

## ORIGINAL ARTICLE

# Developing a measure for the appropriateness of prescribing in general practice

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**Objective:** To explore the feasibility of using a broader definition of the appropriateness of prescribing in general practice by developing ways of measuring this broader definition and by identifying possible relationships between different aspects of appropriateness and patient outcomes.

**Design:** A questionnaire study of patients and general practitioners before and after study consultations, supplemented by data collected from patients' medical records and telephone interviews with patients 1 week later.

**Setting:** General practices in the south of England.

**Participants:** 24 general practitioners and 186 of their consulting patients.

**Main outcome measures:** Unwanted, unnecessary, and pharmacologically inappropriate prescriptions; patients' adherence.

**Results:** Before the consultation 42% of patients said they wanted or expected a prescription for their main problem. Prescriptions were written in two thirds (65%) of study consultations, and 7% of these had not been wanted or expected beforehand. Doctors recorded that one in five prescriptions they wrote were not strictly indicated. Of the 92 independent assessments of these prescriptions, four were judged to be inappropriate and in 19 cases the assessors were uncertain. 41% of prescriptions written were wanted, necessary, and appropriate. Subsequently, 18% of patients for whom a prescription had been written were potentially non-adherent and 25% had worries or concerns about their medication.

**Conclusion:** The attempt to measure appropriateness of prescribing along the three dimensions of patients', prescribers', and pharmacological perspectives is both feasible and likely to yield valuable insights into the nature of general practice prescribing and patients' use of medicines.

The appropriateness of prescribing in general practice is usually defined solely in pharmacological terms. Population based measures of prescribing appropriateness or quality are generally based on limited data (such as PACT data in England) which may not include diagnostic or other individualised information.<sup>1,2</sup> Various instruments have been developed for measuring the appropriateness of prescribing at the individual patient level. The Medication Appropriateness Index (MAI) was based on a review of the literature and consists of 10 questions to be asked of any prescription recorded in a patient's notes.<sup>3</sup> These questions cover issues such as indication for the drug, efficacy, and interactions. Buetow and colleagues subsequently developed a method on the basis of an expert panel, an extensive literature review, and a two round Delphi consultation exercise.<sup>4</sup> The resulting instrument consists of nine indicators which can be used to judge prescribing by general practitioners (GPs) on the basis of what is recorded in patients' records. This instrument is known as the Prescribing Appropriateness Index (PAI). Neither of these instruments takes account of patients' perspectives on the prescribing process.

In order to explore the value of these two instruments more broadly, they have been applied to data from a qualitative study of doctor-patient communication about prescribing.<sup>5</sup> Most prescribing in this study was judged to be appropriate and was classified as such by these two instruments. However, it can be argued that in some cases their application would lead to misleading conclusions. Some prescriptions could be classified as appropriate where a detailed study of the circumstances of the prescription indicated that there were in fact problems.<sup>6</sup>

Barber and Cribb have proposed a wider definition<sup>7,8</sup> of the appropriateness of prescribing that also includes prescribers' and patients' perspectives, but this suggestion has not yet been

developed empirically. Research comparing GP and patient perspectives has demonstrated the influence of the latter on prescribing decisions in primary care.<sup>9,10</sup> It is also well established that a proportion of general practice prescriptions are not thought by the prescriber to be strictly necessary,<sup>11</sup> and that some prescriptions are unwanted by the patients for whom they are prescribed.<sup>12</sup> Any wider measure of appropriateness, which takes account of the ways in which medicines are actually used, needs to take these considerations into account. Population based measures of pharmacological appropriateness need to be supplemented by measures of clinical appropriateness and measures which include patients' perspectives. One reason for taking a wider view of appropriateness is that it may provide a method for predicting patients' subsequent use of medicines and potential or actual non-adherence. To be most useful, measures of the appropriateness of prescribing should help ensure effective use, minimisation of harm, and reduction of waste.

