The incidence and reporting rates of needle-stick injury amongst UK surgeons

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ABSTRACT

INTRODUCTION Needle-stick injuries are common. Such accidents are associated with a small, but significant, risk to our career, health, families and not least our patients. National guidelines steer institution-specific strategies to provide a consistent and safe method of dealing with such incidents. Surgeon-specific guidelines are not currently available. We have observed that hospital sharps policy is often considered cumbersome to the surgeon, resulting in on-the-spot decision making with potential long-term implications. By their essence, these decisions are inconsistent, not reproducible and, thus, we believe them to be unsafe. The under-reporting to occupational health departments is well documented. Current surgical practice has the potential to expose the surgeon to unnecessary risk. The aims of this study were to establish the true incidence of contaminations caused by needle-stick injury in our hospital and to assess how well current protocols are really implemented.

SUBJECTS AND METHODS We identified all surgeons of consultant, non-career staff grade (NCSG) and registrar grade working in a large 687-bed district general hospital serving a population of 550,000, in the UK. We designed a retrospective, anonymous 30-second survey. Surgeons' awareness and opinion of local policy was sought in a free-text section.

RESULTS Of the 98 surgeons in the hospital, 77% responded to the questionnaire and 44% anonymously admitted to having a needle-stick injury. Only 3 of the 33 (9%) who sustained an needle-stick injury said that they followed the agreed local policy. Twenty-three surgeons (70%) performed first aid type procedures such as informing scrub nurse, changing needle and gloves. Seven surgeons (21%) simply ignored the incident and continued. Forty-three surgeons commented on the policy's nature with only 9 who regarded it as 'user friendly'.

CONCLUSIONS Needle-stick injury is still a common problem, particularly in the surgical cohort and remains significantly under-reported. The disparity between hospital sharps policy and actual surgical practice is considered and an explanation for the difference sought. Without this awareness of 'real-life' surgical practice, the occupational health figures for sharps injury will always tell a rosy story under-estimating a real problem. We strongly advocate universal precautions in the operating theatre. However, we acknowledge that sharps injuries will occur. We should remain vigilant and act upon contaminations without surgical bravado but with matter-of-fact professionalism. This includes regular review of policy and, particularly, promotion of surgical awareness.

KEYWORDS

Needle-stick injury – Sharps injury – Surgical contamination – Blood-borne viruses – Reporting rates

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Needle-stick injuries are common^{1,2} and increasing in frequency throughout all healthcare settings.³ The operating theatre environment is the second most common setting in which such injuries occur and is responsible for 19% of all high-risk exposures reported to the Health Protection Agency.⁵ Even when universal precautions are strictly observed, such accidents are inevitable, stressful and are associated with a small, but significant, risk to our career, health, families and not least our patients. National guidelines and institution-specific strategies aim to provide a consistent and safe method of dealing with such incidents.

Locally devised policies must comply with national standards laid down by UK health departments⁴ incorporating Health and Safety Executive legislation.^{5–8} They rely on establishing a level of risk that is acceptable to all. We have observed that these policies may appear particularly cumbersome to the surgeon, resulting in on-the-spot decision making with potential long-term implications. By their essence, these decisions are inconsistent, not reproducible and, thus, we believe them to be unsafe. The under-reporting to occupational health departments is well established.^{2,9–11}

The prevalence of blood-borne viruses such as hepatitis B and C and human immunodeficiency virus (HIV) continue to increase in the general community.^{12,15} Trend data collected by the Health Protection Agency Centre for Infection Surveillance between 2002 and 2005, reported in *The Eye of the Needle*,³ reveal a 49% overall increase in reported occupational exposures. The medical profession carries a disproportionate burden of significant exposures (*i.e.* exposure to a high-risk patient). In 2005, two hepatitis C seroconversions were recorded. One of these cases occurred in the operating theatre. The report states that the healthcare worker could not have acted differently to prevent the exposure. The total number of hepatitis C seroconversions for the years 1997 to 2005 stands at 11. By 2005, there had been five documented patient-to-healthcare worker HIV transmissions reported to the agency and 16 probable seroconversions (these cases had no documented HIV negative test before their significant exposure and, therefore, a subsequent positive test cannot be regarded as a documented transmission). Although these transmissions remain small in number, the consequences to those involved are catastrophic. It is apparent that current surgical practice has the potential to leave the surgeon exposed. The aims of this study were to: (i) establish the true incidence of needle-stick injury; and (ii) assess how well the current Sharps Safety Policy and Needle Stick Injury Pack is implemented.¹⁴

