Reducing medical error and improving patient outcomes

Every doctor with whom I have discussed this topic is concerned that they have caused harm to a patient, either by omission or by commission. Fortunately, most errors made did not appear to affect patient outcome. The risk of harm is greatest among patients who are most sick: as Hippocrates pointed out, for extreme diseases we use extreme remedies.[1] We use more potent drugs or other interventions, with potentially a greater number and more severe adverse effects; and when decisions must be made quickly there is less time for deliberation and consultation. In other situations we can be more considered in our approach, and more cautious. When there is only a small risk from the condition, a high-risk treatment is not justified. Thus for most decisions we weigh probabilities: the chance of benefit, against the potential for harm. Many bad outcomes are not due to professional error, but follow the right decisions made in good faith, with patient agreement to take an acknowledged risk.

Distinguishing the consequences of error against the expected background of illness and death is difficult. The most difficult questions of harm concern delayed effects, especially rare effects, where the probability of an event has been increased or decreased by a small amount. Uncommon side-effects are seldom discovered during the initial trials of a new treatment. They are usually only noted after extensive use, or through systematic research.

What can we learn from the four papers[2-5] in this issue dealing with errors, complications, and side-effects, and what should we do to reduce the problem?

It is not surprising that ticlopidine, a platelet ADP receptor inhibitor, also has other effects. The bone marrow depressant effects of ticlopidine are well known, as is the tendency to produce cholestatic jaundice.[6] The case report of four patients in this issue warns that liver damage may be more severe and common than previously thought, perhaps particularly among the Chinese population.[2] The authors concluded that as a result of their findings they will no longer use the drug, but unfortunately they do not give data on the number of other patients they have treated with this drug to generate an adverse event rate. Such a statistic would be helpful in better understanding risks associated with this drug.

The article by Lam et al[3] about chloramphenicol shows how to analyse for uncommon side-effects, which cannot readily be investigated through experimental studies. The side-effects and complications of chloramphenicol taken orally are well examined, though there will always be some uncertainties in the estimates. For ocular topical use, the administered dose is minimal, and the authors show that the risk is likely to be extremely small. For eye infection, chloramphenicol provides valuable treatment with very low risk. However the authors point out that this drug is prescribed over 100 times more often in Hong Kong than in other countries. If so, then chloramphenicol is not being used only for severe bacterial infections. It is probably often used in patients with slightly red eyes and a little mucus that is mistaken for pus. These patients would be helped just as much by washing their eyes with water as with using an antibiotic. In such situations where no benefit can be gained, one must ask whether any risk at all is acceptable. We should not use chloramphenicol unnecessarily.

Three cases of lead poisoning reported show error due to either ignorance or misunderstanding.[4] Lead compounds have been used in traditional medicine in many parts of the world, and they have long-term consequences. These effects—anaemia, colic, hypertension, and renal failure—are usually sufficiently distant in time such that the original prescriber is unlikely to link them to the medication. However with improved understanding of causation and improved diagnostic methods, western medicine discovered the danger of lead and excluded it from the pharmacopoeia. One of the arguments for traditional medicine is that it is gentle, and has few side-effects. This may be true for those that work largely as placebos, but when traditional drugs are effective, presumably they interfere with some aspect of biological function. Unless that interference is targeted specifically, and with a wide therapeutic range, what the Americans call 'collateral damage' is likely. Thus most effective drugs are likely to be poisons, with side-effects, as shown by substantial literature describing toxic effects from various 'natural' remedies. With the development and licensing of Chinese medicine, it is possible to address this problem. What standards should be set, by whom, and which ingredients should be prohibited?

Clearly doctors in the 'front line' must be aware that many of our patients have attended other doctors or Chinese medicine practitioners, and may be taking drugs that could cause at least some of their problems.

The fourth article by Lau[5] challenges us to consider how to reduce errors, and suggests that methods of handling error through "naming, blaming, shaming, and training" may not be effective. The author concludes by suggesting a cultural change among professionals to a broader perspective on the cause of errors and how to improve safety through developing a non-punitive environment, and redesigning systems. The rates of medical error found in various cited reports are described as "shocking" and a calculated example shows that even a low rate of error leads to many serious consequences. But I have some concerns with this analysis. In a typical hospital admission for a serious condition, there must be many hundreds of decisions with potential for error. In the circumstances, the surprising thing is that

so few occur, or at least are recognised. Our current systems are quite effective. While we must try to improve, we must also celebrate and maintain what already works well.

