Involving users in the design of a system for sharing lessons from adverse incidents in anaesthesia

S. Sharma,[1] A. F. Smith,[2] J. Rooksby[3] and B. Gerry[4]

1 Specialist Registrar in Anaesthesia, Department of Anaesthesia, Blackburn Royal Infirmary, Infirmary Road, Blackburn, BB2 3LR, UK
2 Consultant Anaesthetist, Department of Anaesthesia, Royal Lancaster Infirmary, Ashton Road, Lancaster, LA14 4RP, UK
3 Research Associate, Department of Computing, Lancaster University, Lancaster, LA1 4YT, UK
4 PhD Student, Centre for the Study of Technology and Organisation, Department of Organisation, Work and Technology, The Management School, Lancaster University, Lancaster, LA1 4YT, UK

Summary

In this qualitative study using observation and interviews, 10 anaesthetists from five Departments of Anaesthesia in the North-West region of England were enlisted to participate in the design of an online system to allow the sharing of critical incidents. Respondents perceived that existing schemes had differing and sometimes conflicting aims. Reporting was used for reasons other than simply logging incidents in the interests of promoting patient safety. No existing scheme allowed the lessons learned from incidents to be shared between members of the professional group from which they arose. Using participants' suggestions, we designed a simple, secure, anonymous system favouring free-text description, intended to enable the on-line sharing and discussion of selected incidents. Seven incidents were posted during the 6-month pilot period. The practitioners in our study valued the opportunity to share and discuss educational incidents 'horizontally' within their community of practice. We suggest that large-scale reporting systems either incorporate such a function or allow other systems that permit such sharing to co-exist.

A national system for co-ordinating the collection and analysis of adverse incidents in healthcare is being introduced in the UK [1, 2]. The educational value of discussing events within the professional community in which they occur is also widely recognised but neither the new national scheme nor its forerunner (designed to help hospital Trusts comply with the requirements of the Clinical Negligence Scheme for Trusts – CNST) supports the sharing of incidents within professional networks. The specialty of anaesthesia has pioneered reporting in healthcare [3] but even the Royal College of Anaesthetists' current software does not allow the sharing of incidents between individual departments. Individuals or groups have designed all these systems with little or no formal consultation with potential users.

We aimed to address these problems by involving users in designing a new reporting system that would allow anaesthetists to share reports with each other and preserve the educational value of discussion within the anaesthetic community.

Methods

With approval from the North-West Regional Multi-centre Research Ethics Committee, we wrote to the consultant anaesthetists with responsibility for audit in 10 anaesthetic departments in the North-West region of England late in 2001. Seven expressed an interest and we visited their departments to discuss the project and recruit subjects for interview. Initially, five consultants (four of whom were the lead clinicians for critical incident reporting in their departments) and a specialist registrar took part. During the course of the project, an additional four consultant anaesthetists became involved. This arose through changes in audit co-ordinator roles.

We gathered data from three rounds of semistructured interviews, observations of audit meetings and anaesthetic practice, a validation workshop in which the prototype system was demonstrated before implementation, and documentary analysis of incident reporting forms or copies of outputs from the system. Interview prompts in the first round included respondents' use of information technology in the workplace, their views on critical incident reporting in general, incident reporting procedures at their hospital and their thoughts on having an online incident reporting scheme. The second round focused on respondents' views of the prototype online reporting system. Suggestions for improvement were invited.

A workshop was then held to present the final design of the system and to allow the participants to negotiate the role of the pilot scheme and agree, as a community, how they might use it. A third round of interviews, between 10 and 12 months thereafter, invited respondents to recount their experiences with the pilot and their views on how well the system worked. All interviews were carried out by the same two researchers (JR and BG) and were tape recorded and transcribed for analysis. Analysis proceeded by the constant comparative method [4]. By way of validation, participants were shown their first interview transcripts and invited to comment on accuracy and content during the second round of interviews [5].

Results

We have 19 h of interview data from all 10 respondents (representing five departments) from all three rounds, and observational material obtained from departmental audit meetings and a theatre session attended by the system developers (JR and BG).

All respondents worked in hospitals where there were at least two different critical incident reporting schemes running concurrently – a hospital-wide CNST scheme and a departmental scheme. The purposes of the two reporting schemes were felt to be so opposed that they could not be integrated. It also became apparent that existing reporting systems are used not simply to promote patient safety, but also to express grudges against other staff, to highlight staff or equipment shortages to management, and as a means of 'being seen to do the right thing'. This seemed particularly to apply to the use of Trust schemes.

