Improving patients’ safety locally: changing clinician behaviour

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Safety initiatives in hospitals should focus on common health care interventions that when used appropriately can improve important health outcomes, and when used inappropriately or not at all, result in substantial harm. We focus on preventive health care interventions, and describe five steps that can improve patients’ safety by changing clinician behaviour. The steps are to: do an environmental scan; understand current behaviour, target behaviour for change (why, what, when, where, and who); adopt effective strategies to change behaviour; and synergise.

In their introduction to this series, Bion and Heffner1 outline the background and scope of the problem. Traditionally, when we think of patients’ safety initiatives to reduce medical errors, responses to well-publicised medical misadventures come most readily to mind. Striking examples attracting media attention include the death of a patient in the UK, after removal of the wrong kidney,2 and the death of a child in the USA after transplantation of ABO mismatched heart and lungs.3 Although not originally labelled specifically as a “patients’ safety initiative”, simple measures such as marking an X on the relevant surgical site and cross-matching blood and tissues are well-established practices developed to keep such errors to a minimum. Other practices have been introduced in recognition that mistakes made by exhausted physicians-in-training have caused serious disability or death. For example, the number of consecutive hours that resident doctors may work has been restricted by professional regulatory bodies and public legislation.4 Harm attributed to overzealous enrolment into clinical trials has led to renewed interest in public legislation.5 Harm attributed to overzealous enrolment into clinical trials has led to renewed interest in regulation of clinical investigations.5

Although no one would question that blatant, serious errors of commission must be prevented whenever possible, in purely numerical terms, errors of omission, constitute a far greater safety risk.6 Errors of omission are more pervasive and, paradoxically, more difficult to identify. For example, consider the burden of illness related to central venous catheterisation. More than five million patients in the USA have central venous catheters inserted every year.7 About 15% of patients have complications of the procedure, some of which have the potential for serious harm.8 Accordingly, optimal management of the ubiquitous central venous catheter should be a major safety priority. Although several effective and affordable catheter strategies exist to decrease catheter complications,9 the application of these strategies in practice has not been systematically evaluated, but is probably inadequate.

With this in mind, we believe that more safety initiatives in the hospital setting should focus on common health care interventions, on interventions that when used appropriately can improve clinically important health outcomes, and in particular, on interventions that when used inappropriately or not at all, cause harm. Reducing medical error and improving patients’ safety have become health care priorities.10 In this article, we will address errors of omission as a safety priority, focus on preventive health care interventions, and describe a five-step approach to improve patients’ safety by changing clinician behaviour.

Preventive health care interventions as a safety priority

The number of effective preventive interventions proven in rigorous randomised trials is increasing. Although application of randomised trial evidence has the potential to significantly decrease both morbidity and mortality, it is clear that, when compared with treatment approaches, preventive strategies are often poorly applied in acute care settings. Well-documented examples of underused interventions that prevent morbidity or fatality include aspirin, β blockers and statins after myocardial infarction,11 angiotensin-converting-enzyme inhibitors for...
Changing behaviour to focus on safety

Future patients’ safety efforts are needed for both individual and system-wide approaches that facilitate the application of effective preventive strategies in practice.17 Herein, we suggest a five-step strategy to achieve this goal by a behavioural change programme specifically adapted to the acute care setting. This model has not been formally assessed for effectiveness, and we recognise that other potentially useful models for behaviour change to improve patient safety exist.

Step 1: do an environmental scan

Although errors of commission (eg, surgery on the wrong side of the body) often motivate a clinical collective to immediate action, efforts to reduce errors of omission often follow other types of events. For instance, consider the visit of an infection control nurse to the transplant unit, the journal club review of a randomised trial on intensive insulin therapy in the intensive care unit (ICU), or the readmission of a patient with congestive heart failure. After these “events”, clinicians may engage in reflection and discussion about the extent to which physicians-in-training follow universal barrier precautions for immune-compromised patients, the detection of hypoglycaemia in the critically ill, and the plausibility of pharmacy review of medication profiles during discharge planning. Eventually, a patients’ safety cause may be targeted, may find champions, and may gather enough momentum to motivate people into action.