This study was undertaken to explore the feasibility of using a broader definition of the appropriateness of general practice prescribing, firstly by developing ways of measuring this broader definition and, secondly, by identifying possible relationships between aspects of appropriateness and patient outcomes. The eventual goal, which is beyond the scope of this paper, is the development of a more global measure of the appropriateness of general practice prescribing. The study on which this work was based was the second phase of a two phase project funded by the Department of Health entitled "Improving doctor patient communication about drugs".<sup>13</sup>

## METHODS

The study was a questionnaire based survey of general practice patients supplemented by data from patients' records and

**Table 1** Data required to identify unwanted, unnecessary, and inappropriate prescriptions

Category	Data from patient	Data from doctor	Data from medical record	Measure refers to:
Unwanted prescription	Before the consultation the patient disagrees with the statement "I want a prescription" for a specified health problem	The doctor records that a prescription was written for the same health problem	–	A specific health problem
Unnecessary prescribing	–	The doctor records that a specific prescription that has been written is not strictly indicated	–	A specific prescription
Inappropriate prescribing	–	Doctor's record of all prescriptions written in the consultation	Concurrent prescribing and diagnoses from patient medical record	The patient's diagnosis and therapy

telephone interviews with patients. Questionnaires were designed to measure patients' prior expectations of the consultation, doctors' assessments of their prescribing decisions, and patients' use of medicines 1 week later. Ethical approval was granted by the South Thames MREC and all the relevant local research ethics committees.

### Sampling

The fieldwork involved 24 GPs in 13 practices belonging to four participating groups: the pilot group, a trainers' group, and two practice based groups. These groups were located in a range of areas including a deprived inner city and rural areas. Groups were recruited via personal contact with the researchers or by GPs who were already participating. The intention was to work with both practice based and non-practice based groups, with GPs of varying degrees of experience, and in geographically contrasting areas.

### Data collection

Data were collected in the GPs' waiting rooms by one or two researchers depending on the number of patients being seen. The researchers aimed to give questionnaires to all consulting patients. The questionnaires were based on the findings of the first qualitative phase of the project<sup>14</sup> as well as on previously validated instruments.<sup>15, 16</sup> The patients' pre-consultation questionnaire asked about their health problems and the reasons they were consulting their GP. It consisted of 20 items, and patients were asked if they agreed, disagreed or were uncertain if they wanted these to occur. As well as asking patients if they wanted a diagnosis, tests, examinations, referral and reassurance, it asked about medicines (6 questions) and communication, participation and shared decision making (7 questions). The questionnaire had to be completed by patients before they were called into their consultation. After the consultation a shorter but similar questionnaire asked the patients to describe the consultation. The doctors' post-consultation questionnaire asked about each patient's concerns, their expectations for prescriptions, and the medicines prescribed (if any). In the telephone interview, which was adapted from Barber *et al.*,<sup>17</sup> patients were asked about their use of any medicines prescribed in the study consultation, any concerns or problems with these medicines, and their general views of medicines. Draft versions of the questionnaires were developed with the help of a pilot group of vocationally trained assistant GPs. Data were collected by the three main groups from 186 consultations (representing an 86% response rate from the 216 patients invited to take part) between July 2000 and May 2001. Data about drugs prescribed in the study consultations were extracted from patients' medical records and used for the independent assessments of pharmacological appropriateness. Patients were telephoned a week after the

consultation to find out about their use of medicines and any problems they had encountered. The four questionnaires and the data extraction sheet are available on the *Thorax* website ([www.thoraxjnl.com/supplemental](http://www.thoraxjnl.com/supplemental)).

### Measurement of appropriateness of prescribing

The data enabled the identification of prescriptions with poor outcomes: those which were unwanted (by the patient before the consultation), unnecessary (in the doctor's opinion), or pharmacologically inappropriate (as judged by the researchers). Unwanted prescriptions were identified using patients' pre-consultation questionnaires. They could only be measured for the first problem that the patient expected to raise with the doctor and were only identified for those patients who did subsequently receive a prescription. In contrast, unnecessary prescriptions were measured for all problems recorded by doctors on the basis of doctors' assessments of their own prescriptions. As these two measures (unwanted and unnecessary) were derived from specific problems or medications, it was important to ensure that any comparisons referred to the same problem or medication. Thus, for the purposes of comparison, patients were selected if they received a prescription and if the patient's first problem could be located on the doctor's questionnaire.

