even the most basic of infection control procedures, for instance, hand hygiene.¹⁰ Similarly, previous studies have demonstrated that levels of awareness and knowledge of infection control protocols or policies varies between specific groups of medical staff, and that compliance is greatly influenced by the examples set by senior staff members.¹¹

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Fact or Infection?

Please circle whether you think the statement is true or false
Please attempt all statements

1. Sex   Male   Female

2. What is your level of surgical Training?

Consultant	YES	NO					
Registrar - Year of training	1	2	3	4	5	6	7
SHO /Research fellow year	1	2	3	4	5		
FOUNDATION YEAR	1	2					
			MEDICAL STUDENT YEAR	1	2	3	4

3. In what region do you currently work?   England   Wales   NI   Scot   Abroad

4. In which region did you attend medical school?   England   Wales   NI   Scot   Abroad

1. MRSA is a Gram-positive coccus	True
2. Alcohol hand gel is at least as effective as recommended hand-washing in reducing MRSA transmission	True
3. Healthcare workers with eczema or psoriasis should not be involved in the care of patients with MRSA	False
4. >40% of UK <i>Staphylococcus aureus</i> blood stream infections are due to methicillin resistant strains	True
5. In carriers of methicillin-sensitive <i>Staphylococcus aureus</i> , the axillae and groin are more commonly colonised than the anterior nares	False
6. Colonisation or infection with MRSA is a contraindication to the transfer of a patient to a convalescent or nursing home	False
7. MRSA colonised patients, their relatives and carers should be advised to reduce close physical and social interaction with children and the elderly, until nasal surveillance is negative for colonisation	False
8. Many studies have demonstrated rates of nosocomial infection are associated with high levels of nursing staff workload	True
9. If new positive MRSA carriers are found amongst the previously negative inpatients in a hospital ward, health-care staff from that ward should be screened	False
10. Refusal to accept transfer of a non-emergency patient is justifiable on the basis of the risk posed to other patients by an individual's carriage of or infection with MRSA	False
11. The risk of cross-infection from an MRSA-colonised or -infected patient to other patients in an ambulance is minimal if the ambulance staff apply standard infection control precautions	True

Figure 1 The infection control knowledge questionnaire.

Surgical trainees in the UK comprise one of the largest medical hospital staffing groups. This, combined with the nature of their interventional occupation and the frequency of contact with both infected and debilitated patients, makes them a vitally important stakeholder in the provision of adequate infection control measures in the hospital setting.

In order to detect whether further action was required, a questionnaire study was designed to assess the level of knowledge about current infection control policy and principles within this important staff grouping.

Materials and Methods

During the March 2007 Annual Conference of the Association of Surgeons in Training (ASiT) held in Belfast, a questionnaire was simultaneously distributed to trainees

during one identified session. Trainees were requested to complete the anonymous questionnaire individually and return them to the distributors at the end of the session. The questionnaire was designed to assess levels of infection control knowledge and was based on recently published UK guidelines.⁵

In addition to questions regarding the demographic details of the trainee, the questionnaire consisted of 11 statements in which the trainees had to nominate whether they thought the statements were true or false, in relation to contemporary infection control policy advice (Fig. 1). Four independent experts in microbiology and infection control designed the questionnaire. All four microbiologists agreed the final questions and answers to be included in the questionnaire; five statements within the questionnaire were true and six statements were incorrect.

Attendance figures were obtained from the ASiT executive committee. Participants who provided spoiled questionnaires, who had less than 3 months' surgical training or who were currently working as surgical consultants were excluded from later analysis in the study.

Questionnaire results were transcribed to Microsoft Excel® worksheet for later statistical analysis. Chi-squared, Fisher's Exact Test was used to calculate significance. Permission was obtained from Lothian Regional Ethics Committee and no external funding was sought.

Results

A total of 220 trainees attended the Belfast conference (10% of total ASiT membership). There were 82 trainees present at the time of the questionnaire distribution, of whom 61 trainees participated and responded in the questionnaire study (75% participation). Nine (14.75%) questionnaires were excluded from full analysis (2 questionnaires spoiled, 5 respondents not of sufficient level of surgical experience and 2 were consultants).

Demographics

Thirty-eight (73%) of the participants were male and 14 (27%) were female. Thirteen (25%) were higher surgical trainees (HSTs), 39 (75%) were basic surgical trainees (BSTs). HSTs were deemed to have been those awarded a National Training Number at the time of survey, staff grade surgeons or those who were visiting overseas fellows. BSTs included those in the research/clinical fellow posts, senior house officer level or foundation training programmes.

Results by demographic

Trainees answered, on average, 7.8 (71%) out of 11 questions correctly. The level of correct answers obtained for subgroups of trainees was analysed by sex (male 70%, female 74%) and training level (HST 68%, BST 72%).