Even when motivated, we cannot manage what we do not measure. Although successful preventive strategies may reduce the population incidence of complications, sporadic cases will still occur, so we need to study our patients to establish both the extent to which proven strategies are being used and their success. Other useful methods to learn about and improve patients’ safety initiatives in hospitals include formal interviewer-administered or self-administered surveys of specific prevention practices. For example, a starting place could be a physician survey of prophylaxis against venous thromboembolism in the ICU.18 The universal caveat of all surveys, however, is that stated practice might not represent actual practice; thus, observational data are more valid, and more informative, than self-reports. In other words, serious initiatives for safety of patients should document what is being done to augment knowledge of what people say is being done.

Another common and simple method of generating data for patient safety is an audit or utilisation review of a specific prevention strategy. Utilisation reviews can be longitudinal or cross-sectional;19 if thoughtfully designed, they can measure the frequency and appropriateness of the target behaviour, and also suggest targets for patient safety initiatives. For example, in a single centre utilisation review, we first identified an inadequate thromboprophylaxis rate of 65%.19 A subsequent multicentre cross-sectional study yielded a national thromboprophylaxis rate of 90%, and also highlighted a group of patients in whom thromboprophylaxis was frequently omitted: critically ill surgical patients in the immediate postoperative period.19 Published audits in the ICU setting suggest that there has been a steady increase in adherence to thromboprophylaxis guidelines over time.20 A working environment that facilitates the implementation of preventive strategies by first documenting what is happening can be a major boon to patient safety.

Step 2: understand current behaviour

A prerequisite to changing future behaviour is understanding current behaviour. To increase the use of effective preventive strategies we must first understand why they are not used,21 and then institute effective strategies to increase their use by changing behaviour. This step is well illustrated by a qualitative study, in which researchers investigated environmental factors that positively influence β-blocker prescription for patients with myocardial infarction.22 The investigators did semi-structured interviews with eight cardiologists, four internists, two emergency physicians, 15 nurses, 11 quality management staff, and five senior administrators in eight US hospitals. This method revealed six factors believed to increase β-blocker use: setting goals, administrative support, clinician support, design and implementation of improvement initiatives, use of data, and contextual factors. Rather than relegating patient safety initiatives to the transplant unit, the journal club review of a randomised trial on intensive insulin therapy in the intensive care unit (ICU), or the readmission of a patient with congestive heart failure. After these “events”, clinicians may engage in reflection and discussion about the extent to which physicians-in-training follow universal barrier precautions for immune-compromised patients, the detection of hypoglycaemia in the critically ill, and the plausibility of pharmacy review of medication profiles during discharge planning. Eventually, a patients’ safety cause may be targeted, may find champions, and may gather enough momentum to motivate people into action.

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teach. You teach not only doctors—but you also teach your residents, your nurses, your care coordinators. Everyone has to be on the bandwagon of β-blockers.” These investigators highlighted the power of clinician-specific data about prescribing patterns. As one cardiologist noted, “What has worked best in this process is having someone who’s got data that she can feed back to me and other physicians as we take care of patients. Just knowing that I only sent 20% of my [acute myocardial infarction] patients home on β blockers sensitizes me . . . that’s what I’ve seen as making a big difference . . . just kind of enlightening people as to what they are doing in an objective kind of way.” From this study, we learn which environmental influences encourage prescription of β blockers, and we can emulate strategies that seem to promote patient safety in our own environment.

