Surgical errors

A protocol for the reduction of surgical errors
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The importance of reporting errors in “real time”

Medical errors make headline news. The headlines will always emphasise the human suffering associated with medical error, but the prevention of such errors comes as the result of detailed analysis of their circumstances. One area of particular concern to surgeons is wrong site/wrong side surgery. Although its occurrence is rare, it is potentially avoidable. A notable recent case in the UK was that of a patient who died from renal failure after the removal of his healthy kidney and not his diseased one. Worldwide systems should be in place to prevent this occurring, but the data revealing the extent of the problem have not been readily available.

In the past there has been little opportunity to understand the cause of errors as such events—although rare—were often not reported and not collated with other similar events, preventing their repeated recurrence. Not surprisingly, doctors were often reluctant to disclose such errors or “near misses”. But attitudes and practices are changing. In the USA the Joint Commission on Accreditation of Healthcare Organizations (JCAHO; www.jcaho.org; see box 1) has shown that, by the voluntary reporting of serious errors to a central body, these events can be analysed. This has revealed not only the relative rarity of wrong site/wrong side surgery, but has also allowed the pooling of data and their analysis, permitting guidelines to be drawn up to prevent their potential recurrence.

When retrospective studies are undertaken, these suggest that at least 5–10% of hospital admissions will suffer an adverse event. By inference and extrapolation, this would imply that 1.3 million people in the USA are harmed annually and in the UK the figure would be over 400,000. Within these figures, surgery is rated the highest risk factor for all adverse events. Root cause analysis of medical errors leading to adverse events reveals them to be multifactorial. In the case of wrong site surgery, this will involve a breakdown in communication between members of the surgical team and the patient and his/her family. Contributory factors will include problems with the routine process of “site marking” (that is, marking the site of the operation with indelible ink before anaesthesia), failure in the verification of a preoperative checklist, incomplete patient assessment, missing patient notes, distraction, and various other organisational issues. However, a major problem with these retrospective studies is that it is difficult to obtain “real time” information regarding the circumstances.

In the USA the JCAHO has been supporting a voluntary reporting system since 1996 that potentially allows clinicians to report errors as they occur; it also examines other sources such as the media. This information is collated and examined and reported as a periodic newsletter called Sentinel Event Alerts which describes common causes and suggests steps for elimination and prevention of their recurrence. This includes not just wrong site surgery but also other areas such as medication errors, blood transfusions, and post-operative complications.

For wrong site/wrong side surgery the JCAHO has so far reported 150 cases, with root cause analysis available for 126: 73% were on the wrong body part or site, 13% were for wrong patient surgery, and 11% for the wrong surgical procedure. Over 80% of these incidents were self-reported, with the remainder arising mainly from patient complaints. In New York State, where a mandatory system for reporting is in place, there were 46 cases in 2 years, which suggests that these voluntary figures could be a vast underestimate. A recent survey of hand surgeons in the USA found that at least 20% of them had undertaken wrong site surgery at least once in their career, and a further 16% had only avoided this at the time of incision. This reinforces the necessity for prospective reporting.

From their analysis of prospective reporting of wrong site surgery, the JCAHO has issued the “Universal protocol for preventing wrong side, wrong procedure, wrong person surgery” which has been endorsed by the major American medical associations. These recommendations stress the importance of risk reduction strategies including checking and rechecking. The marking of the surgical site should involve the patient; the use of verification checklists and the availability of the appropriate documents such as notes and x rays; verification by the patient of the site in the operating theatre complex; and the monitoring of these processes; a final time out is suggested before starting the procedure with active communication involving the whole team. An important concept promoted by the protocol is the active involvement of the patient in the process. This requires the clinical team to involve patients in decisions about their care.

In the UK this could be extended to include a second patient signature on the consent form to confirm, where appropriate, that the site or area marked is correct to the best of the patient’s knowledge. At present in the UK there are no nationally applied guidelines or protocols regarding site marking; local practice often requires that the nursing staff merely document that the site or side is marked, but the operating surgeon ultimately takes responsibility and this potentially provides a source of individual error.

