

Safer medicines management in primary care

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SUMMARY

Errors in the medicines management process represent an important source of iatrogenic harm in primary care. Most errors result from underlying systems-based problems that are amenable to intervention and potentially preventable. In this paper, we seek to identify the frequency of medication-related morbidity in primary care, understand the underlying systemic reasons that increase risk of medication-related errors and iatrogenic harm, and suggest strategies for improving the safety of medicines management.

Keywords: safety; errors; adverse events; prescribing; medicines management.

Introduction

THE safety of medicines management in primary care is a topic of considerable importance, given the wide variety of drugs prescribed and the fact that primary care teams are taking on responsibility for increasingly complex medication regimens. In this article, we ask three questions: 'How safe is medicines management in primary care?', 'Why do medication-related adverse events occur?', and 'How can the safety of medicines management be improved?'

We have used a broad definition of medicines management that includes prescribing, dispensing, administration, monitoring, repeat prescribing, and the education and training of patients and healthcare professionals. This article focuses mainly on medicines management in relation to general practice, rather than primary care in its widest sense.

How safe is medicines management in primary care?

There has been relatively little research into the safety of medicines management in primary care and we are not aware of any studies that have assessed the relative risks of each stage of the medicines management process. Below we have outlined the key findings of studies on the frequency of medication-related adverse events, case reports of serious medication-related error, and research on the prescription of potentially hazardous drug-drug combinations and problems detected by community pharmacists. These studies suggest that the most hazardous points in the medicines management process relate to prescribing decisions, administration (how patients take their medicines) and monitoring.

The most serious medication-related adverse events often lead to hospital admission. A recent systematic review and

meta-analysis of 15 descriptive studies suggests that some 7% (median = 7.1%; interquartile range [IQR] = 5.7 to 16.2) of hospital admissions are drug-related and over half (median = 4.3%; IQR = 3.1 to 9.5) of these could be considered preventable.¹ Table 1 includes the types of medication that are most likely to be responsible for hospital admission.^{1,2-6}

Further information comes from studies that have relied on incident monitoring and self-reporting techniques to estimate the frequency of preventable adverse events in general practice. Of these, the most important is a large incident monitoring study from Australia, in which over half of the events reported were medication related and 79% of these were considered preventable.⁷ Deaths were recorded in 3% of the medication-related incidents and major harm in 15%.⁷

Medical defence organisations hold reports of serious drug-related errors and deaths from prescribing in general practice and some medicolegal experts have published collections of their experience.^{8,9} The largest and most up-to-date case series shows that, of 1000 consecutive claims lodged against general practitioners (GPs) after July 1996, 19.3% related to alleged prescribing mistakes, the most common — across all drug categories — involved failure to recognise or monitor adverse medication effects.^{10,11} Eighteen per cent involved prescription of incorrect or inappropriate medication, 12.5% involved contraindicated drugs, and 12% involved wrong dose of medication. Steroids accounted for one-fifth of prescribing-related claims and the following drug groups were also important causes of claims: antibiotics, phenothiazines, hormone replacement, oral contraception, antiepileptics, opiates, lithium, non-steroidal anti-inflammatory drugs, and warfarin.

A number of studies have looked at the incidence of prescription of hazardous drug-drug combinations in primary care. Differences in methodology make comparisons between studies difficult. Nevertheless, in three large-scale Scandinavian studies, interactions of potentially major clinical significance occurred in over 1% of cases where patients were receiving two or more items.¹²⁻¹⁴ A study from the United Kingdom has shown that, despite increased use of computerised drug interaction alerts in general practice, there is still scope for reducing drug interaction errors.¹⁵

Studies that have looked at prescription errors detected by community pharmacists have shown considerable differences in error rates (range = 1% to 40% [approximate])¹⁶⁻²² with

Table 1. Drugs and drug groups that are commonly associated with preventable morbidity and methods by which prescribing could be made safer.