Subjects and Methods

We obtained approval from the local hospital audit committee. We performed a multidatabase electronic literature review. We identified all surgeons of consultant, non-career staff grade (including associate specialist) and registrar grade working in a busy, 687-bed district general hospital serving a population of 550,000, in the UK. All on-site specialties were included. There is no on-site neurosurgery, cardiac surgery or plastic surgery.

To identify the incidence of needle-stick injury during the preceding 6-month period and establish the post-event behaviour of the individual surgeon, we designed a retrospective, anonymous 30-second survey (Appendix 1). A simple free-text section was also included to assess surgical opinion on this subject.

Results

A total of 98 questionnaires were distributed. There were 75 respondents (77%), comprising 36 consultants, 24 registrars and 15 non-career staff grades (Table 1). All 75 responses are documented in Appendix 2.

Of the 75 respondents, 33 (44%) anonymously admitted to at least one needle-stick injury over the study period. One

Figure 1 Needle-stick injury by grade of surgeon (NCSG, non-career staff grades).

Table 1 Questionnaire response by grade of surgeon

	Consultant	NCSG	Registrar	Total
Needle-stick injury	18	5	10	33
No needle-stick injury	18	10	14	42
Total	36	15	24	75

NCSG, non-career staff grades

surgeon admitted to more than 10. Needle-stick injury occurred irrespective of surgical experience (Fig. 1).

A very small number of surgeons followed the Sharps Safety Policy (3 out of 33 [9%]), significantly fewer than those who typically undertake other post exposure actions ($P = 0.09$; 95% confidence interval, 0.03–0.24). First aid type precautions involving informing scrub nurse, changing gloves and needle were overwhelmingly the most popular mode of action (23 of the 33 needle-stick injuries [70%]). The rest (7 of 33 needle-stick injuries [21%]) chose to ignore the needle-stick injury and continue without any pro-active action (Fig. 2 and Table 2).

Staff grade surgeons were better at following the Sharps Safety Policy (NCSG 40%, registrar 0%, consultant 0.06%).

All 75 respondents expressed a degree of awareness of the Sharps Safety Policy. Of these, 19 felt fully aware of the local policy and 3 were totally unaware of its existence.

Counting only the surgeons who responded with regards to their own experience of the policy, only 9 found the Sharps Safety Policy friendly to use, 34 found it cumbersome or difficult to use, and 32 surgeons did not comment on an experience with the policy.

Of the three surgeons who followed the policy after their exposure, two considered the experience friendly whilst the other found it a cumbersome effort. Of the 30 who did not

Table 2 Analysis of those who did and did not follow policy by grade of surgeon

	Consultant	NCSG	Registrar	Total
Followed policy	1	2	0	3
Did not follow policy	17	3	10	30
Total	18	5	10	33

NCSG, non-career staff grades

follow the policy following their exposure, 21 considered the policy either difficult to follow or cumbersome with the other 9 providing no explanation. None considered the policy user friendly.

Twenty-one comments were received in the free-text section with a wide range of views and suggestions.

Discussion

Our study not only supports previously published work demonstrating that needle-stick injury is common and significantly under-reported problem,^{2,9-11} but also demonstrates for the first time that surgeons are a particularly at-risk group. With the rising population prevalence of blood-borne viruses^{12,13} and the increasing incidence of all exposures and significant exposures to the Health Protection Agency, we believe that the risks to the surgeon are increasing. We propose that the disparity between actual surgical practice and that advised by local policies and national standards at the

time of this study should be considered and an explanation for this difference sought. Without this awareness of 'real-life' surgery, the occupational health rates of needle-stick injury will always tell a rosy story under-estimating a real problem.