Feedback on incidents to the anaesthetic departments was problematic in all Trusts except one. Typically, reports would be written and not followed up, or feedback came in the form of aggregated data. Those that had access to computer databases of critical incidents had difficulty interrogating the system to extract relevant data. In addition to being able to obtain data about critical incidents on a large scale, participants valued feedback about specific incidents from their peers. Discussing incidents with colleagues was seen as an opportunity for learning. For this reason, the most useful field in the report forms was considered to be the description of the incident, as it contained the narrative. Many of the existing reporting systems required individuals to be identified, and this was thought to hinder reporting. Participants felt that although incident reports are seen as a positive resource within the department, outside the practice context where they arose they may be viewed in a more judgemental light and so anonymous reporting was preferred. Existing reporting schemes are mainly paper-based. All the departments had computer facilities, but it was clear that within departments there was a broad range of computer and web use.

From participants' comments it was possible to specify three aims of the proposed scheme:

● it should complement, not replace, existing schemes, by allowing the sharing of selected incidents of particular educational value;
● it should be computer-based but simple;
● it should allow for anonymity where desired and be secure so that only members of the anaesthetic audit community could gain access to the site.

Primary reporting would continue to the existing schemes, but would then be followed by submitting a summary of the original report to the online system. It was proposed that each participant would represent their department and submit not only their own critical incidents but also those that had occurred within their department. It was envisioned that this could be done after incidents had been presented and discussed. It was generally agreed that an online system would be practical, although, as some respondents suggested that their use of the Web was only occasional, a notice board presentation was considered the most workable option. All were agreed that the site should be secure, accessed by username and password only. Further, although anonymous reporting was preferred, our data suggested that authors did want to know who might potentially be reading their reports.

We therefore produced lightweight, web-based software supporting a 'bulletin board' [6]. The interface was intentionally kept very simple (Fig. 1). The 'Write Reports' option led to an input form largely based around the Royal College of Anaesthetists' form, which most participants found familiar and easy to use. It was recognised as being over-complex for the needs of this system, but was used as a starting point. Participants were divided on the issue of free text vs. categorisation, but as a compromise we agreed that there would be 10 fields in
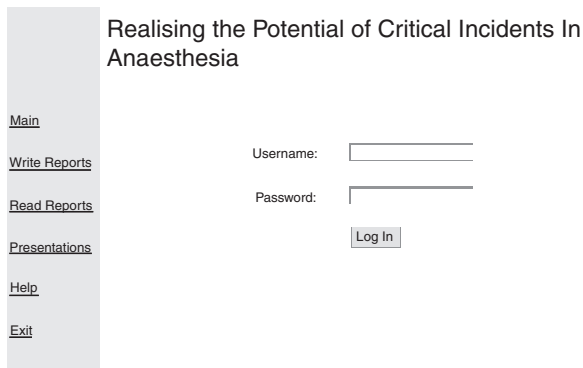
Realising the Potential of Critical Incidents In Anaesthesia

Main

Write Reports

Read Reports

Presentations

Help

Exit

Username: [   ]

Password: [   ]

[Log In]

Figure 1 Screenshot of system home page.

Table 1 Fields in the Incident Form.

Reporter	Textbox
Patient's age	Textbox
Patient's sex	Textbox
ASA physical status	Dropdown menu
Urgency	Dropdown menu
Factors associated with the incident	Checkboxes
What effect did the incident itself have upon the patient/staff?	Dropdown menu
How preventable do you think the incident will be by further resource?	Dropdown menu
Please describe what happened	Text area (Compulsory)
What lessons can be learned from this?	Text area

this form (Table 1), the only compulsory one being the 'Please Describe What Happened' unlimited free text box. Users were able to view the database at any time and add their own comments to critical incidents that had been posted on the notice board, so establishing an ongoing dialogue about specific incidents. In addition, an E-mail of the reports entered that month was sent to all the participants every month. Contributors were not required to enter their names on the report, but could do so if they wished. The 'participants' option on the website listed the name and affiliation of every individual with access to the system. This design was demonstrated at a group workshop and approved by those present.

The pilot ran for 6 months (September 2003–February 2004). During this time, seven reports were posted. The types of incidents included complete oxygen delivery failure from an anaesthetic machine, a postoperative vocal cord palsy, drug errors, equipment problems, anaphylaxis and a case of an undiagnosed subclavian stenosis giving a falsely low blood pressure reading. Figure 2 shows one of the incidents posted. Participants in follow-up interviews claimed that they liked the system and in many aspects felt that it was a success. In particular, the features that were thought to have worked well were the simple format, the

anonymous reporting, the ease of submitting and reading reports, the quality of the reports, the facility to add comments to reports, and the monthly E-mail newsletters. There were a number of reasons suggested for the small number of reports posted to the system (Table 2).

