BETTER SAFE THAN SORRY – CHECKLISTS, INTUITION AND BEYOND

Alan Merry

Auckland City Hospital and the University of Auckland,
Auckland

The problem of iatrogenic harm in healthcare has received great emphasis since the attention-getting claim by the Institute of Medicine that up to 98,000 people die every year in the USA from this cause.[1] This claim is based on the extrapolation of data from the Harvard Medical Practice Study,[2] and was no doubt intended to galvanise the healthcare community into action. It is, however, probably overstated; Hayward et al[3] using a similar methodology, also found high levels of preventable acute-care patient deaths. However, *"after considering 3-month prognosis and adjusting for the variability and skewness of reviewers' ratings, clinicians estimated that only 0.5% (95% CI, 0.3%-0.7%) of patients who died would have lived 3 months or more in good cognitive health if care had been optimal, representing roughly 1 patient per 10,000 admissions to the study hospitals."* There are strong philosophical grounds for the position that all lives should be held to have equal value, but clearly comparisons of the majority of these losses in healthcare with regular aeroplane crashes, or even the road toll, raises questions about apples and oranges.[4] The primary message remains the same – too many patients are harmed from medical errors and that this constitutes a major public health problem; it would be unfortunate if the credibility of this message was undermined by a lack of rigour in the way it is delivered.

The Elements of Quality in Healthcare

Safety is of course only one element of quality in healthcare. Other important elements are –[4]

- Access
- Efficiency
- Effectiveness
- Timeliness
- Acceptability
- Appropriateness
- Patient centredness

Anaesthesia as a Public Health Problem

It has recently been estimated that 234 million operations are carried out each year, globally (twice the number of babies born).[5] This surgery is very unevenly distributed – the estimated mean rate of major surgery in countries spending US$ 100 or less per head on health care is 295 (SE 53) procedures per 100,000 population per year compared with 11,110 (SE 1,300; $p<0.0001$) in countries spending more than US$ 1,000. Thus there are many people in the former areas who are not receiving operations that they need, while it is likely that some in the latter areas may be receiving care in excess of need. In the former countries, rates of perioperative mortality are sometimes hundreds of times higher than in the latter, largely on account of inadequate anaesthesia services.[6] It is clear that surgery, and the anaesthesia needed to provide safe surgery, are major public health problems globally, and this is true even in wealthy countries where room for improvement remains in the safety of surgery and anaesthesia, in reducing inequities in access to these services, and in the appropriateness of care provided.

The World Health Organisation's Surgical Safety Checklist

Atul Gawande, leader of the Safe Surgery Saves Lives initiative[7] is a surgeon, a public health specialist, a staff writer on the New Yorker, and an author of three books on the quality of healthcare. The World Health Organisation (WHO) Surgical Safety Checklist (the Checklist) was developed as an affordable and universally

applicable response to the problems discussed above. The checklist was carefully designed after extensive consultation and is backed by evidence-based guidelines.[8] It was evaluated in eight pilot sites around the world and found to significantly and substantially reduce harm associated with surgery. It is inexpensive and makes sense, so it is gratifying to see its uptake rapidly expanding around the world.[9] Two further studies have now added compelling evidence to support this general approach to improving safety in surgery and anaesthesia.[10,11] A recent editorial in the New England Journal of Medicine concluded "checklists seem to have crossed the threshold from good idea to standard of care."[12]

In New Zealand the Health Quality and Safety Commission has several programmes under way that address aspects of peri-operative practice, including central line infections and surgical site infections, but also, notably the question of harm from errors during surgery and anaesthesia. The Checklist has been widely implemented but anecdotal evidence and data in press suggest that the way it is used varies considerably.

The Checklist is a process management tool. It was designed not only to act as a cognitive aid for managing complex processes, but also to promote communication and teamwork. It is worth considering how this approach aligns with our understanding of human decision-making.

Crises, Decisions, and Expertise

Anthropologist Charles Bosk studied surgical teams in the United States.[13] He was impressed with the importance placed on honesty when surgeons in training make mistakes. Technical errors and errors in judgment were recognised as integral to training, and the requirement was simply for trainees to be honest, seek help in resolving problems, and take steps to avoid repeating the same errors. By contrast, dishonesty or attempts to cover up an error were viewed as incompatible with excellence in surgery.[14] Contrary to the picture often painted about healthcare, this approach is consistent with contemporary analyses of blame when things which go wrong in complex systems, encapsulated in the concept of "just culture."[15] Unfortunately, Bosk also noted that trainees who were identified as deficient were not necessarily stopped from progressing in surgical careers, but rather tended to be shunted to less prestigious institutions where increasing isolation exacerbated the risk they posed to patients.[13]

How Decisions Are Made – The Reason Rasmussen Model

David Gaba[16,17] should be credited with introducing anaesthetists to the framework for understanding errors and mistakes described in James Reason's classic book "Human Error."[18] According to Reason, failures of human endeavour can be divided into failures of action (slips and lapses) and failures of decision making or planning. Reason places great emphasis on the strength of humans in pattern recognition, and contrasts this with their less intuitive capacity for Boolean logic.

The key to understanding an error or mistake, according to Reason, is to understand the cognitive processes at play in the action or decision that went wrong. People store the essential features of learned situations as schemata, and also store the responses to these situations that they have used previously, with success. "Rule based" reasoning involves matching a new situation to a stored schema and applying a learned response. "Knowledge based" reasoning, by contrast, involves thinking from first principles, and is probably more descriptively called "deliberative reasoning".[15] This form of cognition is powerful, but effortful and slow. It is the basis of scientific progress, but has limitations when time is of the essence.