Drug or drug group	Methods of improving safety
Non-steroidal anti-inflammatory drugs (NSAIDs), including aspirin	<ul style="list-style-type: none"> • Use judiciously, especially in the elderly and others who are particularly at risk from adverse events
Diuretics	<ul style="list-style-type: none"> • In at-risk groups who need these drugs, co-prescribe with a cytoprotective agent • Use judiciously, especially in the elderly • Monitor for adverse effects, e.g. postural hypotension, falls, and electrolyte disturbances • Carefully consider the balance of risks and benefits if adverse effects occur
Hypoglycaemic agents	<ul style="list-style-type: none"> • Patient education concerning the use of these agents is essential, particularly in terms of how to recognise early manifestations of low plasma glucose and what to do in the case of intercurrent illness
Anticoagulants	<ul style="list-style-type: none"> • Considering the balance of potential benefits and risks to individual patients is important • Effective monitoring systems are essential • International normalised ratio (INR) should be rechecked promptly following the introduction of another drug that might interact
Digoxin	<ul style="list-style-type: none"> • Use judiciously and monitor for adverse effects • Consider the need to check digoxin levels or reduce dose as patients' renal function deteriorates
Psychotropic drugs	<ul style="list-style-type: none"> • Use judiciously, especially in the elderly, and monitor for side effects
Antimicrobial agents	<ul style="list-style-type: none"> • Use judiciously, especially in the elderly • To minimise risk of pseudomembranous colitis, try to avoid giving multiple courses of broad spectrum antimicrobial agents
β -adrenoreceptor blocking drugs	<ul style="list-style-type: none"> • Avoid use in patients with asthma or COPD — this includes the use of eye drops
Long-term corticosteroids	<ul style="list-style-type: none"> • Use judiciously and carefully; consider the balance of benefits and risks before prescribing • Carefully consider co-morbidities and other medications that might increase the risks of corticosteroids • Try to avoid co-prescription with NSAIDs (including aspirin) and/or use a cytoprotective agent • Give prophylaxis for osteoporosis in patients on long-term high dose corticosteroids

lower rates noted in studies that have focused on clinically significant problems and interventions made by pharmacists.^{16,18} Although administrative errors account for many of the problems detected in these studies,^{17,20-22} these types of error may be indicative of faults in medicines management systems and addressing these might lead to overall improvements in safety.

Why do adverse events occur?

Adverse events often result from more than one failure in the medicines management system and studies of adverse events occurring in secondary care settings have generated models, to explain their possible underlying system causes.²³ Based on this work we have provided a model of how things can go wrong in primary care, using an example of a patient who developed pulmonary pneumonitis as a result of receiving an erroneously high dose of amiodarone (Figure 1). In this model, the actual adverse event is shown in column IV. Working backwards, column III identifies the points in the medicines management process where the literature suggests most problems occur: prescribing, dispensing, patient education, and medication monitoring. Column II shows the types of problem that could have contributed to the event and column I shows the possible underlying system failures. The framework as a whole is designed to illustrate the complexity of medicines management in primary care and the contribution of different types of system failure to an adverse event. In common with ideas proposed by Leape and colleagues,²⁴ we believe that understanding systems failures is likely to generate the most useful insights into how prescribing can be made safer.

Another way of thinking about why adverse events occur is in terms of the 'Swiss cheese model'.²⁵ In this model an adverse event is seen to be the result of a series of failures of safety systems (represented by holes in slices of Swiss cheese). An example is shown in Figure 2 in which a patient is

at risk of suffering an adverse event after requesting a previously used medication that is now contraindicated. In one instance, (the top arrow) the problem is detected by the pharmacist and the medication is not dispensed. In the other instance (bottom arrow) the error trajectory passes through all of the safety barriers and the patient suffers from an adverse event. Using this example it is easy to see how the adverse event could have been prevented by improvements in various aspects of the medicines management process.