Figure 2 The percentage of correct answers by higher surgical trainees (HSTs) and basic surgical trainees (BSTs) for individual questions.

Two consultant-level attendees also agreed to participate in the study at the time of the survey. Whilst detailed demographic analysis was not performed on the consultant questionnaires obtained, the average level of correct answers was 9 out of 11 (82%; *i.e.* one more question on average answered correctly in this cohort).

BSTs outperformed HSTs in 7 out of 11 questions and answered more questions correctly overall (Fig. 2). Several questions were notable by the poor number of correct answers given. Question 4, concerning prevalence of MRSA bacteraemia was only answered correctly by 4 (31%) HSTs and 16 (41%) BSTs (mean, 39%; $P = 0.74$). Question 9, concerning screening of staff if new MRSA carriers are identified on the ward, was only answered correctly by 6 (46%) HSTs and 21 (54%) BSTs (mean, 52%; $P = 0.75$). Finally, Question 10, concerning transfer of MRSA-positive patients, was only answered correctly by 2 (15%) HSTs and 14 (36%) of BSTs (mean, 31%; $P = 0.3$).

Discussion

Ensuring that healthcare workers are effectively educated and competent in infection control continues to pose a challenging problem for those concerned with maintaining standards in surgery, training and patient outcomes. Infection control is a rapidly expanding specialty and has recently received unprecedented levels of attention due to the rise and impact of hospital-acquired infection.⁵ This provides a major challenge to the governmental and external agencies, at both national and local level, involved in delivering reduced infection rates and producing effective infection control guidelines.

Whilst previous authors have examined levels of knowledge in various groups of healthcare workers, little has

been reported on the contemporary levels of infection control knowledge in UK surgical trainees. Surgeons and surgical trainees compose one of the largest staff groupings of hospital doctors within the NHS and the nature of their daily work requires strict adherence to infection control policies to reduce patient morbidity and mortality from hospital-acquired infection.

The average number of correct answers in this study was 7.8 out of 11 (71%), demonstrating deficiencies in infection control knowledge, particularly in some key areas. MRSA bacteraemia can have a mortality of 23.1%, and importance is placed in early recognition to provide appropriate management.¹² Within our cohort, only 39% of the group were aware of the prevalence of MRSA bacteraemia. This reveals a lack of awareness to the changing epidemiology of infection within the UK and may reflect possible further deficits in core knowledge, including the rapid increase of *Clostridium difficile* and MRSA infection.¹⁵ Knowledge concerning the screening of staff for MRSA colonisation was similarly poor, with only 52% answering correctly. This reflects a lack of familiarity with guidelines for control and prevention of MRSA and, therefore, raises concerns regarding the level of understanding of other infection control policies within this cohort. Finally, 69% of the surgical trainees would refuse to accept transfer of a non-emergency MRSA-positive patient due to risk posed to other patients. This is contrary to current guidelines and may compromise a patient's ability to receive specialist care or increase their in-patient stay.⁵

Due to the changing epidemiology and evolving knowledge regarding this subject, interventions to increase infection control knowledge must be available to surgical trainees throughout their career. Infection control campaigns must initially include undergraduates to instil good

practice from an early stage and quality of teaching is essential for current and future practice.^{2,14} Authors have previously recommended a multifaceted approach, combining computer-aided learning packages, formal Objective Structured Clinical Examination-type assessment and clear and better role models. These approaches have shown to be demonstrably better in improving knowledge.^{2,10,11,15,16}

Computer-aided learning packages are at least as effective as formal lectures, and the student can access the learning material in their own time and at regular intervals throughout their undergraduate career.¹⁷ New electronic online surgical training formats could provide an ideal platform for learning and allow interactive assessment of post-graduate students, and for course content to be modified far more flexibly, in the face of continually changing knowledge or advice. Purpose-designed infection control diploma courses are widely available and provide a more formal and comprehensive educational tool for those seeking further knowledge and a qualification in the area.

In addition to increasing the content of traditional examinations to reflect more focus on this subject, the introduction of Objective Structured Clinical Examinations at recruitment and selection centres may provide trainees the ample incentive to learn core skills and knowledge in infection control.² However, these changes will require support from institutions of surgical learning and will only follow a reflective evolution in the core surgical training curriculum.

Locally, senior staff play a fundamental part in influencing the practice of junior staff through peer teaching of infection control.¹⁸ Junior staff and students are likely to mimic the incorrect example of peers; therefore, it may be that focused training and educational programmes aimed at senior staff should be implemented.¹⁰

Conclusions

This questionnaire study demonstrates a lack of knowledge in regards infection control policy amongst contemporary surgical trainees. Wide-spread improvement in surgical staff infection control knowledge will require a concerted effort to be employed by those designing surgical curricula. This would be assisted by a rationalisation of the many differing sources of advice in this field, produced by a multitude of local, regional, national, governmental and voluntary sector stakeholders in infection control.

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