Consider the use of semirecumbency (placement at 45° from the horizontal in bed) to prevent pneumonia in mechanically ventilated patients. In four randomised trials, researchers have compared semirecumbent with supine position; results of three trials showed less gastroesophageal aspiration and findings in one showed less pneumonia in patients placed semirecumbent than in those placed supine. However, results of observational studies have shown that critically ill patients are infrequently semirecumbent in practice. To understand the perspectives of multidisciplinary ICU clinicians regarding the determinants and consequences of semirecumbency, we undertook a qualitative study with semistructured interviews and focus groups. Participants identified barriers to use of the semirecumbent position and suggested alternative positions (eg, lateral placement), as well as contraindications to semirecumbency (eg, haemodynamic instability), risk of harm (eg, decubitus ulcers), safety concerns (eg, sliding out of the bed), and inadequate resources (eg, insufficient beds in which patients can be semirecumbent). Education, guidelines, reminders, audit and feedback, and quality improvement initiatives were advocated to promote semirecumbency. In summary, underuse of this inexpensive strategy to prevent pneumonia was related to insufficient awareness of its potential benefit, real and perceived deterrents, and absence of enabling and reinforcing strategies. Armed with this knowledge, patients’ safety teams can begin to target safety initiatives, including those that are cognitive (eg, interactive education), administrative (eg, charting of body position), and behavioural (eg, audit and feedback).

Step 3: target the behaviour for change
Successful patients’ safety initiatives need to clearly identify the behaviour targeted for change. Although there is no blueprint for success, it is crucial to carefully address each of the why, what, when, where, and who of behaviour change.

Why change?
In making the case for undertaking a patient safety initiative, effective articulation of the “why” is crucial to garner support for change. A communication format and vehicle must also be chosen. The “why” can be told in the form of an anecdote to illustrate the need for change. Anecdotes are often used by clinicians in the form of cases presented at morning report or at morbidity and mortality rounds. Missed opportunities to prevent errors of omission might need more creative use of narratives. For example, in a large community there are 2000 patients with atrial fibrillation Every year, 100 of them including our neighbours, co-workers, or family members, will be expected to suffer a stroke, and for 50, these strokes will be disabling or fatal. If all eligible patients received prophylactic warfarin, there would be an estimated 30 fewer disabling or fatal strokes each year. This approach turns the abstract, potentially unrewarding job of preventing errors of omission into a mission to prevent a disaster in the lives of 30 of our relatives and fellow citizens.

In sharing patient-safety stories to hospital administrators, we can also capitalise on the growing understanding of evidenced based policy-making. Since policy-makers are influenced by social and strategic goals, as well as local data, audits and interinstitutional performance comparisons might also help to make the case for why patients’ safety initiatives are needed.

What to change
When choosing the preventive strategies to be modified, the “what” should be specific, and operational details should be clear to those who are effecting the change. Those initiatives that are doomed to fail are ones that are very general, such as “our goal is to decrease the infectious complications of central venous catheters”. The target must be defined with observable, discrete, and measurable components. For instance, we could state “our goal is to decrease our current 2% incidence of catheter related bacteraemia to 1% within 1 year by implementing the following: insertion under full barrier sterile techniques, ultrasound guidance for difficult insertion, avoidance of the femoral insertion site, use of antibiotic coated catheters for high risk patients or long term use, no scheduled catheter changes, new site replacement and avoidance of guidewire exchange, and dry gauze rather than transparent dressing.”

When to change
The “when” to change might occur in response to a specific stimulus cue. In other words, the timing of the preventive intervention depends on what the target is, when it occurs, and when it is appropriate to intervene. For example, as soon as the diagnosis of myocardial infarction is made, this prompts immediate initiation of pharmacotherapy that prevents or delays mortality. Patients with acute upper gastrointestinal non-variceal bleeding, however, do not immediately undergo therapeutic endoscopy, which decreases rates of rebleeding, surgery, and mortality, until they have been resuscitated adequately and are haemodynamically stable. The “when” also refers to the health system’s readiness to change. The traditional approach to patient safety is reactive, and often in response to the stimulus of an iatrogenic error. There are other times to capitalise on when institutional change can be more easily effected, such as just before hospital accreditation. However, proactive patients’ safety initiatives should be geared to preventing errors in the first place, shifting us away from reliance on recent or impending institutional events that prime the system. For patients’ safety initiatives that will have a meaningful impact in the acute care setting, the “when” is now.

