DOI:10.1111/j.1365-2125.2006.02825.x

Editors' view

Balanced prescribing

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Ambrose Bierce, in definitions that were later incorporated into *The Enlarged Devil's Dictionary* (1967), described a prescription as 'A death warrant' and 'A physician's guess at what will best prolong the situation with least harm to the patient.' In his follow-up to Bierce, *A Sceptic's Medical Dictionary* (1997), Michael O'Donnell defined it as 'A device for ensuring that a patient pays another visit to the doctor.' These definitions have some merit, not least that they are amusing, but they do leave something to be desired. A more commonly quoted definition, sometimes known as the five rights, is that of 'giving the right drug, in the right dose, by the right route of administration, at the right time, to the right patient'. But this omits some other important features. My own definition is 'A written order, which includes detailed instructions of what medicine should be given to whom, in what formulation and dose, by what route, when, how frequently, and for how long; it initiates an experiment in which the prescriber discusses the treatment with the patient and investigates and monitors the effects of the prescribed drug, with the aim of devising a dosage regimen that maximizes the beneficial effects and minimizes the risk of harms.' Dull, I know, but more precise than either Bierce or O'Donnell, who anyway had other intentions.

In writing prescriptions we all aspire to be safe prescribers, or should. But what is safe prescribing exactly? A search of Pubmed using the term ' "safe prescribing"[all fields]' yields only 36 hits, and none explicitly defines the term. Some imply that safe prescribing is the avoidance of medication errors [1, 2] or adverse drug reactions [3], but there is more to it than that. If everyone is to become a safe prescriber, we need to understand what that means, and definition should come first.

Let's start by considering the main elements of the process. Firstly, one's choice of medicine must be appropriate to the patient and the condition [4]. That should be a component of any definition. By 'appropriate' I mean that the mechanism of action of the medicine should match the pathophysiology of the disease and that there should be no contraindications to its use (e.g. concomitant diseases or potential drug interactions). Others include other features of the prescription in their definition of appropriateness, as exemplified by the Medication Appropriateness Index [5], but doing so perhaps asks the word to bear more definition than it can reasonably stand.

Secondly, one aims to minimize harm; otherwise one's prescribing can hardly be said to be safe. Together these two criteria suggest the following definition: 'Safe prescribing is a process that recommends a medicine appropriate to the patient's condition and minimizes the risk of undue harm from it.'

I have included the word 'undue' here, in the sense of 'going beyond what is acceptable', to imply the relative nature of safety. A risk of harm is often acceptable, the main criterion being that it should be outweighed by the attendant benefit. Perhaps therefore one should also mention benefit in the definition. Here is my next try: 'Safe prescribing is a process that recommends a medicine appropriate to the patient's condition and ideally optimizes the balance of benefit to harm.'

Here I have felt the need to include 'ideally', because one does not always succeed in achieving the optimum

balance, even when one's prescribing is as good as it can be. Good prescribing (or optimum prescribing) is not necessarily as safe as one would want, because there are always uncertainties about the potential outcomes. But shouldn't safe prescribing and good prescribing be synonymous? Well, only within the constraints of the system. Acceptably good prescribing does not necessarily guarantee safety. And that in turn suggests the idea of 'balanced prescribing' (instead of the more restrictive, and often unattainable, 'safe prescribing'), a concept that encompasses appropriateness and optimization, within the limits imposed by uncertainty. Then, making explicit the desirability of individualizing therapy with a suitable dosage regimen, this suggests the following definition: 'Balanced prescribing is a process that recommends a medicine appropriate to the patient's condition and, within the limits created by the uncertainty that attends therapeutic decisions, a dosage regimen that optimizes the balance of benefit to harm'.

One could also add the words 'and economic' after 'appropriate', but in my view cost, although important, should not be part of the principle of balanced prescribing.

Evidence of poor prescribing

We know that balanced prescribing, as defined here, is hard to achieve.