Judgements of appropriateness could only be made in cases where sufficient data were available to do so. These independent judgements were made by two authors (NBa and CB) using the Pharmacological Appropriateness Rating of Medicines (PARM) devised for the purpose. This was an instrument which combined the common elements of the MAI<sup>3</sup> and PAI<sup>18</sup> to capture as many aspects of pharmacological appropriateness as possible. It rated prescriptions on indication, dosage, regimen, contraindications, and risk of interactions. Only one overall assessment was made for each patient, so the assessment was not necessarily linked to a specific medication or problem. The judgement of appropriateness was made whether or not a prescription was written so, for example, an inappropriate decision not to prescribe would be included. The identification of prescriptions which were unwanted, unnecessary, and inappropriate was made by excluding patients without prescriptions, those without any assessment of appropriateness due to incomplete data, and those prescriptions written for problems other than the patient's first problem. As a result, the sample size for assessing prescriptions in relation to all three dimensions was small.

These three aspects of appropriateness require data from a number of sources—patient, doctor, and medical record. These are summarised in table 1.

### Analysis of data

The results were analysed in order to establish the extent to which it was possible to identify unwanted, unnecessary, and

**Table 2** Percentage (and number) of prescriptions that were unwanted by selected variables

	Yes	No	p value
Emergency consultation	0% (0)	9% (8)	0.09
New problem	3% (1)	10% (7)	0.19
Patient wanted to be offered choice of treatment	9% (3)	14% (4)	0.27
Patients pay for prescription	4% (2)	10% (6)	0.16
Patients non-adherent	3% (1)	8% (7)	0.25
Patients experienced belief barrier	2% (1)	9% (7)	0.11

"Yes" in the first cell indicates that this cell refers to people with emergency consultations and "No" in the second cell indicates that this refers to people without emergency consultations, etc.

inappropriate prescriptions, and to identify the ways in which these variables related to patient characteristics and outcomes.  $\chi^2$  tests were used to measure association between two dichotomous variables, or Fisher's exact test when there were fewer than five cases in cells of  $2 \times 2$  tables.

## RESULTS

### Patients' expectations

When questioned beforehand, most patients wanted to participate in treatment decisions and emphasised the importance of communication. Before the consultation 42% of patients said they wanted or expected a prescription for their main problem, and fewer than one in five (18%) said they did not want a prescription. This left over a quarter (28%) who were uncertain and 12% who did not answer. Nearly half (47%) agreed that they would rather not have a prescription if it was not really necessary.

After the consultation no patient recorded that they were at all dissatisfied and none was unhappy with the prescribing decision. Most patients received what they wanted, and their expectations of the consultation were exceeded.

### Unwanted prescriptions

Prescriptions were written in two thirds of consultations (121 out of 185, 65%). Patients received unwanted prescriptions in 7% of cases in which a prescription was written, which was approximately one per GP per clinic session. Although unwanted prescriptions—defined on the basis of patients' prior expectations—were more common in pre-booked consultations, when the presenting problem was not a new one, for patients who did not want a choice of treatment, for patients exempt from prescription charges, for patients who were subsequently adherent, and for those who had no problems with their medication, none of these differences was of statistical significance (table 2).

### Doctors' assessments

In five out of six consultations (84%) doctors felt they understood patients' views about their illness and nearly as many felt that they understood the treatment the patient would like (79%). Doctors were only correct 53% of the time when asked whether patients wanted a prescription or not. When doctors thought they understood the patients' treatment preferences, in 80% of cases the patient also felt that the doctor had listened to the treatment the patient thought they wanted.

In 3% of consultations doctors felt "very pressurised" by the patient to prescribe and in nine consultations (5%) they reported feeling slightly or definitely uncomfortable about their prescribing decisions.