Where to change
The “where” refers to the identification of critical points in the continuum of a patient’s hospitalisation most amenable to initiating or enforcing prevention strategies. Ideally, patient-specific preventive interventions are considered at hospital admission (eg, perioperative thromboprophylaxis might be ordered at this time, and withheld as necessary in relation to the operation, and insertion and removal of an epidural catheter).
Transitions in critical illness reflected in patient transfer from one setting to the next may be an ideal “where” to change behaviour. For instance, in two randomised controlled trials, hypothermia lowered the risk of death and clinically important neurological disability after out-of-hospital ventricular fibrillation cardiac arrest. A local environmental scan (table) identified that no patient received this potentially beneficial intervention, which is a clear example of an error of omission. In the table, we provide an example of the many venues of care in which clinician behaviour change could take place to assist in hypothermia management. This complex intervention would ideally be started as part of the pre-hospital or emergency department management; however, transfer to the ICU might be the best trigger to ensure that this preventive strategy is used in all eligible patients. Discharge planning from a high-dependency unit is a suitable time to ensure that the range of effective interventions that will prevent readmission, morbidity, and mortality are considered. Discharge planning from the hospital should also identify ways to ensure adherence to these interventions when the patient returns home.

Who to change

The “who” to change depends on the target behaviour. Obviously, patients’ safety is a concern not only to physicians, but also to all in health care. Nurses, respiratory therapists, dieticians, pharmacists, and physicians are the target, especially those who, by the nature of their work, are best positioned to implement, and continue auditing the safety initiatives. The acute care setting poses unique challenges to such safety, due to the diverse and serious health problems of the population, and the fast-paced multidisciplinary nature of acutely ill patients in hospital. Ironically, although multidisciplinary care might improve patient outcomes, it could, through its diversity, lead to absence of clear responsibility for the prevention of harm. Thus, the selection or election of clinician champions is a fundamental step for the success of the strategy.

The notion that physicians should be in charge of all patients’ safety initiatives may be ill- advised. Whereas decisional responsibilities should be clear, the democratisation of patient safety initiatives is imperative if we are to improve patients’ outcomes. Individuals involved in delivering preventive care have key roles, since their behaviour is usually the target of the safety initiatives, and their responsibility is ensuring that the safety initiative is sustained if not accelerated. This long-term view can be seen in the creation of patient safety teams.

In the next section, we will discuss “how” effective strategies to promote patient safety can be advanced by changing clinician behaviour.

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<tr>
<th>Step</th>
<th>Activity</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Do an environmental scan</td>
<td>ED and ICU directors informedly surveyed use of hypothermia in comatose survivors of VF cardiac arrest</td>
<td>ED directors reported no patients treated with hypothermia in pre-hospital phase or in the ED. ICU directors reported occasional use in the tertiary ICU, planning for use in one university affiliated ICU, but no use in other ICUs</td>
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<td></td>
<td>Prospective audit of comatose survivors of VF cardiac arrest admitted to local ICUs</td>
<td>Majority of suitable patients did not receive hypothermia; when used, the timing and effectiveness were sub-optimal</td>
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<td>Understand current behaviour</td>
<td>Structured interviews with ED and ICU MDs and RNs</td>
<td>Some ED physicians and most ICU physicians were aware of RCTs showing less neurological dysfunction using hypothermia; some scepticism was expressed about the results and generalisability</td>
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<td>Target the behaviour to change</td>
<td>Two published RCTs in comatose survivors of VF cardiac arrest showing that hypothermia decreased neurological dysfunction</td>
<td>Agreed that hypothermia should be used for all comatose survivors of VF cardiac arrest who satisfy entry criteria for HACA Trial.</td>
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<td></td>
<td>Comatose survivors of VF cardiac arrest who satisfy entry criteria for HACA Trial will receive hypothermia management</td>
<td>Detailed protocol prepared (external cooling to 32–34°C, ice packs as necessary, sedation, and paralysis)</td>
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<td>After multidisciplinary ED and ICU journal clubs in which two RCTs were critically appraised</td>
<td>Agreed that RCT evidence is strong enough to prevent neurological dysfunctional and should be implemented locally</td>
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<td>Ambulance, ED, ICU, cardiac catheterisation laboratory</td>
<td>Agreed that hypothermia should start in the ambulance, continue in the ED, during investigation and treatment in the cardiac catheter laboratory, and in the ICU</td>
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<td>Target paramedics, ED, ICU, and cardiac catheterisation teams</td>
<td>Ideally, paramedics in pre-hospital phase, ED team and ICU team always, and cardiac catheterisation team if necessary</td>
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<tr>
<td>Adopt effective behaviour change strategies</td>
<td>Interactive education with paramedics</td>
<td>Paramedics agreed that hypothermia protocol is needed for managing comatose survivors of VF cardiac arrest. ED; ICU will consult early to check patient eligibility for hypothermia using entry criteria for HACA Trial.</td>
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<td>Collaborative creation of protocol for ambulance service, ED, and ICU</td>
<td>Draft hypothermia protocol developed and pretested</td>
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<td>Audit of hypothermia protocol compliance by ICU research coordinators using structured questionnaire</td>
<td>After feedback of audit results to ambulance service, ED and ICU, increased compliance with hypothermia protocol aided by local opinion leader</td>
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<td>Identification of senior ICU MD as local champion</td>
<td>Increased compliance with hypothermia protocol</td>
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<tr>
<td>Synergise</td>
<td>Case based discussion and two RCTs presented at medical grand rounds. Further discussion in multidisciplinary ED and ICU journal club, including additional joint journal clubs with neurologists and cardiologists</td>
<td>ED and ICU team enthused about this preventive intervention</td>
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<td>Neurologists agree that patients should receive hypothermia even though sedation and paralysis may delay neurological prognostication Cardiologists agree that patients should receive hypothermia in the catheter laboratory as needed</td>
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**Example of the five step approach to patients’ safety using hypothermia for comatose survivors of VF cardiac arrest to prevent neurological dysfunction**