It is clearly important that, if errors occur, lessons should be learnt to prevent their recurrence. The JCAHO approach has shown that, with voluntary collection, it is possible to capture details of errors in “real time”, although this may not reflect the true incidence of errors. Analysis of the information provided by the clinicians reporting the errors can aid the development of guidelines aimed at preventing their recurrence. In the UK the National Patient Safety Agency (www.npsa.nhs.uk) is developing a national reporting system for patient safety incidents which is being implemented in England and Wales—the National Reporting and Learning System (NRLS). This has been trialled by 39 health service organisations and is in the process of being rolled out nationally. The aim is to identify recurrent patterns of behaviour and practice associated with errors and to feed this back to ensure safer care. It is envisaged that, by encouraging the reporting of errors, their number will decline, paralleling the airline industry. However, it should be recognised that, despite increasing technical reliability, human error can never be totally removed.

The reporting of medical errors in “real time” will reveal a truer picture of their frequency. This offers the potential of providing solutions that will reduce the risk or even prevent their occurrence...
Box 1 JCAHO

The JCAHO, founded over 50 years ago, has a declared mission to improve continuously the safety and quality of care provided to the public. A major role is to identify the causes of harmful errors and facilitate their reduction through analysis, reporting, implementation, and monitoring of any applied policies. An effective reporting system is an essential prerequisite for serious event analysis and needs to be within a framework that allows the information to be legally protected from disclosure so that data can be seen as Sentinel Event Alerts. Data from the analysis of reported serious events are used as the foundation for the formulation and implementation of safety and quality guidelines.

in identical circumstances. Patient involvement seems simple but is, in fact, a major shift in emphasis. Despite evidence from the airline industry where safety is also paramount, the junior staff have clear instructions to challenge their seniors in situations of potential error whereas in surgery the likelihood of the junior surgeons and staff challenging their senior colleagues is much less likely.21 Indeed, in the case of the patient whose wrong kidney was removed, it is reported that a medical student present in the operating theatre did suggest wrong side surgery. Any guidelines issued must therefore provide backing for issues that may arise from this challenge.

The JCAHO has shown the way with the reporting and analysis of these incidents. We must ask whether there is any reason why the UK should not adopt the protocol that has emerged from their experience.


References

m as the problem does not mean that individuals do not have to maintain 
competence and practice ethically or be 
called to account when they act 
unprofessionally. Accentuating the system and 
downplaying professional responsibility 
may be politically expedient to some 
groups, particularly those professional 
groups opposed to external scrutiny. 
But sacrificing professional accountabil-
ity increases the risks to patients. The 
failure to urge professional responsibility 
continually with calls for a “blame free” 
approach to error reporting sends the 
public the message that the health 
system favours one above the other.

UNDERSTANDING VIOLATIONS

Patients making complaints about their 
health care are entitled to have their 
individual care examined to see if there 
has been a departure from the required 
standard. System issues may be the main 
cause. But health providers may also 
have cut corners and broken rules. 
Medical standards may have been 
breach and substandard care provided. 
Rules are broken so often in hospitals— 
for example, non-compliance with 
a protocol such as failure to wash 
hands—that we have become immune 
to them. It is easier to blame such 
violations solely on the system than to 
require individuals to meet their profes-
sional responsibilities. Reason defines a 
violation as a deviation from safe operat-
ing procedures, standards, or rules. He 
categories violations as routine, optimis-
ing, and necessary. The first two relate 
to personal characteristics while necessary 
violations are linked to organisational 
failures. Cutting corners are routine 
violations that thrive in work environ-
ments that rarely sanction violations or 
reward compliance—for example, not 
following protocols, inadequate hand-
overs, inadequate infection control, and 
not attending on-call requests. Optimis-
ing violations involve individuals moti-
vated by personal goals such as greed or 
thrills from risk taking—for example, 
letting inexperienced junior staff operate 
without supervision when a consult-
sant is busy with private patients, 
experimenting with unproven proce-
dures, and doing inappropriate proce-
dures. Necessary violations comprise 
work environments and circumstances 
which force workers to break rules to 
get the job done. Deliberate violations— 
those where there is an intention to act 
as distinct from a violation caused 
through ignorance—are recognised and 
managed. Intentional violations do not 
necessarily intend a bad outcome. Poor 
understanding of professional obliga-
tions and a weak infrastructure for 
managing unprofessional behaviour in 
hospitals provide fertile ground for 
aberrant behaviour to flourish.

