Best practice and patient safety in anaesthesia

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The pursuit of patient safety involves reducing the gap between best practice and the care actually delivered to patients. Understanding how to reliably deliver best practice care using established anaesthetic techniques may, today, be more important than seeking new ones. Advances in anaesthesia safety involve analysing failures and devising strategies to address these. However, anaesthetists do not work in isolation, and their contribution to the function of the multidisciplinary teams in which they work has far-reaching consequences for patient care.

Medical error and patient safety

In 1949¹ Robert Macintosh challenged the prevailing view that deaths under anaesthesia were inevitable, contesting they were frequently attributable to anaesthetists' failures. Since then, anaesthetists have pioneered many systems-based initiatives to reduce avoidable harm to patients, largely through addressing the problem of human error. The establishment of the Anesthesia Patient Safety Foundation (APSF) in the USA was a notable milestone in this journey.² Perrow³ and Reason⁴ have been influential in informing the adoption by anaesthetists of the concepts of systems thinking,⁵ incident reporting,⁶ and root-cause analysis.⁷ It is now recognized that accidents are inevitable in systems such as healthcare, because of complexity and the latent factors that set-up humans to fail.⁸ Incident reporting identifies latent factors, ideally before harm occurs. Root-cause analysis, in contrast, is usually carried out in response to harm. Emphasis on a ‘blame-free culture’ has given way to the concept of a ‘just culture’⁹—but in either case practitioners need to feel safe to report their errors, knowing that the aim is to improve safety rather than to blame individuals.

Big gains have been made through engineering and technology. Examples include pin-indexing of cylinders, pulse oximetry, and capnography. Incident reporting patterns have changed dramatically, and oxygenation failures, prominent in early reports, have become uncommon. However, certain problems seem to be resistant to improvement. Medication error is one such problem. The APSF has recently called for a new paradigm to address medication error, based on standardization, technology, greater use of pharmacists, and culture change.⁹ The key difference between medication errors and errors in oxygen delivery is that there are no simple engineering solutions that will address the former without the active engagement of practitioners. A formal check of every medication before administration has strongly been advocated in this journal,¹⁰ and a randomized controlled trial has demonstrated that anaesthetists conforming with key principles of safe drug administration¹¹ (including checking, using barcodes) made significantly fewer errors than non-conformers.¹² However, despite evidence and substantial efforts to promote this cause, many anaesthetists have not adopted published guidelines,¹³ and continue with idiosyncratic approaches to drug administration.
Similarly, using the World Health Organizations’ Surgical Safety Checklist is strongly supported by evidence demonstrating substantial gains in safety, yet many practitioners resist its whole-hearted adoption. Is it just to continue the blame-free toleration of errors associated with behaviours which ignore practice guidelines and current literature, or is there a moral imperative to adopt advances in patient safety as they emerge?

There is a strong case for reserving the term ‘error’ for situations where the failure is entirely unintentional. Errors are conceptually different from violations (and, of course, deliberate harm). While an error is ‘the unintentional use of a wrong plan to achieve an aim, or failure to carry out a planned action as intended’, a violation is ‘a deliberate—but not necessarily reprehensible—deviation from those practices appreciated by the individual as being required by regulation, or necessary or advisable to achieve an appropriate objective while maintaining safety and the on-going operation of a device or system’. Violations pre-dispose to errors and may amplify their consequences. Speeding (a violation) may not in itself cause a traffic accident, but increases the risk of serious harm should a lapse in attention (an error) occur. Should failing to check a drug before administration or to engage with the Safe Surgery Checklist be construed as an error or a violation?

Reason classifies human error according to the cognitive processes involved at the time: failures in action (slips and lapses, which are unconscious) or failures in decisions (rule-based errors or knowledge-based errors). Knowledge-based errors arise when consciously made decisions, using logical reasoning processes, are based on faulty understanding or interpretation of the facts. Rule-based errors are associated with decisions that are automatic and unconscious and based on pattern recognition and learned responses to particular situations. As with knowledge-based errors, they can reflect a misapprehension of the facts. In both cases, the errors often become understandable once it is appreciated that they reflect mental models rather than reality. Determining the culpability of an error depends on understanding the cognitive processes involved in its generation. Failure to check a drug before administration, and failing to attend properly during the Surgical Safety Checklist, might well be lapsed (i.e. genuine errors). However, an active decision not to engage in these practices is difficult to construe as error. A case could be made that such behaviour reflects an unintentional ignorance of the relevant literature or guidelines, but surely there is an obligation on practitioners to stay informed on matters clearly related to their own practice, at least to a reasonable degree? Organizations involved in the training and continuing professional development of anaesthetists have formally endorsed patient safety behaviours (e.g. through the promulgation of guidelines) supporting our view that patients might reasonably expect anaesthetists to keep up with important developments on safety, and view failure to do so as a violation.

