What is a prescribing error?

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Abstract

Objective—To develop a practitioner led definition of a prescribing error for use in quantitative studies of their incidence.

Design—Two stage Delphi technique.

Subjects—A panel of 34 UK judges, which included physicians, surgeons, pharmacists, nurses and risk managers.

Main outcome measures—The extent to which judges agreed with a general definition of a prescribing error, and the extent to which they agreed that each of 42 scenarios represented a prescribing error.

Results—Responses were obtained from 30 (88%) of 34 judges in the first Delphi round, and from 26 (87%) of 30 in the second round. The general definition of a prescribing error was accepted. The panel reached consensus that 24 of the 42 scenarios should be included as prescribing errors and that five should be excluded. In general, transcription errors, failure to communicate essential information, and the use of drugs or doses inappropriate for the individual patient were considered prescribing errors; deviations from policies or guidelines were not.

Conclusions—Health care professionals are in broad agreement about the types of events that should be included and excluded as prescribing errors. A general definition of a prescribing error has been developed, together with more detailed guidance regarding the types of events that should be included. This definition allows the comparison of prescribing error rates among different prescribing systems and different hospitals, and is suitable for use in both research and clinical governance initiatives.


Keywords: prescribing errors; medication errors; definition of error

Studies carried out in US hospitals suggest that prescribing errors occur in 0.4–1.9% of all medication orders written1,2 and cause harm in about 1% of inpatients.3 No large scale studies of prescribing errors have been carried out in the UK, although studies of pharmacists’ interventions suggest that many errors occur and are subsequently remedied following the interventions of ward pharmacists.4 A recent report from the Department of Health recommended that serious errors in the use of prescribed drugs should be reduced by 40% by 2005, and that baseline rates of errors will need to be established.5

However, a major problem with interpreting quantitative prescribing error studies is that the definition of an error used by the researchers is often ambiguous or not given at all. Comparisons of error rates across the literature are therefore accompanied by significant uncertainty.

Where definitions are given, there may be marked differences among studies. A common approach has been to consider that a prescribing error has occurred if both doctor and pharmacist agree that this is the case.6 7 While pragmatic, this approach is limited by potential differences in the knowledge and views of individual practitioners. Other studies have used outcome-based definitions, including as errors only those that result in harm to the patient. However, in many cases6 7 pharmacists intervene to prevent errors from reaching the patient and so the outcome remains unknown. Even where prescribing errors are defined more explicitly, there is wide variation in the types of events included. For example, Betz and Levy8 include “prescribing a medication without sufficient education of the patient on its proper uses and effects” while Tesh et al9 include “the prescription of medication by brand (instead of generic) name”. Others do not consider these to be prescribing errors. Consequently, it is almost impossible to compare data from different studies or to use prescribing error rates as a meaningful component of clinical governance. If alternative prescribing systems are to be evaluated in terms of their effects on prescribing error rates, a clear definition is needed. The objective of this study was to develop a practitioner led

Key messages

• A major problem with interpreting quantitative studies of prescribing errors is that definitions are often ambiguous or not given.
• The Delphi technique was used to develop a general definition of a prescribing error and to determine whether specific types of event should be included or excluded as prescribing errors.
• Health care professionals are in broad agreement about the types of events that should be considered prescribing errors.
• The definition developed can be used to determine the incidence of prescribing errors in UK hospitals.

What this paper adds to the area

This paper develops a general definition of a prescribing error and presents examples of the types of event that should be included and excluded as prescribing errors.
What is a prescribing error?

Firstly, the investigators proposed the following preliminary definition of a prescribing error: “A prescribing error occurs when, as a result of a prescribing decision or prescription writing process, there is an unintentional significant (1) reduction in the probability of treatment being timely and effective or (2) increase in the risk of harm”. Each judge was asked to indicate their extent of agreement with this preliminary definition using a scale numbered from 1 (disagree) to 9 (agree), and to suggest ways in which the definition could be improved.

Secondly, the judges were asked to indicate the extent to which they agreed that each of 42 general scenarios represented a prescribing error. These scenarios were developed following a review of previous prescribing error studies and included events that have been considered prescribing errors in some studies but not in others, together with other areas of potential ambiguity. Judges were encouraged to include written comments to justify or qualify their scores.

Finally, the judges were asked if they wished to make any additional comments on the general definition of a prescribing error, having considered the specific scenarios.

OPERATIONAL DEFINITION OF A PRESCRIBING ERROR

An operational definition of a prescribing error that can be used as a common foundation for future work in both research and practice.

methods

Methodology

A two stage Delphi technique was used to elicit the views of a panel of expert judges. Consensus methods such as the Delphi are being increasingly used in clinical guideline development; the aim is to maximise the benefits of having an expert panel consider a problem while minimising the problem of domination often associated with group decision making. According to the Delphi technique, participants indicate the extent to which they agree with a series of statements in a postal questionnaire; their scores are then summarised and included in a repeat version of the questionnaire so that each participant can reconsider their scores in view of the group’s responses. The views of each participant are treated equally, and each participant is anonymous to the remainder of the panel.