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*INPATIENT SAFETY IV*
Step 4: how to change: adopt effective behaviour change strategies

An important task of the patients’ safety team is to identify potential behaviour change strategies that are most likely to affect the target behaviour in the target location. In other words, we want patients’ safety initiatives implemented at the right time, in the right place, in the right way, and by the right people. Some behaviour change strategies need adaptation to the structure, size, function, and culture of each hospital, because not all strategies are equally effective or feasible in all institutions. It is useful to consider the notion of “market segmentation” here. Although pharmacists might respond favourably to automated alerts when entering a prescription into the pharmacy computer, some clinicians on the ward may be tempted to take exception to the alert and overrule it. Local research to identify the frequency and magnitude of such a problem would be an important first step in exploring the potential for automatic alerts to be effective.

The best overview of studies that assess behaviour change strategies is by the Cochrane Effective Practice and Organization of Care (EPOC) review group, which contains 41 systematic reviews of hundreds of original studies. Although this overview identifies investigations of modest quality, thereby weakening the inferences from this body of research, studies assessing behaviour change are becoming more rigorous. There are also some important lessons to learn. The panel shows the EPOC taxonomy of interventions to promote behaviour change. Passive dissemination, such as providing key players with a summary of the “why, what, when, where, and who” of the behaviour change strategy for patient safety, is likely to increase awareness of the initiative but, by itself, is unlikely to change behaviour. Use of local opinion leaders, and audit and feedback of recent performance (such as the results of an environmental scan and understanding current behaviour) might be moderately effective. Targeted interactive educational interventions, reminders, and prompts are more effective in inducing and sustaining change. The most effective interventions are multifaceted, multiply redundant, and adapted to the local setting.

Just as knowledge of the research evidence about health care interventions that prevent morbidity and mortality does not ensure its use in practice, knowledge of evidence about effective behaviour change strategies does not ensure their use as implementation strategies. Therefore, one of the most important issues in closing the loop on safety initiatives is taking a scientific approach to assessment of whether behaviour change strategies are indeed being applied, and whether they are achieving the desired patient outcome. This feedback is only possible with rigorous surveillance, audits, and other observational studies, followed by reinforcing strategies when needed.