### Teamwork and error

We have focused on error as it pertains to individual anaesthetists. However, anaesthetists work in teams and there is increasing evidence that failures in teamwork and communication contribute substantially to patient harm. We believe that patients could reasonably expect that their healthcare providers will collaborate to deliver the most effective and safe service, but repeated calls from patient safety bodies for improved collaboration between health professionals have largely gone unheeded.

Lingard reported that over 25% of operating room (OR) communications failed, resulting in inefficiency, waste, delay, tension, and procedural error. Observational studies report failure to communicate critical information in postoperative handovers (e.g. allergies). Mozzacco found that limited sharing of information in OR teams during and after surgery doubled the risk of surgical complications compared with teams who shared information frequently.

Team training appears to work. A meta-analysis of studies of 2650 non-clinical teams attributed to ~20% of the differences in team processes and outcomes to prior team training, and similar findings have been reported in clinical teams. Good leadership and well-functioning healthcare teams have been linked to improved patient safety. One of the explicit aims of the WHO Surgical Safety Checklist is to improve teamwork, through introduction of team members and sharing of information about the patient. This may underlie much of this checklist’s dramatic impact on patient safety.

Salas proposed a five-dimensional model for effective teamwork: team leadership (directing, co-ordinating, evaluating, assigning tasks, motivating, planning, and establishing a positive attitude); mutual performance monitoring (monitoring team-mate performance); backup behaviour (anticipating other team members’ needs); adaptability (adjusting strategies on the basis of new information); and a team orientation (taking others’ ideas or priorities into account, believing in the value of team vs individual). These five dimensions are coordinated by the underpinning mechanisms of mutual trust, closed-loop communication, and shared mental models. Shared team mental models (shared understanding of the situation and plan, understanding teammates roles, capabilities, and tasks) have been identified as critical for effective teamwork. A shared mental model based on effective sharing of information promotes an accurate understanding of the facts on which both rule-based and knowledge-based decisions are made and provides considerable defence, against error and allows the cognitive resources of the entire team to be fully leveraged for decision-making and error detection.

Unlike many other teams, OR teams consist of different professional groups with biases and discipline-based stereotypes that affect their interactions with each other. They may not even conceive of themselves as a team, but rather as a collection of different professional groups.
These groups may experience problems with between-group communication because of the different way information is coded and the perceived value of another group’s information. Failure to identify with the OR team as a whole may limit anaesthetists’ understanding of others’ roles, clarity about the patient care plan, or the sense of responsibility for aspects of care outside those directly relevant to anaesthesia. This may result in reduced ability to monitor performance of the team, provide support, detect and challenge errors, optimize task coordination, or adapt to changing situations.

Conclusion

We work in an environment where unreliable delivery of best practice care is a major cause of adverse events.25 Anaesthetists have contributed substantially to advancing patient safety, often through improvements in the system that require little active engagement by practitioners. Increasingly, improving safety does require engagement. Guidelines and emerging evidence on safer practices offer substantial gains in safety, but only if effectively implemented. Perhaps, the biggest challenge today is to convince all anaesthetists that the science of patient safety is as relevant to their practice as the pharmacology and physiology that underpins their daily practice.

Declaration of interest

A.F.M. is a shareholder in a drug administration system, SaferSleep.

References

2 Cooper J. Patient safety and biomedical engineering. In: Kitz R, ed. This Is No Humbug: Reminiscences of the Department of Anesthesia at the Massachusetts General Hospital. Boston: Department of Anesthesia and Critical Care, Massachusetts General Hospital, 2002; 377 – 420
23 Salas E, Sims D, Burke C. Is there a ‘Big Five’ in teamwork? Small Gr Res 2005; 36: 555