Discussion

In this paper we have given an overview of the design and implementation of the UK's first online critical incident reporting system for sharing incident reports between anaesthetic departments.

One of the main strengths of the system lay in the fact that its users were involved in its design from the outset and were given the opportunity to shape the final product [7]. Allowing the system's developers access to audit meetings and the operating theatre provided them with valuable insights into the likely constraints on the system in day-to-day use. In addition, this highlighted the importance of designing a system in which data from peer review of incidents at audit meetings could be captured. Such discussions can be very powerful educationally as they unlock some of the often-unvoiced 'tacit' aspects of professional knowledge [8]. This design strategy is in contrast to the 'top down' approach of existing reporting systems. Designing it in this way created a very simple online form centred on the narration of the incident rather than the categorisation of data.

Our results suggest that practitioners value the opportunity to 'trade' educational lessons but fear that this benefit may be lost from large-scale reporting systems. Our online system, restricted to the anaesthetic community of practice, allowed participants access to the full database of reports and gave them the facility to add comments to reports posted, and obtain timely feedback. On the other hand, Bloomfield has drawn attention to the tendency to design information systems to enable data to be codified and counted [9]. This invariably results in the data being summarised to make them more manageable, but generally results in a loss of contextual detail. Anonymous reporting was also a much desired feature. Many other reporting systems require the reporter to be identified, as this enables further analysis if necessary. Since this was not an aim of our system, anonymity was possible.

Was the system underused? Although the number of reports was low, participants felt that the system was a success in terms of the quality and usefulness of the information it carried. We aimed to capture only those incidents with broader educational relevance, and it is not surprising therefore that of the estimated 1434 incidents per month reported or discussed at the participating hospitals during the 6-month trial period, only seven

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ASA: 1: Fit

Urgency: 1: Routine; on distributed list

Factors: Equipment

The incident caused: 2: Transient abnormality unnoticed by the patient

How preventable do you think the incident would be by further resource? 5: Not obviously by any change of practice

What happened: Patient was having a rigid bronchoscopy followed by submandibular gland excision. The patient was ventilated using a Sanders injector for the bronchoscopy, connected to the high pressure oxygen outlet on the anaesthetic machine (Blease Frontline) Following the bronchoscopy, the patient was reintubated and ventilated conventionally for the next procedure. However, when the Sanders injector was disconnected from the oxygen outlet, the outlet valve jammed open causing a massive leak of oxygen, enough to cause complete failure of the anaesthetic gas supply to the patient. Fortunately, my initial response of fiddling with the leaking valve led to it closing and restoring normal function. If it had not closed, or another anaesthetist had reacted differently, the patient would have remained unventilated until an alternative system of ventilation could be obtained. Cylinder and piped medical air on the machine were of no value as all the gas supply was leaking out.

Lessons learned: However good and reliable modern anaesthetic machines are, catastrophic oxygen failure can always occur - even bypassing the normal backup of cylinder supply, or medical air supply as in this case. The new Association of Anaesthetists machine checklist recommends checking that an alternative means of ventilating a patient is available and checked - this incident is a good reminder of how important that can be. I intend to use this incident as a teaching scenario from now on.

Figure 2 Example of Incident Report.

Table 2 Possible barriers to greater use of the system.

- Small user base
- Apathy
- Other professional issues that took priority
- Forgetfulness
- Lost passwords
- Participants who were lead clinicians for critical incident reporting at the start of the pilot moved on to the other areas
- Lack of suitable incidents to report
- Participants were mainly senior anaesthetists and therefore less likely to have critical incidents
- An existing culture of under-reporting

were judged suitable for further sharing. The commonest criticism of the pilot was the small number of users with access to the system, though this followed from the initial specification, as only audit co-ordinators were allowed to use it. Our interview data suggest, too, that newer reporting schemes, with their managerial and legal emphasis, have deterred reporting in general and also introduced other motives for reporting.

We suggest that four design features should be satisfied if a shared reporting system is to succeed. The system should be

- integrated with existing practice;
- integrated with existing reporting schemes;
- maintain the educational value of discussing incidents;
- maintain the trust of the community using it.

It remains to be seen how far large-scale incident reporting systems will meet this need and we believe that horizontal dissemination of the lessons learned from incidents should also take place.

Acknowledgements

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