Strategies to change professional behaviour in the acute care setting

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<tr>
<th>Single-faceted interventions</th>
<th>Multifaceted interventions</th>
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<td>Educational materials</td>
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<td>Conferences</td>
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<td>Local consensus process</td>
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<td>Educational outreach visits</td>
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<td>Local opinion leaders</td>
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<td>Patient-mediated interventions</td>
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<td>Audit and feedback</td>
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<tr>
<td>Reminders (manual or computerised)</td>
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<td>Marketing</td>
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Multifaceted patients’ safety initiatives that first address barriers in the environment and capitalise on enabling features in the environment, demand substantial investments in time, effort, and personnel. While determining the “how” to change behaviour, patients’ safety teams should ensure that all clinicians involved in the problem are involved in the solution. The next step discusses an approach to broaden the mandate of the patient safety team.

Step 5: synergise

The final step in the strategy to change clinician behaviour to improve patients’ safety is to include all relevant stakeholders in the process. Acute care hospitals are complex, dynamic environments that function (or malfunction) as a result of the interplay of diverse departments, teams, and individuals. Changing the way such complex organisations operate is best achieved by those involved being committed and enthused about the proposed change. For some patients’ safety initiatives, few groups might seem to be involved, whereas others might involve almost everyone in the institution.

An example of a complex patients’ safety initiative incorporating the whole hospital is the replacement of a cardiac arrest team with the medical emergency team (MET) system. The concept of the MET originated in New South Wales, Australia in 1990, and is based on the premise that patients showing early signs of clinical deterioration will benefit from the timely intervention of a team of clinicians skilled in resuscitation. Traditionally, a patient deteriorating acutely on the ward will be attended first by a bedside nurse, who will then seek assistance from the most junior member of the medical team. Junior physicians are likely to have little training and few skills in resuscitation, and their attendance might be delayed by their commitment to other, often less acutely ill, patients. If the patient continues to deteriorate, the assistance of increasingly senior and, hopefully, skilled doctors is summoned. It is only when the patient has a cardiac arrest that conventional channels of communication are circumvented. The cardiac arrest call immediately produces a team skilled in resuscitation who then attempts to revive the patient.

By contrast, in a hospital with a MET system in place, the staff caring for acutely ill patients are trained to recognise early clinical signs of deterioration, and use an a priori set of criteria to summon the MET. The MET, which usually comprises the same people as the former cardiac arrest team, undertakes a detailed urgent assessment, and intervenes to diagnose, monitor, prevent, treat, palliate, or possibly transfer the patient to a high dependency unit. Successful implementation of a MET system involves overcoming many barriers to institutional change, and demands the education and empowerment of ward nurses, acceptance by the primary attending physicians, the dedication of MET team members and their parent departments, and the commitment of hospital administrators. Proof of concept is emerging, that with a MET, errors might be prevented and patient safety improved.

Economic context

Some of the disincentives for patients’ safety initiatives are economic. Although professional, legal, and ethical factors often determine which errors are targeted for patient safety initiatives, financial factors determine which initiatives, if any, are undertaken to address the errors. For example, local health care resources will determine the patients’ safety response to decrease the chance of recurrence of a life threatening allergic antibiotic reaction.
One pharmacy department might introduce an individualised automated drug dispensing programme. A second hospital with an existing clinical information system might use software to confirm suitability of prescriptions. A third hospital in a developing country might not create a specific patients’ safety initiative, since obtaining antibiotics and retaining physicians to administer them are more pressing needs.

Although some approaches to patients’ safety can involve costly environmental redesign (eg, new electronic medical records that generate automated reminders), others do not (eg, pre-printed orders). Simple strategies can be effective. For example, several years ago, one of us (VMM) needed to isolate a patient in a general ward in Peru; however, there were no masks, gloves, gowns, isolation rooms, or air filter systems. Persuaded and motivated by the feasibility of hand washing, the ward team set up a hand washing station at the end of the patient’s bed, and placed two of the patient’s children (who were always at the bedside and were very keen to help) in charge of the station. Signs were posted on the wall behind the bed to remind clinicians and visitors to wash their hands before and after patient contact. To our satisfaction, all visitors were promptly reminded by the children, and physically impeded from contacting the patient if they failed to wash their hands. This anecdote highlights the use of low technology solutions appropriate to the cultural and socioeconomic context, and the role that proxies can play in patients’ safety initiatives.