Panel Selection

Forty three health care professionals were invited to participate in the study. These individuals, all of whom had experience in UK hospitals, were purposively selected to ensure that a wide range of health care professionals of different grades and different clinical specialities were included. Many were also chosen on the basis of their expertise in risk management or the study of prescribing errors.

First Stage of the Delphi Process

The questionnaire sent to the judges was in three parts.
Table 2 Situations that should be included as prescribing errors

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Round 1*</th>
<th>Round 2*</th>
<th>Code†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription inappropriate for the patient concerned</td>
<td>8, 9, 9</td>
<td>N/A</td>
<td>C, I</td>
</tr>
<tr>
<td>Prescribing a drug for which there is no indication for that patient‡</td>
<td>8, 9, 9</td>
<td>N/A</td>
<td>C, I</td>
</tr>
<tr>
<td>Prescribing a drug to be given by intermittent intravenous infusion, without specifying the duration over which it is to be infused</td>
<td>5, 6, 8</td>
<td>5, 7, 8</td>
<td>P, I</td>
</tr>
<tr>
<td>Prescription for discharge medication that unintentionally deviates from the medication prescribed on the inpatient drug chart</td>
<td>9, 9, 9</td>
<td>N/A</td>
<td>C, I</td>
</tr>
</tbody>
</table>

*Figures refer to the lower limit of the interquartile range, the median score (in bold), and the upper limit of the interquartile range.
†C = consensus; P = partial agreement; I = include as a prescribing error; EQ = equivocal.
‡Originally worded as “prescribing a drug for which there is no documented indication for that patient”. However, the judges considered that a prescribing error had not occurred if an indication existed but was not documented, while prescribing where no indication existed was considered a prescribing error. The word “documented” was therefore removed and the scenario included as a prescribing error.

Results

RESPONSE RATE
Thirty four (79%) of those approached agreed to take part. These comprised nine physicians, three surgeons, 12 pharmacists, seven nurses, two clinical pharmacologists, and an anaesthetist (table 1). A wide range of clinical specialties were represented; nine of the panel had extensive experience of medication error research and one was the editor of a relevant peer reviewed journal. In the first Delphi stage responses were received from 30 (88%) of the 34 judges. Responses to the second stage were received from 26 (87%) of the 30 judges to whom second stage questionnaires were sent.

DEFINITION OF A PRESCRIBING ERROR
When asked for their opinion on the definition proposed, the judges’ median score was 7.0 and the interquartile range 6.5–8.0. This indicates that the consensus was to accept the researchers’ preliminary definition. Many additional comments were made relating to this definition, most of which fell into three categories. Firstly, four respondents were unsure whether errors in the prescribing decision should be included as well as those in the prescription writing process. These judges considered the prescribing decision to be part of a broader concept of “clinical decision making” rather than “prescribing”. However, other respondents emphasised the importance of including both elements of the definition, and it was concluded that both should remain. Secondly, six judges were concerned about the use of the word “significant” and considered that the inclusion of this word meant that the definition was only of a “serious” prescribing error. However, others felt that this word should be included for two reasons: (1) it was considered important to differentiate between clinically meaningful prescribing errors and those cases
where some optimisation of treatment was possible but where a prescribing error could not be said to have occurred; (2) it was recognised that cognitive errors could occur in the prescribing process without there being any adverse consequences for the patient. For example, a doctor may prescribe drug X instead of the intended drug Y, but if both are equally safe and effective then the cognitive error is not clinically important. It was therefore considered that the word “significant” was necessary, but that it should be made clear that the definition is of a “clinically meaningful” prescribing error. Finally, three judges indicated that a comparator was needed within the definition as “reduction” and “increase” implied a baseline. It was therefore decided to add a statement to this effect.

The definition of a prescribing error finally adopted was therefore: “A clinically meaningful prescribing error occurs when, as a result of a prescribing decision or prescription writing process, there is an unintentional significant (1) reduction in the probability of benefit being timely and effective or (2) increase in the risk of harm when compared with generally accepted practice”.

TYPES OF EVENTS TO BE INCLUDED AS PRESCRIBING ERRORS
Following the first Delphi stage, consensus was achieved for 11 (26%) of the scenarios. Only the 31 for which no consensus was achieved were included in the second stage. Following the second stage, consensus was achieved for a further 25 scenarios. For the remaining six, partial agreement existed. Of the 36 scenarios for which consensus was reached, the consensus was to include it as a prescribing error in 24 cases, to exclude it in five cases, and that it was equivocal in seven cases. Of the six scenarios for which partial agreement existed, two were excluded as prescribing errors, three were excluded, and one was considered equivocal.

The final classification of each scenario is shown in tables 2–4. Those classified as prescribing errors concerned the selection of drugs or doses that were inappropriate for the individual patient, failure to take into account pharmaceutical issues such as intravenous drug incompatibilities, failure to communicate essential information, and transcription errors. The majority of the scenarios not considered to be prescribing errors represented deviations from policies and guidelines.