- Appropriate prescribing can be elusive [4]. For example, in one study in 208 elderly outpatients taking five or more regular medications, in which appropriateness was defined more widely than here [5], 14% of 16 440 evaluations of 1644 medications were rated inappropriate on one or more of ten criteria.
- There is significant underprescribing of effective treatments, such as angiotensin converting-enzyme inhibitors for patients with heart failure [6] and statins for hyperlipidaemia [7].
- Overprescribing is also rife. For example, polypharmacy, defined as the use of five or more drugs, occurs in more than 10% of people aged over 65 years in the UK [8]. And although not all polypharmacy is inappropriate [9], some undoubtedly leads to adverse drug reactions and interactions.
- Much less is known about ineffective prescribing, but there is evidence that it is common. Of 196 US out-patients aged 65 and older who were taking five or more medications, 112 (57%) were taking a medication that was ineffective, not indicated, or duplicative [10]. It is also clear that one form of ineffective therapy is being increasingly used – homoeopathy. In this issue of the *Journal* Ross et al. report that 49% of general practices in Scotland prescribe such remedies, although 5% of practices account for 50% of the remedies prescribed [11]. Elsewhere, Ernst rightly deplores this [12]. Readers of the *Journal* may be interested to know that the British Pharmacological Society takes a robust attitude to homoeopathic remedies and strongly supports the statement that has been issued by Sense About Science [13].
- Medication errors are common. In one study of four general medical wards in the UK there were 135 drug errors a week, of which 34 were potentially serious [14]. Nearly 1100 patients died in 2001 in the UK from medication errors or adverse drug reactions, a five-fold increase over the previous 10 years [15, 16]. In the USA it has been estimated that at least 1.5 million residents are harmed or killed each year because of medication errors, leading to extra healthcare expenses in hospitals of at least $3.5 billion annually to treat the error-related injuries [17]. There is a good example of a medication error in this issue of the *Journal* [18].
- In a survey of 40 000 medication errors that occurred in 173 hospital trusts in England and Wales in the 12 months to July 2006, collected by the National Patient Safety Agency, about 15% caused slight harm and 5% moderate or severe harm [19]. Only 18 trusts were rated as excellent, 70 were good, 73 fair, and 12 weak.
- Adverse drug reactions are common. Among 18 820 patients aged over 16 years admitted over six months, 1225 admissions were related to an adverse drug reaction, a prevalence of 6.5%; adverse drug reactions directly led to admission in 80% of cases; deaths occurred in over 2%, giving an overall death rate of 0.15% [20]. The projected annual cost of such admissions to the NHS was calculated at £466 m; some would have been avoidable.

Students are not unaware of their deficiencies as future prescribers, and both here and abroad have expressed their desire for more teaching in practical drug therapy and prescribing [21,22]. In a US study of 123 house-staff (interns and residents) and 52 medical students 11% did not always check prescribing information before prescribing new drugs, 25% did not check for drug allergies, 41% did not double-check dosage calculations, 44% did not check for renal impairment, and 70% did not check for potential drug–drug interactions [23]. The authors concluded that prescribing behaviours were poor, partly because of inadequate training and a culture that did not support safe prescribing.

Tackling the problem

How then is balanced prescribing to be achieved? I believe, with others [24, 25], that education is the cornerstone, given the extensive evidence that education of both doctors and medical students can improve prescribing. For example, a brief educational intervention increased safe prescribing by 28 medical students, increasing the numbers of error-free orders five-fold [26]. When 40 final-year medical students were randomly allocated either to participate in a teaching session facilitated by a pharmacist or to receive no additional teaching, the taught students achieved higher scores in eight OSCE stations and felt more confident in performing the skills on five stations [27]. When medical students were given small-group teaching, the average percentage score in a test of reconstituting and administering an intravenous injection rose steadily from 48% in 1999 to 72% in 2001 [28]. In a randomized controlled study in 85 preclinical Dutch medical students, those who were given extra teaching scored significantly higher in tests of prescribing abilities, specifically the ability to choose a treatment and monitor its effects [29].

In an extension of the last of these studies, published in this issue of the *Journal*, Vollebregt et al. have shown that preclinical role-play has a small positive effect on certain skills in practical drug therapy, namely choosing a drug treatment and giving patients information [30]. Two other papers in this issue of the *Journal* demonstrate how a prescribing curriculum can be delivered electronically to medical students [31, 32]. Other studies, too numerous to mention, support the use of education to improve prescribing by qualified doctors.

In recent years many types of guidelines have been formulated to help prescribers choose appropriate therapy for specific conditions, with some success, although there is evidence that guidelines are ineffective unless they are accompanied by either education or financial incentives [33]. However, in this issue of the *Journal* we publish evidence that in some cases doctors will adopt guidelines rapidly, in this case in the treatment of diabetes mellitus in the Netherlands [34]. The factors that persuade doctors to do this are not clear.

Conclusions

In this short review I have only scratched the surface of the evidence that has been published on numerous aspects of prescribing, including efforts to improve it. We need an independent systematic review of all the evidence relevant to prescribing and its teaching and assessment for graduates and undergraduates in the UK and world wide, which would synthesize current knowledge, identify important gaps, and allow the development of a set of minimum standards for prescribing behaviours. A balanced review should improve our understanding about how to achieve balanced prescribing.

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