Our hospital's Sharps Safety Policy¹⁴ had been well developed and conforms to the national standards. It contains useful advice about prevention strategies to avoid sharps injuries occurring both in and outside of the operating theatre. It defines a sharp as 'any object in the healthcare setting that could puncture the skin and thus permit the entry of bacteria and viruses into the body'. The list of examples is extensive, although not exhaustive, and includes implements such as scalpel blades, diathermy, towel clips, drill bits, forceps, skin clips, osteotomes and bone spikes.

The local policy defines a sharps injury as 'an injury where a needle or other sharp contaminated with blood or high-risk body fluid penetrates percutaneously. This includes cuts, pinches, scratches, nicks, gashes and bites which break the skin.' Needle-stick injury and sharps injury are terms often used interchangeably, needle-stick injury being sharps injuries caused by a needle and the most commonly reported of this type of injury. We used the needle-stick injury term in our study but made no attempt to define it, leaving this up to the individual, representing more accurately the operating theatre experience. A more recent edition of the policy, The Action Pack,¹⁵ avoids confusion by using the collective term 'contaminations'.

Clearly, the abundance of sharps available and in constant use in the operating theatre creates a unique environment in the context of the wider hospital. It is no surprise, therefore, that the incidence of contaminations in our surgical participants is greater than previously seen when all healthcare professionals are studied.

The hospital Sharps Safety Policy and Needle Stick Injury Pack (now The Action Pack) are readily available in all of our operating theatres and contain instructions of how to act following a sharps injury. Our experience and findings in this study suggest that the procedures are viewed as cumbersome or difficult to use by the majority of surgeons. We are aware that these pre-conceptions, whether accurate or not, will in themselves act as a barrier to reporting.

We set out in this study to establish the true incidence of needle-stick injury by anonymously questioning surgeons of all grades and specialities in our centre. The 44% (33 surgeons) who anonymously admitted to at least one needle-stick injury over our study 6-month period is similar to previously reported incidences. Work by Elmiyeh *et al.*⁹ studying all healthcare workers showed an incidence of 38% per year. However, in their study, 51% of respondents reported all of their injuries. Wallis *et al.*¹⁶ found a mean rate of 1.4 sharps or eye exposures per year (range, 0-12 exposures per year) in consultant orthopaedic surgeons with a reporting rate of 33% (their overall questionnaire response rate was

34%). We found that only three surgeons (9%) were inclined to adopt the procedures documented in the pack, readily available in their operating theatre. We see this as worryingly poor post-event behaviour. Elmiyeh *et al.*⁹ observed that doctors, as a cohort, were worse than other healthcare professionals, but did not elaborate further on a surgical cohort.

We feel these post-exposure response rates particularly in the surgical cohort are unacceptably low. Our study is small, retrospective and confined to one centre, but we have no reason to believe that its findings are not accurate or representative of the wider problem. These under-reporting rates fall significantly short of any reported before. Occupational health estimates of surgical incidents will fall far short of the true incidence if they use data collected over a variety of healthcare professionals.

We feel that we have commenced on the first step to improving the overall management of surgical contaminations by establishing, initially only on a small scale, the true incidence of the surgical problem. The next step is to tackle the circumstances surrounding the incidents and the subsequent post-event behaviour. To do so, we must look at the on-the-spot decision making that goes on at the time of an incident.