### Unnecessary prescriptions

In most cases (90%) doctors recorded whether the prescription they had written was strictly indicated or not. On average, GPs recorded that one in five prescriptions was not strictly

**Table 3** Percentage (and number) of prescriptions that were considered unnecessary by selected variables

	Yes	No	p value
Emergency consultation	19% (5)	24% (23)	0.68
New problem	34% (12)	18% (12)	0.15
Patient wanted to be offered choice of treatment	24% (8)	14% (4)	0.18
Age under 25	33% (6)	22% (21)	0.44
Patients pay for prescription	29% (14)	18% (11)	0.28
Patients non-adherent	31% (10)	20% (18)	0.31
Patients experienced belief barrier	29% (12)	20% (16)	0.38

"Yes" in the first cell indicates that this cell refers to people with emergency consultations and "No" in the second cell indicates that this refers to people without emergency consultations, etc.

indicated. Prescriptions thought to be unnecessary were more common in pre-booked consultations, with patients consulting with a new problem, with those wanting to be offered a choice of treatment, with patients under 25 years of age, with patients who pay prescription charges, with patients experiencing a belief barrier (see below), and with patients who were subsequently non-adherent (table 3). None of these differences was statistically significant.

### Pharmacological measure of appropriateness

The pharmacological measurement of appropriateness is problematic due to the difficulty of reliably capturing all the relevant information. Data required to make this assessment could only be extracted from the records of 92 patients. Of the 92 independent assessments, four were judged to be inappropriate and in 19 cases the assessors could not determine appropriateness because there was insufficient information.

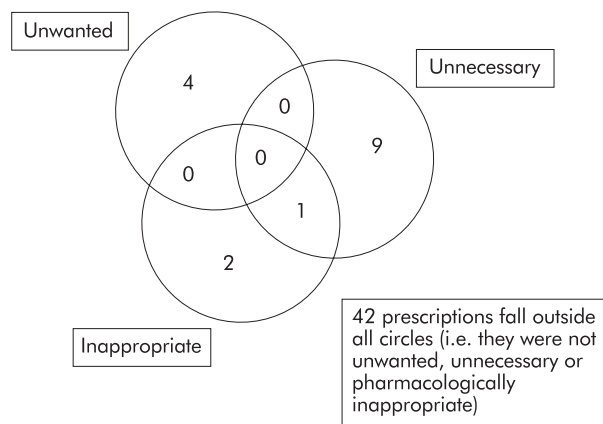
### Combined measures of appropriateness

Considering the separate assessment of unwanted, unnecessary, and technically inappropriate prescriptions, there were 58 prescriptions for which data on all three outcome measures were available (fig 1). For these prescriptions there was no overlap between all three categories. Thus, no prescription in this study was judged to be unwanted, unnecessary, and technically inappropriate. There were 42 prescriptions judged to have none of these poor outcomes, of which 24 (41% of the total) were wanted, necessary, and appropriate and 18 included cases where either the patient was uncertain or the independent assessors were unsure. There were 16 cases (28% of the total) with at least one poor outcome as follows: nine prescriptions judged to be unnecessary only; four judged to be unwanted only; two judged to be inappropriate only; and one judged to be both inappropriate and unnecessary. Thus, 23% of unnecessary prescriptions were wanted by the patient (table 4). All the other unnecessary prescriptions were given to patients who were uncertain about whether they wanted a prescription or not.

### Patients' subsequent use of medicines

Telephone interviews were carried out with 105 patients. The questions asked in the telephone interview related specifically to the medication prescribed at the study consultation a week earlier. Nearly one in five patients (18%) were potentially non-adherent because they had not started taking the medicine, had stopped early, had missed doses, or had altered the dosages. Patients who were using previously prescribed medication or who were taking medicines on an as-needed basis were not counted as non-adherent.

A larger proportion (25%) indicated there was a belief barrier with the prescribed medication—that is, they thought it did not work well or had one of a number of worries or



**Figure 1** Venn diagram showing intersections between unwanted, unnecessary, and pharmacologically inappropriate prescriptions from a sample of 58.

**Table 4** Numbers of patients receiving wanted and necessary prescriptions

Wanted medication (pre-consultation)	Necessary prescribing	
	No	Yes
No	0	8
Yes	5	57
Uncertain or no answer	17	34
Total	22	99

concerns about it. A weak (but not statistically significant) relationship was found between these variables with patients having belief barriers being nearly twice as likely to be non-adherent.