Improving safety in medicines management

Relatively little research has been undertaken into methods of improving the safety of medicines management in primary care. Nevertheless, it is possible to make some suggestions by taking account of evidence that exists on changing prescribing behaviour, focusing on the drugs that cause the greatest problems in primary care, and tackling problems in the medicines management process.

A number of studies have shown that, in order to change prescribing behaviour, an active intervention is required.²⁶⁻³² Thus, the use of mailed educational materials, or distributing lists of patient-specific medications without explicit suggestions for change tends to have little beneficial effect.²⁶ But educational outreach,^{28,29} the use of computerised prompts,³¹ and active intervention by pharmacists^{30,32} have all been shown to have beneficial effects upon prescribing behaviour. These points should be borne in mind when designing interventions aimed at improving safety in primary care.

Focusing effort on improving the medicines management of those drugs that cause the greatest morbidity in primary care could have a significant effect in reducing adverse events. Table 1 shows some of these drugs or drug groups, together with possible methods for improving safety.

Knowing the drugs that are most commonly associated with preventable morbidity means that it is possible to identify

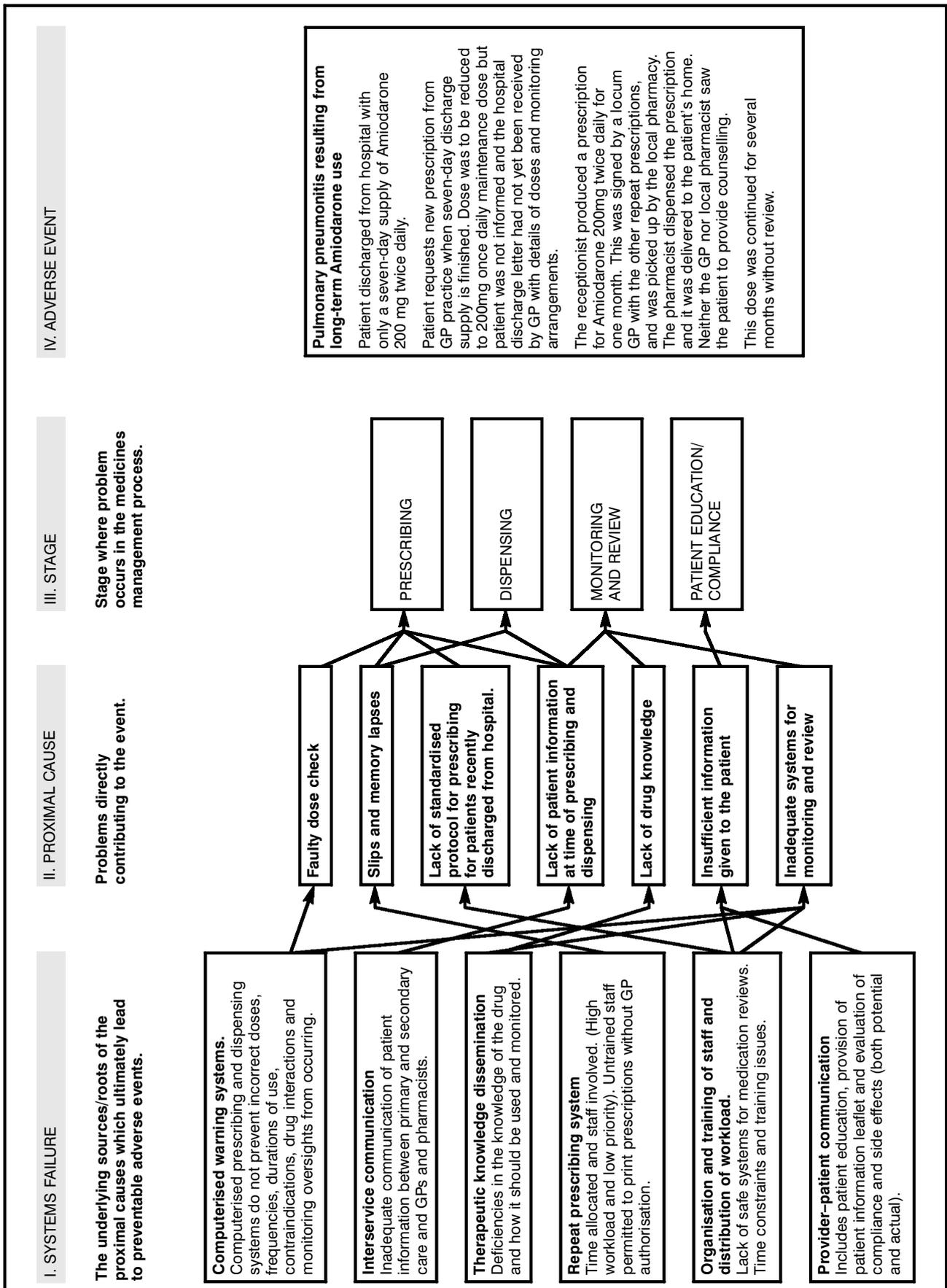


Figure 1. A schematic model for understanding the causation of adverse events in primary care.

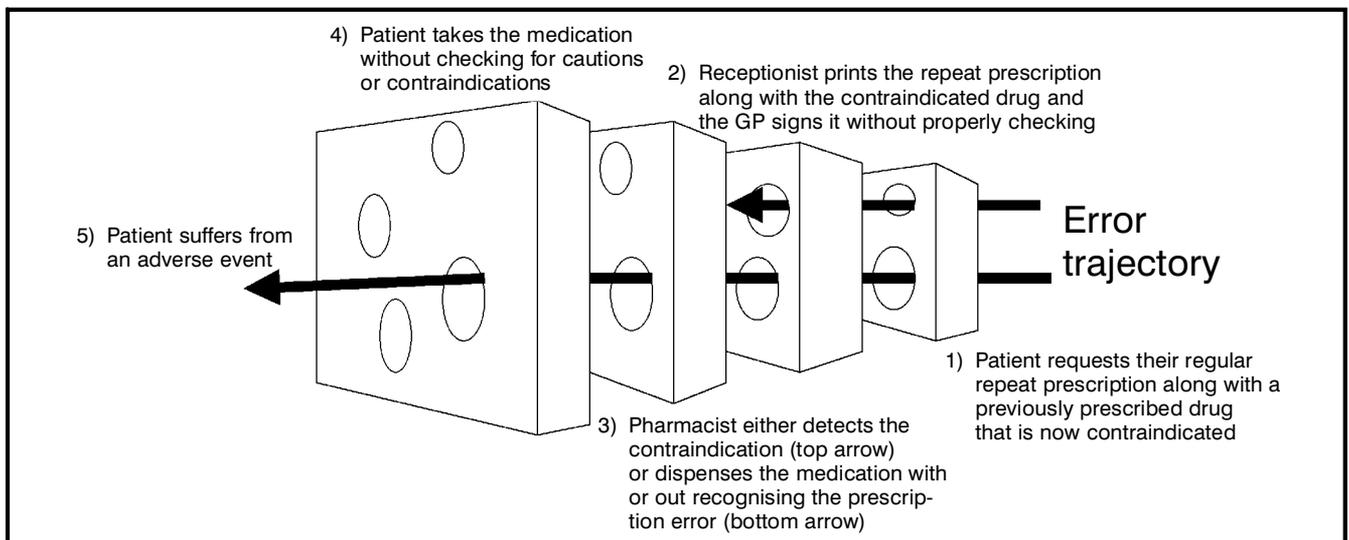


Figure 2. Swiss cheese model of how error in the medicines management process may or may not lead to adverse events.

patients most at risk. Using clinical computer systems it is possible to identify problems with several of the drugs or drug groups in Table 1. For example, it is possible to identify patients receiving high doses of prednisolone for more than six months who have not been prescribed osteoporosis prophylaxis, or patients receiving β -adrenoceptor blocking agents who also have asthma.