We postulate that surgeons make an initial risk assessment. There is a sense of security arising from the hepatitis B vaccination. The only cases reported in *The Eye of the Needle* where hepatitis B transmission had occurred were in healthcare workers who were not immunised or only mounted a partial response to the vaccine.⁵ Ergo, if immunised, then safe. Similarly, documented transmission of other blood-borne viruses even after significant exposure is low (HIV 0.3%; hepatitis C 3%). Furthermore, HIV post-exposure prophylaxis using anti-retroviral agents is unpleasant and not without its own risks. We doubt, however, that any surgeon would question the benefits of post-exposure prophylaxis following a known transmission. For hepatitis C, there is no effective post-exposure prophylaxis currently available. We also note the poor adherence to the national guidelines following a properly reported hepatitis C exposure, with only 20% of cases performing the correct tests at the correct times.³ We suspect that, if the surgeon deems the patient to be low risk, he or she is unlikely to pursue the matter further.

We also postulate that surgeons may perceive an exposure and its consequences as a threat to their own career. This may lead, even in the event of a high-risk, significant exposure, to not report the event.

Lastly, we suspect that surgeon apathy and other perceived priorities cause significant under-reporting. Wallis *et al.*¹⁶ found that the most common reason for not reporting exposures by orthopaedic consultants was that the reporting system was too complex.

Some of these proposed explanations leading to under-reporting are misguided. In fact, blood taken from a surgeon following an exposure is stored and only analysed at a

later date if there is evidence of seroconversion. Testing of the source blood allows the surgeon to receive post-exposure prophylaxis for as short a period as possible, a full course in the event of a HIV exposure or follow-up with a view to early treatment when indicated following a hepatitis C exposure. If the source is found to be without blood-borne infections, the post-exposure prophylaxis can usually be stopped after a short period (24–48 h). We note the lack of effective hepatitis C vaccine and that 85% of hepatitis C seroconversions occur asymptotically.^{3,17} Routine follow-up to detect and document transmission is, therefore, essential. In the vast majority of cases, the surgeon's blood will not be tested and the career implications only realised if there is a reciprocal benefit to health. Without this baseline test, the surgeon risks losing the ability to identify a particular exposure as the index contamination and calls unwanted legal questions of culpability into the frame.

We do not believe that surgical apathy is an appropriate reason for failure to report. On-going education to re-inforce this important matter is essential to maintain its priority.

Conclusions

We are concerned that the post-event practice of the overwhelming majority of the surgical cohort has the potential to fail and consequently renders them at greater risk than need be. Strategies to combat the discrepancy between incident and reporting rates include making the reporting system more user-friendly with less 'form filling' (as frequently requested in respondent's comments). Surgeon education to advertise a more user-friendly procedure is essential. Surgeons must again be encouraged to report each and every incident as this is the only true way to ensure that, in the rare but important event of an exposure occurring, correct management of the potential transmissions occurs and the episode can be identified as the index event.

We strongly advocate universal precautions in the operating theatre. However, we acknowledge that sharps injuries will occur. Bespoke surgeon-specific guidelines may be required to help protect us in the future, but the true incidence of needle-stick injury and post-exposure actions is required to provide the impetus for any change.

The focus of our attentions should be to remain vigilant and act upon these events in a proactive manner, without surgical bravado but with matter-of-fact professionalism. This includes the regular review of the guidelines and promotion of surgical awareness.

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APPENDIX 1

The anonymous 30-second survey of needle-stick injuries in surgeons

Please circle your correct response to each question

PART 1

1	What grade of surgeon are you?	Consultant	Non-career staff grade	Registrar
2	Have you had a needle-stick injury in the past 6 months?
Yes (If Yes go to part 2)
No (If No go to part 3)			

PART 2

1	In the past 6 months, how many needle-stick injuries have you had?	1–5	6–10	> 10
2	What action do you most commonly take?
Ignore and continue
Replace gloves, replace needle
Inform scrub nurse
Follow each step of local policy			

PART 3

1	Are you aware of your local sharps policy and procedures?
Fully aware of policy and procedures
Aware policy exists but unaware of procedures
Unaware of policy or procedures
2	How user friendly is your policy?
User friendly
Able to follow but with difficulty
Difficult to follow

Your comments:

(PTO if required)