LEARNING FROM THE PAST

The main avenue of redress for patients 
suffering adverse events during the 
1980s and 1990s was to make a com-
plaint. Health professions and organisa-
tions were deaf to stories of inadequate 
or substandard treatments and focused 
on the messengers (regulatory author-
ities, consumer groups, complaint agen-
cies, or lawyers) as the problem. 
Professional accountability was the 
focus of these investigations, with no 
to the role played by the 
system. We should learn from that 
experience. Just as it was wrong in the 
past to focus only on individuals, it is 
equally wrong today to think that all 
adverse outcomes are caused by systems 
problems with no attention to profes-
sional duties and responsibilities.

A WAY FORWARD

In my experience as both a regulator 
and a safety exponent,* systems issues 
usually accompany breaches of profes-
sional responsibility (weak regulations, 
reporting requirements, or inadequate 
training). It depends how you look and 
where. A root cause analyses’ would 
needily always identify systems problems 
and rarely individuals. Systems failures 
may also mitigate the level of responsi-
bility for the individuals. Where and 
how professional responsibility fits into 
the “no blame” culture is unclear. How 
can we make it clearer?

Public trust requires both a re-
designed health system delivering safe 
and quality health care and a strong 
professional ethic and accompanying 
accountability system. As a first step, 
three things should happen:

- professionalism in the workplace 
needs to become part of the safety 
agenda;
- methods for managing and respond-
ing to intentional violations by indi-
viduals in the workplace need to be 
debated and designed: building in 
sanctions for routine violations and 
rewards for workplace compliance is 
a first step;
- teaching clinicians about the inevit-
ability of mistakes is already happen-
ing but we also need to teach them 
how to respond to mistakes.

Disciplinary outcomes for doctors are 
largely determined by peer review and 
focus on the actions taken after the 
leave rather than the mistake itself. 
Demystifying accountability mechan-
isms and educating professionals about 
their ethical obligations will help them 
identity systems problems and the 
appropriate remedies and professional 
issues and their appropriate response.

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Doctors’ hours of work

What matters more in patient care? Giving doctors shorter hours of work or a good night’s sleep?

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Focusing only on reducing hours of work may not have the desired effect of reducing symptom levels

The long hours that doctors work, and the length and quality of their sleep, have long been viewed as influencing their health and the safety of care they give.1 In 2000 it was agreed by the European Parliament that the Work-time Directive, which had limited working hours in general, should also apply to doctors in training. This will mean no more than 58 hours per week by August 2004 and eventually a maximum of 48. In Europe this has more to do with the risks towards the doctor while in the US efforts to reduce long hours have more come from their threat to patient safety. But is this focus on hours the right one?

There is certainly some evidence that a long working week will affect your health: a meta-analytical review of workers in general found small but significant positive correlations between overall health symptoms, physiological and psychological health symptoms, and hours of work.2 In Japan, where working hours are particularly long, this has been implicated in cardiovascular disorders and diabetes mellitus.3 Nevertheless, most studies show surprisingly little evidence for the relationship between hours of work and psychological well-being: even when hours are long, they have little or no correlation with levels of stress or depression.4 On the other hand, a combination of the intensity of demands (rather than long hours per se) combined with low discretion over how one’s work is done continues to be an influential model of the causes of job related stress.5 Doctors have consistently shown unusually high levels of stress symptoms and consider overwork to be involved in this.6 What is likely, however, is that the tiredness caused by long hours makes any potential job related stressors—such as lack of support, dealing with patient deaths, or the high cost of error in medicine—much more difficult to cope with and, in this way, stress symptoms may be a mediator between hours worked and psychological disorders such as depression or anxiety.7

Nevertheless, doctors certainly see overwork—both long hours and a lack of support—as contributing to incidents of poor care,8 and evidence from a military study suggests that individual errors increase with fatigue.9 However, the same study found that, over time, the team can compensate for these errors, and so those who worked together over a longer period had higher individual error scores but lower team error scores than those working together only briefly. It seems that the relationship of hours to error is complex,10 mediated by such factors as the support of colleagues, including leaders, as well as the levels of control one has over one’s job.11 Certainly for younger doctors, long hours of work, well managed,12 13 may be a relatively insignificant factor compared with the positive effects of being part of a team and the enjoyment of practising medicine. Rather than continuing the pursuit of a shorter working week, it may be better to aim for ensuring good support, leadership, and teamwork since good teams have healthier staff and better outcomes.12 13

Although there is inevitably a relationship between hours of work and hours of sleep, the negative effects of sleep loss on both mood and performance have been found much more consistently than those of long hours. Sleep deprivation necessarily varies in real life studies, but most definitions involve fewer than 4 hours sleep in 24, or frequently interrupted sleep. Most studies show that mood is lowered after a long on-call shift and young doctors report feeling more confused and less confident.14