Although patients receiving unnecessary prescriptions were more likely to be potentially non-adherent and have negative beliefs about their medication, small sample sizes prevented us from attributing any statistical significance to the results. People receiving an unwanted prescription were no more likely to be non-adherent than those receiving wanted prescriptions.

**DISCUSSION**

The results showed that 7% of patients received prescriptions when they had not wanted one before seeing the doctor, 20% of prescriptions were not thought by the prescriber to be strictly indicated, and 4% were judged to be technically inappropriate. Of the prescriptions for which data on all three measures were available, none was unwanted, unnecessary and technically inappropriate and 41% were wanted, necessary and appropriate. Nearly a quarter of the unnecessary prescriptions were wanted by the patient and half of these were also technically appropriate. Our findings suggest that people receiving unnecessary prescriptions may be more likely to be non-adherent than those receiving necessary prescriptions. There is thus a paradox of prescriptions which were both unnecessary and wanted and yet were not taken as prescribed.

This work suggests that the attempt to measure appropriateness along the three dimensions of patients', prescribers', and pharmacological perspectives is both feasible and likely to yield valuable insights into the nature of general practice prescribing and patients' use of medicines. Such measures have the potential to facilitate a deeper understanding of the complex process of prescribing than pharmacological appropriateness alone.

**Key messages**

- It is possible to identify unwanted, unnecessary, and pharmacologically inappropriate prescriptions.
- Less than half the prescriptions in this study were wanted, necessary, and appropriate.
- Some prescriptions were both wanted and unnecessary but were not taken as prescribed.
- These measures need further development.

The limitations of this study include its small size when investigating rare events and the fact that the participating doctors were an unrepresentative group. Compared with other studies, the patients in this sample were somewhat less likely to hope for prescriptions.<sup>9,19</sup> However, the proportion of consultations in which prescriptions were written was comparable to that in other studies, suggesting that, in terms of prescribing at least, these consultations were not atypical. The proportion of prescriptions thought by the prescriber to be not strictly necessary is remarkably similar to the proportions found in other studies.<sup>9,11</sup> The proportion of patients categorised as non-adherent to the new medicine is less than the results of the study by Barber and colleagues<sup>17</sup> using similar methods which found that 30% of patients were non-adherent 10 days after receiving a new prescription for a chronic condition. The measure of wanted prescriptions was based on patients' pre-consultation questionnaires, and it could be argued that patients might change their minds during the course of the consultation. While this is obviously true, no research has yet explored whether patients' use of medicines is more closely related to their pre- or post-consultation assessments of their medication. It may be harder for patients to say that they did not want a prescription after they have received one than to say they do not want a prescription in a pre-consultation questionnaire.

Given the reality of everyday practice in which patients may present several problems in a single consultation, researchers developing these measures will need to ensure that any comparisons refer to the same presenting problem and/or prescribed medicine. Such measures will also need to allow for the fact that some patients will be uncertain about what they want. Sufficient data to enable judgements of pharmacological appropriateness will need to be collected.

If these preliminary results are confirmed in larger studies, they suggest that further investigation of the reasons why GPs write prescriptions they deem not strictly necessary would be fruitful. This would need to include a consideration of the ways in which diagnoses are attributed in these cases. The results also suggest that the measurement of patients' beliefs would be useful in relation to the prediction of non-adherence.<sup>20</sup> As well as being useful for research purposes, the further development of the instruments used in this study could enable GPs to carry out routine monitoring of their own prescribing decisions. However, the data in this study were collected by funded outside researchers and, if these measures were to be used in routine practice, practice staff would need to be given extra time for data collection. These measures might also have a role to play in relation to clinical governance. On the basis of this work, we have developed an educational pack to help GPs to monitor communication and prescribing in their own practices.

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The four questionnaires used in this study and the data extraction sheet are available on the *Thorax* website at [www.thoraxjnl.com/supplemental](http://www.thoraxjnl.com/supplemental).

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