In the space available it is not possible to provide detailed advice on how to improve safety in the different stages of the medicines management process. Nevertheless, we allude to some key points below and suggest that readers consider other sources for more detailed advice.^{33,34}

The prescribing decision

A key issue in any prescribing decision is to balance risks and benefits. The safest option may be not to prescribe at all. When balancing risks and benefits it is essential to have all necessary information available about the drug (in terms of cautions, contraindications, interactions, and side effects), relevant information about the patient (age, sex, co-morbidities, and allergies), and to make maximal use of practice computer software for alerts of potential hazards. Most GPs are familiar with computerised drug interaction alerts, but prescribing could be made safer if computer system suppliers linked morbidity codes and information on renal and hepatic function to the prescription of potentially hazardous drugs.

Medication reviews and monitoring

One of the challenges that many GPs face is having the time to undertake thorough reviews of patients receiving long-term medication. Such reviews should ideally cover the appropriateness of the medications and whether they need to be continued, a review of medication use, inquiry into potential side effects, and checking for potential interactions and contraindications. If GPs do not have the time or expertise to undertake such reviews then this may be an important systems failure. Potential solutions include improved training, restructuring general practice to allow time to be given to prescription reviews, use of pharmacists to assist with reviews (particularly

for patients with complicated medication regimens), and incentive payments.

In terms of laboratory test monitoring of drugs (and their potential side effects) there is often a lack of clear evidence-linked advice on how often these tests should be done. Even when evidence is available many practices do not have secure systems in place to ensure patients get the appropriate tests done. To reduce risks associated with ineffective medication monitoring, better systems need to be developed. One option is for practices to agree on protocols for the blood test monitoring of drugs (such as diuretics, angiotensin converting enzyme inhibitors, digoxin, lithium, statins, thyroxine, anti-convulsants and immunosuppressive drugs) and to set up effective call and recall systems which link to repeat prescribing systems. Another option is to give more responsibility to patients so that they know how often their blood tests are needed and how to request these tests.

Repeat prescribing

Given that over 80% of drugs are now issued on repeat prescriptions, there is a need for repeat prescribing systems which minimise the risk of adverse events.³⁵ Key features of such systems include:

- documentation of what types of drug should not be issued on repeat prescription; examples might include immunosuppressants, antibiotics, and drugs where there is potential for addiction or intentional overdose;
- setting an appropriate review date following initiation or review of a repeat prescription;
- Making use of computer facilities to determine whether a patient is under or overusing their medication;
- providing clear rules for clerical staff about the circumstances in which they should not automatically print a repeat prescription; and
- for prescription requests not falling within agreed rules, GPs should have all relevant information available to them before signing a repeat prescription.

Patient education

Not all patients are experts in their conditions, but they are all experts in themselves. An open discussion about treatment options can reveal information about sensitivities/allergies and preferences that may well improve the 'medication-taking experience' and reduce physical and psychological morbidity. Similarly, by encouraging the patient to read information leaflets, important contraindications are less likely to be missed. There is an obvious trade-off here between reducing the chances of morbidity and extending consultation times, but most who have tried it have found shared decision-making to be a positive experience. This idea can be extended to shared management plans, especially in the chronic conditions, such as asthma, diabetes, coronary heart disease, and epilepsy, with the resulting benefit of improving concordance and thereby minimising the risk of harm through omission of medication.

Conclusions

This paper has shown that there are important risks in the medicines management process in primary care. Improving the safety of medicines management in primary care is likely to require the adoption of multiple strategies, including better support for prescribing decisions, more effective involvement of patients in these decisions, and better systems for monitoring the safety of medicines. Success is likely to be dependent on more effective use of computers and improving partnerships between general practice staff, patients, and pharmacists.

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