These psychological effects are mirrored where the quality of care is considered. Errors increase with sleep loss, and data on shift work show a rise in industrial injuries on the night shift.15 In medicine, such data are rarely collected and instead a variety of cognitive tests are used as proxy measures of performance—assessing memory, concentration, alertness, and attention to detail after nights on call. Review studies16 and meta-analyses17 agree that sleep deprived people perform significantly less well than controls, particularly in terms of mood and cognitive tasks, whether proxy assessments or simulations are used. For example, surgical house officers following a weekend on call showed significant impairments in concentration and speed.18 Performance in general was highly related (0.5–0.6) to the number of hours of sleep: an impairment to vigilance estimated to be close to that caused by 0.7 g/kg alcohol which, as they point out, is near the legal UK limit. Simulations of laparoscopic surgery show that more errors occur with increasing sleep loss19 and after a night on call.20 Moreover, there is some evidence to suggest that there are deleterious effects even 2 days later.21

In the short term, an educational approach to the dangers of sleep loss and ways to improve sleep quality may be useful, alongside encouraging leaders to ensure that those deprived of sleep are not put in potentially dangerous

Key messages

- There is only a small complex relationship between hours of work and performance or mood.
- Other factors such as team relationships, leadership, and job design may matter more.
- Lack of sleep or disturbed sleep, in particular, leads to substantial decrements in performance.
- Remediying the raft of factors is likely to improve both working lives and patient safety more than focusing simply on a shorter working week.
situations. The benefits of napping or rest periods in terms of subsequent performance have been reported and could be built into the working day officially rather than surreptitiously by individuals. However, it seems important that we integrate our approaches to improving working lives and patient care, and resist focusing only on hours or any single factor. What is needed is a systems approach towards a cultural change that uses an evidence base to address the complex factors that contribute to staff working below par, and that treats healthy alert staff as a key element of patient safety.


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The apparent conflict between what people say they would do and what they actually do is intriguing. On the one hand, it is not unusual for people—including probably most of us—to make plans for actions that are then not carried out, particularly in new and stressful circumstances. Along with this general caveat, it may also be that factors such as severity and type of stroke are important mediators of action taken. One could imagine that severe signs of stroke such as unconsciousness, hemiparesis, or aphasia might be more likely to prompt a call for an emergency ambulance than less obvious or transient symptoms including visual disturbance, weakness in a limb, or slurring of speech. Certainly, people who have had a stroke have reported not recognising the symptoms they experience because they were so different from those they had read about. Furthermore, if a diagnosis of stroke is not always straightforward for qualified medical practitioners, it is perhaps not surprising that patients themselves have difficulty in self-diagnosis or are reluctant to call out emergency services. It would seem that, in order to design and target education more effectively, further exploration concerning the messages people actually hear about stroke from the information given is needed.

The title of Carroll et al’s paper states that “knowledge was good but action was poor”, yet the figures for recognition of risk factors, particularly among the health professional group, seem low (median of 2 for nurses compared with a median of 1 for the other groups). This level of knowledge is surely not good enough, given that these were staff in medical wards (albeit not specialist neurology wards) and that a number of important and modifiable risk factors such as atrial fibrillation were rarely mentioned. As for the people who actually had risk factors, only one third could recall having been advised of this risk. Interestingly, the investigation by Sug Yoon et al 7 found that those who recalled being advised about their risk of having a stroke were actually no better at recognising their own symptoms.

So where does this leave us when thinking about and targeting education on risk factors and their relation to stroke? Given that stroke remains a common and poorly understood condition, 8 10 education for the general population and health professionals, as well as those with risk factors, is vital. There is no doubt that advances have been made in understanding the importance of the content, context and timing of “information giving” to enhance knowledge. However, while knowledge is power in some domains of life, catalysts to action are clearly less well understood in the case of stroke. It is important that we provide education—whether for at risk groups or the general population—in ways that people can really understand and, indeed, act upon the knowledge gained. Simply providing “more” education is not an adequate response.

With the continued efforts of organisations such as the Stroke Association and others, increased prioritisation of research into stroke appears to be happening, at least in the UK. Along with other research priorities, how people make potentially life and death decisions when they have a stroke is clearly worth more detailed investigation if we are to provide timely appropriate services and improve our record in stroke care.

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