**Discussion**
Using the Delphi technique, a general definition of a prescribing error has been developed together with guidance concerning the specific types of event that should be included. This is practitioner led, more detailed than the definitions used in previous studies, and concordant with human error theory. According to theories of human error, a series of planned actions may fail to achieve their desired outcome because the plan itself was inadequate or because the actions did not go as planned. Our definition reflects this distinction, including failures both in the prescribing decision and the prescription writing process.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Situations that may be considered prescribing errors, depending on the individual clinical situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Results</td>
</tr>
<tr>
<td>Prescribing a drug in a dose above the maximum dose recommended in the British National Formulary or data sheet</td>
<td>4.75, 6.7, 6, 6 C, EQ</td>
</tr>
<tr>
<td>Misspelling a drug name‡</td>
<td>4.5, 8, 6.7, 6.7 C, EQ</td>
</tr>
<tr>
<td>Prescribing a dose that cannot readily be administered using the dosage forms available</td>
<td>3.75, 6.7, 6.7, 6.7 C, EQ</td>
</tr>
<tr>
<td>Prescribing a dose regime (dose/frequency) that is not that recommended for the formulation prescribed</td>
<td>5.6, 7.25, 6, 6 C, EQ</td>
</tr>
<tr>
<td>Continuing a prescription for a longer duration than necessary</td>
<td>5.6, 7.25, 5.6, 7, 6, 6 C, EQ</td>
</tr>
<tr>
<td>Prescribing a drug that should be given at specific times in relation to meals without specifying this information on the prescription</td>
<td>4.6, 8, 5.6, 6, 6, 6 C, EQ</td>
</tr>
<tr>
<td>Unintentionally not prescribing a drug for a clinical condition for which medication is indicated</td>
<td>1.5, 5, 7.5, 3.75, 5.5, 7.25 P, EQ</td>
</tr>
</tbody>
</table>

*Figures refer to the lower limit of the interquartile range, the median score (in bold), and the upper limit of the interquartile range.
†C = consensus; P = partial agreement; EQ = equivocal.
‡The judges’ comments suggested that major misspellings of a drug name that lead to ambiguity should be considered prescribing errors, whereas minor misspellings should not.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Situations that should be excluded as prescribing errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Results</td>
</tr>
<tr>
<td>Prescribing by brand name (as opposed to generic name)</td>
<td>1, 2, 3, 5, 5.25 C, EX</td>
</tr>
<tr>
<td>Prescribing a drug without informing the patient of its uses and potential side effects</td>
<td>1.75, 3, 3, 4, 6 C, EX</td>
</tr>
<tr>
<td>Prescribing a drug for which there is no evidence of efficacy, because the patient wishes it</td>
<td>2, 3, 5, 2, 3, 3 C, EX</td>
</tr>
<tr>
<td>Prescribing for a child a drug that has no product license for use in children</td>
<td>1, 2, 4.25, 1, 2, 3 C, EX</td>
</tr>
<tr>
<td>Prescribing a drug that is not in the hospital formulary</td>
<td>1, 2, 3.25, 2, 3, 3 C, EX</td>
</tr>
<tr>
<td>Prescribing contrary to hospital treatment guidelines</td>
<td>1.75, 3, 5, 1.75, 3, 4.25 P, EX</td>
</tr>
<tr>
<td>Prescribing contrary to national treatment guidelines</td>
<td>2, 3, 5, 2, 3, 5 P, EX</td>
</tr>
<tr>
<td>Prescribing for an indication that is not a drug’s product license</td>
<td>1, 3, 5, 1, 3, 3.25 P, EX</td>
</tr>
</tbody>
</table>

*Figures refer to the lower limit of the interquartile range, the median score (in bold), and the upper limit of the interquartile range.
†C = consensus; P = partial agreement; EX = exclude as a prescribing error.
The 42 scenarios assessed by the judges were classified into those considered to be prescribing errors, those not considered to be prescribing errors, and those about which the judges were equivocal. Prescribing without taking into account the patient’s clinical status, not taking into account important pharmaceutical issues, failure to communicate essential information, and transcription errors were all considered to be prescribing errors. However, failures to adhere to standards such as hospital or national guidelines, or the drug’s product licence, were not. This calls into question the validity of prescribing error studies that define errors based on deviations from such standards. The definition used is no standard way of defining consensus, and it is not recognised that prescribing errors vary considerably in terms of their severity. Because pharmacists correct many prescribing errors before significant harm ensues, a severity assessment method that does not require knowledge of actual patient outcome is required to evaluate the significance. A visual analogue scale has proved to be valid and reliable for assessing medication administration errors and we are currently testing it for use with prescribing errors.

The definition developed is now being used to measure the baseline incidence of prescribing errors in a UK hospital, and is proving very useful in deciding what should be included as a prescribing error and what should not. We hope others will adopt the definition for research and clinical governance initiatives so that meaningful comparisons can be made in this important area.

This research forms part of a larger study entitled “Prescribing errors in hospital inpatients: how can we reduce the risk?” This research was funded by the NHS Executive London (NHSE-LRO) Research and Development Responsive Funding Programme. The views and opinions expressed do not necessarily reflect those of the NHSE-LRO nor the Department of Health.

What is a prescribing error?


Cartoon used with permission of the artist, Ross Scrivener

“All the evidence suggests we are extinct.”