In thinking about negative patient outcomes, we must be careful to distinguish the causative links, and apply the best remedies for each type. Education is effective to remedy ignorance among those who want to learn, especially if we understand and correct the individual factors that lead to a person making incorrect decisions. Other errors are caused by system failures, and for these, system changes are required. This may require resource reallocation. One of the most important issues is ensuring that staff have enough training and time to obtain the evidence to make good decisions. When time and staffing are limited, we must accept a certain level of error. When operational staff make errors for these reasons, ultimate responsibility belongs to the administrators and politicians. Other poor outcomes occur not by error, but by chance, when a decision is made to take the risk because of the potential for benefit. The ticlopidine cases come under this category: a known risk with an estimated rare occurrence.[2] Better attempts to estimate the risk will enhance risk-benefit assessment in the future.

Diagnostic tests and screening provide a different type of probability error. The sensitivity and specificity characteristics of a test are set by the cutpoint chosen to distinguish 'normal' from those needing further action. Whatever the cutpoint, the test will have lower predictive value when used in a low prevalence situation, as in primary care rather than in hospitals, and even poorer predictive value in screening populations, where most disease is early rather than typical. Probability errors are in a different category to human and system failures, because they are intrinsic to the choice of cutpoint, and there is no remedy. Moreover, in screening, with a test dependent on human decisions rather than machines, the test characteristics may change. The job of a screener of cervical smears, mammograms, or chest X-rays is tedious: checking many normal cases with very occasional cases of early disease. It is inevitable that some will be missed. They can easily be found on retrospective review after the cancer develops: an 'error', but only blameworthy if the rate is higher than feasible standards.

How does this all apply to clinicians? We must look for errors, analyse them, and try to address their cause. For example, one morning when supervising trainees, two were observed to give patients prescriptions for combination drugs, each containing an antihistamine and pseudoephedrine. Neither doctor was aware of the full contents of the medication. High-dose phenylpropanolamine occasionally causes stroke in healthy young women[7]: possibly pseudoephedrine could also produce this rare effect, as well as causing unpleasant side-effects such as palpitations and insomnia. These keen, well-educated young doctors made a classic error, and on their error being identified both readily admitted that they had discussed this issue in a tutorial only a few weeks before. They may have learned the information, but had not effectively transferred this knowledge into practice.

Such combination medications provide a classic example of a system problem. The computer systems used by doctors in the hospital do not describe the full ingredients of these drugs, nor do readily available references. Patient demand for cough mixtures and decongestants and the ethos of the health system lead junior doctors to prescribe rather than argue the relative merits of these preparations with patients. Junior doctors are not taught to give such compound medications, but develop this practice through informal peer learning. The easiest way to solve this system problem would be by prohibition: simply not making compound medications available. An alternative would be for the computer system to inform doctors of the contents of compound medications, or to prohibit printing of prescriptions for combination medications where ingredients are duplicated. The pharmacy could also refuse to dispense them.

How well can our systems change to solve such problems? One of the aphorisms of systems theory is that every stable system is perfectly adapted to produce the outcomes it produces. Systems remain stable because it is easier for all concerned to keep them the way they are. Extra energy is needed to change the situation and maintain the new state until everyone accepts it as the new norm. A progressive organisation is one that listens to staff, even encourages them to bring out their difficulties, and then assists in finding ways to resolve identified problems. Although individual medical practices may find this difficult, for large organisations the difficulties are much greater. Undertaking audits and implementing change takes extra effort and resources, above what is currently available. Changing systems to reduce medical error and improve patient outcomes remains a challenge for us all.

JA Dickinson, PhD, FRACGP
Department of Community and Family Medicine
The Chinese University of Hong Kong
4/F Postgraduate Education Centre (School of Public Health)
Prince of Wales Hospital, Shatin, Hong Kong

References

1. Bloomsbury dictionary of quotations. 2nd ed. London: Bloomsbury Publishing; 1991.
2. Tsui PT, Lai ST, Leung WS, et al. Prolonged jaundice following percutaneous coronary intervention and ticlopidine therapy. HKMJ 2002;8:57-9.
3. Lam RF, Lai JSM, Ng JSK, Rao SK, Law RWK, Lam DSC. Topical chloramphenicol for eye infections. HKMJ 2002;8:44-7.
4. Auyeung TW, Chang KKF, To CH, Mak A, Szeto ML. Three patients with lead poisoning following use of a Chinese herbal pill. HKMJ 2002;8:60-2.
5. Lau DH. Improve patient safety and reduce medical errors. HKMJ 2002;8:65-7.
6. Quinn MJ, Fitzgerald DJ. Ticlopidine and clopidogrel. Circulation 1999;100:1667-72.
7. Kernan WN, Viscoli CM, Brass LM, et al. Phenylpropanolamine and the risk of hemorrhagic stroke. N Engl J Med 2000;343:1826-32.