Thank you for your contribution

APPENDIX 2

Individual responses to questionnaire

Grade	Recent stick?	How many	Action	Awareness	Friendliness	Grade	Recent stick?	How many	Action	Awareness	Friendliness
Consultant	Yes	>10	First aid	Unaware	No answer	NCSG	No			Fully aware	Cumbersome
Consultant	Yes	1–5	First aid	Fully aware	Cumbersome	NCSG	No			Fully aware	Cumbersome
Consultant	Yes	1–5	First aid	Fully aware	Cumbersome	Registrar	No			Partially aware	Cumbersome
Registrar	Yes	1–5	First aid	Fully aware	Cumbersome	Consultant	No			Partially aware	Cumbersome
Consultant	Yes	1–5	First aid	Partially aware	Cumbersome	Consultant	No			Partially aware	Difficult
Consultant	Yes	1–5	First aid	Partially aware	Cumbersome	Consultant	No			Fully aware	Friendly
Consultant	Yes	1–5	First aid	Partially aware	Cumbersome	Consultant	No			Fully aware	Friendly
NCSG	Yes	1–5	First aid	Partially aware	Cumbersome	Registrar	No			Fully aware	Friendly
Registrar	Yes	1–5	First aid	Partially aware	Cumbersome	Consultant	No			Partially aware	Friendly
Registrar	Yes	1–5	First aid	Partially aware	Cumbersome	Consultant	No			Partially aware	Friendly
Registrar	Yes	1–5	First aid	Partially aware	Cumbersome	Registrar	No			Partially aware	Friendly
Registrar	Yes	1–5	First aid	Partially aware	Cumbersome	Registrar	No			Partially aware	Friendly
Consultant	Yes	1–5	First aid	Partially aware	Difficult	Consultant	No			Partially aware	No answer
Consultant	Yes	1–5	First aid	Partially aware	Difficult	Consultant	No			Partially aware	No answer
Consultant	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Consultant	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Registrar	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Registrar	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Registrar	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Consultant	Yes	1–5	First aid	Partially aware	No answer	Consultant	No			Partially aware	No answer
Registrar	Yes	1–5	First aid	Partially aware	No answer	NCSG	No			Partially aware	No answer
Registrar	Yes	1–5	First aid	Partially aware	No answer	NCSG	No			Partially aware	No answer
NCSG	Yes	1–5	Follow policy	Partially aware	Cumbersome	NCSG	No			Partially aware	No answer
Consultant	Yes	1–5	Follow policy	Fully aware	Friendly	NCSG	No			Partially aware	No answer
NCSG	Yes	1–5	Follow policy	Partially aware	Friendly	Registrar	No			Partially aware	No answer
Consultant	Yes	1–5	Ignore	Partially aware	Cumbersome	Registrar	No			Partially aware	No answer
NCSG	Yes	1–5	Ignore	Partially aware	Cumbersome	Registrar	No			Partially aware	No answer
Consultant	Yes	1–5	Ignore	Partially aware	Cumbersome	Registrar	No			Partially aware	No answer
NCSG	Yes	1–5	Ignore	Fully aware	Difficult	Registrar	No			Partially aware	No answer
Consultant	Yes	1–5	Ignore	Fully aware	Difficult	NCSG	No			Partially aware	No answer
Consultant	Yes	1–5	Ignore	Fully aware	Difficult	NCSG	No			Partially aware	No answer
Consultant	Yes	1–5	Ignore	Partially aware	Difficult	Consultant	No			Partially aware	No answer
Consultant	No			Fully aware	Cumbersome	Registrar	No			Unaware	No answer
Consultant	No			Fully aware	Cumbersome	Registrar	No			Unaware	No answer
NCSG	No			Fully aware	Cumbersome	Registrar	No			Partially aware	Difficult
Registrar	No			Fully aware	Cumbersome	NCSG	No			Partially aware	No answer
Registrar	No			Fully aware	Cumbersome	NCSG, non-career staff grade.					
Consultant	No			Fully aware	Cumbersome						