Other Considerations and Insights

Within the anaesthesia community, the first refinement to the Reason-Rassmusssen General Error Model[18] should be attributed to Bill Runciman, who pointed out that many of the errors made by anaesthetists are in fact technical, and not slips, lapses or mistakes.[4] Rather, these errors reflect the varying balance between the skills of a practitioner in undertaking a task such as inserting an epidural or managing an airway and the difficulty presented by different patients in relation to that task. This concept draws on a normative approach to defining a failure as an error. One expects certain levels of ability from practitioners at particular stages of their development, rather than omnipotence from cradle to grave (as it were). Failures are inevitable, but they should not usually occur in situations where success would be expected, or at a frequency that exceeds acceptable norms. The use

of the CUSUM technique to monitor outcomes is grounded in this view of performance, particularly when refined by correcting for the difficulty of the task in question.[19,20]

Thaler and Sunstein[21] appear to take a wider view of automatic actions than Reason's. Given the essentially subconscious nature of many rule based decisions it does seem that the distinction between these and actions that are automatic may not be particularly helpful in understanding how things go wrong in complex human activities. These authors therefore simply divide human cognitive processes and their associated actions into two systems, automatic or conscious, and also introduce the term "reflective system" thinking for the latter, which is congruent with the view (expressed above) that "knowledge based" is not an ideal name for this type of decision making. To be clear, Reason's analysis of error is impressively comprehensive, extensively referenced and highly sophisticated, but some of the issues are quite nuanced, and the aim here is primarily to clarify some points that I think are occasionally misunderstood.

What Sort of System is Healthcare?

In the context of healthcare, the use of the aphorism "Every system is perfectly designed to produce the results it gets" is correctly attributable to Paul Batalden, from Dartmouth Medical School.[22,23] One of the central tenets of the Reason Rasmussen model of mistakes and errors is that their prevention lies in focussing on the system rather than the person. But what sort of a system are we dealing with?

Predicting future states of dynamic systems, such as the weather system, is difficult because of extreme sensitivity to the conditions at the start of the time period in question. For any level of reliability, it is necessary to start again, iteratively, re-entering the actual data at regular intervals, to keep predictions on track. These chaotic systems are not random, but they are too complex for long-term predictions to be reliable. Many things in healthcare, including the way patients respond to interventions, show characteristics of systems of this type. The inherent uncertainty of healthcare is often overlooked in considerations of decision theory. In this regard, Zimmerman and Glouberman have provided an illuminating classification of processes.[9,24] Processes can be simple, complicated or complex. Simple and complicated processes should be predictably repeatable, but complex processes may not be. Healthcare includes all three types of process, and any analysis of decisions should take account of the type of process involved.

Other Considerations

There is much empirical evidence to support the fundamental point, made clear by Reason, that errors are unintentional. Work by Wegner has gone further, however, and shown that there are occasions when determined efforts to avoid doing something actually have the opposite effect.[25,26] Klien and his group have extended laboratory-based research by observing decision making in high intensity acute settings such as fires and war zones.[27] In essence, their work provides much support for the power of intuition. Synthesising this information draws one back to Reason's emphasis on the human capacity for pattern recognition, and to the counter-intuitive point that the answer does not lie simply in "trying harder." It leads one inexorably to the view that there is no substitute for experience, but that experience alone is not enough. Experts can make decisions quickly through intuition (often using frequency gambling[15]) that serve them well most of the time, but unfortunately not always. They do this by using their extensive store of schema and their ability to recognise subtle differences between situations and draw on previous experience to find timely and effective solutions to apparently arcane problems. Occasionally they get things wrong because they have insufficient information or because they simply overlook something that may appear trivial but turns out to be important.

How Do Checklists Fit In?

Algorithms (which are cognitive aids with similarities to checklists) and checklists have been strongly advocated to assist in making difficult decisions and keeping healthcare processes on track.[28,29] These tools do not replace the human capacity for sophisticated decision making in complex settings. Instead, they can assist this process by ensuring that important things are not overlooked or forgotten. The WHO Checklist goes further. By promoting the introduction of team members it makes it more likely that people will speak up when they alone see a disaster in the making, and also facilitates directed communication. It aims to engender an atmosphere in which people can function together more effectively as a team, both in routine work and in crises.[9]

The Role of Simulation

One way of increasing one's store of the schemata needed for good decisions in a wide range of clinical situations is through the use of simulation.[30,31] Simulation is expensive, and in anaesthesia has not yet reached the level of reliability and validity seen in aviation.[32] Nevertheless, simulation provides opportunities to practice decision making in realistic scenarios in which different cognitive strategies can be practised, experience can be gained in the effective use of process tools (including checklists and algorithms), and reflection can take place on what works and what does not.

The Role of Anaesthetists in Promoting Patient Safety

Anecdotally, many anaesthetists have embraced the WHO Checklist and contributed to its effective implementation and use. Anaesthetists have an enviable reputation for leadership in patient safety. The Commission's project for embedding and improving the effective use of the Checklist nationally provides a great opportunity for building on this reputation. More generally, engagement in the on-going challenge of continually improving the already excellent standards of anaesthesia is a fundamental responsibility to our patients. The vision should be to make New Zealand the first country in the world to achieve the vision of the Anesthesia Patient Safety Foundation in the US and truly claim that "no patient shall be harmed from anaesthesia."[33]

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