Economic barriers to patients’ safety initiatives might not be overcome by hospitals with the will, but not the resources, to start and maintain such programmes. Even when faced with a good business plan, administrators may face difficult decisions about redirecting resources from other, just as worthwhile, programmes to support patients’ safety initiatives. The process of whether and how medical errors are identified, and whether and which patients’ safety initiatives are used to address them, depends on local economic realities and is highly context-specific.

The future
We believe that patients’ safety initiatives in the acute care setting should concentrate on not only prevention of high profile errors of commission, but also take a systems approach to prevent those pervasive errors of omission that greatly affect population health. We have suggested a five-step process towards successful implementation of patients’ safety initiatives. Although we are humbled by the enormity of the task, we are also encouraged by increasing awareness, public and professional support, and emerging research on patients’ safety. We hope that when we become the patients of tomorrow, we can be cared for in safer and more effective acute care facilities than those in which we work today.

Conflict of interest statement
None declared.

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Uses of error

Understanding errors in the research process

Benjamin Druss

The manuscript was in press and I had happily moved all traces of it from my desk to a file cabinet. The next week, I would be presenting the results of the paper, which examined the costs and associated disability of the most expensive conditions in the USA, to a group of colleagues. Then came the question. It was just a small question, wrote the meeting’s facilitator after reviewing my slides, but where was diabetes on the list of conditions? I exhumed the file and began looking through my notes. Soon I realised that somewhere in the initial process of categorising diagnoses into broader clinical groups, I had left diabetes off the list. A sense of unreality and dread welled up in me. How could I have made such a mistake? I called my coauthor on the paper. “Look at the bright side,” he joked “if we need to submit a retraction, we will get two publications on our résumés.” We retraced our steps. We ran and reran our analyses. To our relief, once we added diabetes, the other disease rankings stayed fairly constant, and only minor changes were required in the text. I swallowed hard and called the journal’s executive editor. “Well,” he said “I’m glad we discovered this before the paper was published.” There was still time, he said, to fix the galley proofs.

Human beings are fallible. This truth underlies the commonness of errors in clinical practice, and the almost certain corollary in scientific research. As in medical practice, the research enterprise has developed multiple mechanisms for catching such errors, including input and oversight by granting agencies, coauthors, peer reviewers, and editors. However, some mistakes will inevitably slip past the safeguards. Although the short-term consequences of research errors may be less visible than those resulting from clinical mistakes, their total impact may be even greater because they affect so many patients’ care. At present, the scope of the problem is simply not known because there has been no systematic effort to study the prevalence, consequences, and causes of errors in research.

In clinical medicine, we have only recently begun to understand that the best approach to reducing errors is not through blame and moral judgment, but rather by modifying the health systems in which these mistakes occur. The research community needs to begin a parallel process of self-examination. How, and how often, do errors occur in the scientific process? How can we promote an atmosphere in which scientists can openly discuss and learn from their mistakes? What are the best mechanisms for detecting, reporting, and mitigating these errors’ impact on research and the care of patients? We researchers must be willing to examine our errors and editors. However, some mistakes will inevitably slip past the safeguards. Although the short-term consequences of research errors may be less visible than those resulting from clinical mistakes, their total impact may be even greater because they affect so many patients’ care. At present, the scope of the problem is simply not known because there has been no systematic effort to study the prevalence, consequences, and causes of errors in research.

In clinical medicine, we have only recently begun to understand that the best approach to reducing errors is not through blame and moral judgment, but rather by modifying the health systems in which these mistakes occur. The research community needs to begin a parallel process of self-examination. How, and how often, do errors occur in the scientific process? How can we promote an atmosphere in which scientists can openly discuss and learn from their mistakes? What are the best mechanisms for detecting, reporting, and mitigating these errors’ impact on research and the care of patients? We researchers must be willing to examine our own work with the same spirit of inquiry and commitment to improvement as we advocate for our clinical colleagues.

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