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Development of learning outcomes for an undergraduate prescribing curriculum (British Pharmacological Society prescribing initiative)

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WHAT IS ALREADY KNOWN ABOUT THIS SUBJECT

- Tomorrow's Doctors provides overarching outcomes for undergraduate medical students on prescribing skills; however, detailed learning outcomes are not available.

WHAT THIS STUDY ADDS

- This study provides additional guidance for medical schools and teachers by setting out detailed learning outcomes for prescribing.
- The outcomes reflect the recent emphasis on teamwork and communication, as well as the need to minimize medication errors.
- This is a further step towards defining practical prescribing competence.

AIMS

The question of whether new medical graduates are adequately prepared for the challenge of prescribing has been raised. Although broad outcomes for prescribing competency have been agreed, clarity is needed on the detailed outcomes expected of new graduates. This study aimed to create a consensus on the required competencies for new graduates in the area of prescribing.

METHODS

We used a modified Delphi approach based on the findings of a systematic review of educational interventions for improved prescribing. Panellists were asked to rank the importance of a list of 53 possible learning outcomes and to add any additional outcomes felt to be missing.

RESULTS

Of the 48 experts who were invited to participate, 28 agreed (58%). Forty-five learning outcomes were included from the original list of 53. A further nine outcomes were suggested by panellists, of which five were included. The wording of three outcomes was changed in line with suggestions from the panellists. Many of the agreed outcomes relate to improving patient safety through medication review, checking appropriateness of the drug for the patient, recognizing the prescriber's limitations and seeking advice when needed. Enhanced communication with the patient and healthcare team, better documentation in the notes and discharge letters were key areas featured in this Delphi exercise.

DISCUSSION

This study has identified 50 learning outcomes for teaching prescribing. These build on the existing British Pharmacological Society document by focusing specifically on prescribing, with greater emphasis on avoiding medication errors and better communication.

Introduction

Prescribing is a complex and challenging task that is becoming increasingly difficult. Current evidence shows an increasing incidence of medication errors and adverse reactions, providing a substantial threat to patient safety. Poor-quality prescribing may also be reflected in under-prescribing, over-prescribing, inappropriate and irrational prescribing [1], all of which have serious implications for patients and healthcare organizations such as the National Health Service (NHS).

Studies have identified a range of factors behind poor prescribing at individual, environmental and organizational levels utilizing Reason's Human Error Theory [2]. These include lack of training, low perceived importance of task and lack of awareness of errors, as well as increasingly complex polypharmacy and patient factors, lack of standardization, and particular aspects of some care environments [3–5]. New prescribers have highlighted a lack of undergraduate and postgraduate education in prescribing [6, 7]. Moreover, first-year doctors are neither confident nor competent when prescribing, by their own assessment and that of their supervisors [8, 9]. Recent data from a General Medical Council (GMC)-sponsored study of graduates of two UK medical schools found that >80% failed an assessment in prescribing [10].

It is vital that new doctors have adequate undergraduate training to prepare them for the complex task of prescribing as well as postgraduate opportunities to evaluate and improve their skills. In order to do so, greater depth and clarity are needed in letting medical students know exactly what skills they need to learn, and to demonstrate competency in. The GMC has provided broad guidance, updated this year in Tomorrow's Doctors [11], and the Safe Prescribing Working Group (convened by the Medical Schools Council) [12] has expanded on this by giving overarching outcomes. However, the literature may not provide outcomes that are sufficiently detailed for constructing assessment tools for examining the specific prescribing competencies of the new medical graduate. This is particularly true for the widely used Objective Structured Clinical Examination format, where the marking scheme needs to be written to focus on recognizing core competencies, with explicit criteria for 'pass' and 'fail' students.

Hence, the British Pharmacological Society (BPS) has recognized the need to produce a specific undergraduate curriculum in prescribing that will build upon the 2003 curriculum in clinical pharmacology and therapeutics [13]. In this Delphi study we aimed to establish the key curricular outcomes for teaching, and assessing, prescribing competencies of new medical graduates prior to their entering clinical practice.

Methods

A systematic review of the literature describing educational interventions to improve prescribing by undergraduate or postgraduate medical trainees was undertaken to identify possible models for the curriculum [14]. Only one programme, the World Health Organization (WHO) Guide to Good Prescribing, was found to have consistent evidence of success [15]. This was therefore used as the basis for 53 initial learning outcomes, which also incorporated elements from the existing BPS core curriculum for clinical pharmacology and therapeutics (CPT) [13], and the papers identified in the systematic review.

Experts in clinical pharmacology, pharmacy and medical education, as well as representatives of primary and secondary care and doctors working at all levels within the NHS, were invited to participate in a consensus panel. Those with a particular interest in prescribing education or medication errors were specifically targeted. A purposive sampling approach including snowballing was used, with those agreeing to participate asked to suggest another expert to invite.

A modified Delphi approach was adopted to minimize time demands on the expert panel and to ensure that data from the literature search were included in considerations.

Panellists were asked to consider a list of 53 possible learning outcomes (as described above), giving each a score of 1 (not at all important), 2 (of little import), 3 (neutral), 4 (somewhat important), or 5 (very important) indicating their agreement that the outcome be included in the curriculum. They were also asked to suggest any changes to the outcome wording and to suggest any other outcomes that were missing. In the second round, the same list of outcomes was sent to the panellists, with a summary of the round 1 scores, and their original score. They were asked to reconsider their score in the light of the group opinion and given the opportunity to change it. They were also asked to score the newly suggested outcomes provided by other group members and again given the chance to suggest wording changes or additional outcomes. Panellists were not known to each other, and individual scores were kept confidential.

Consensus for inclusion was taken as a score of $\geq$4.5 and a standard deviation of <1. Consensus for exclusion was taken as a score of <4.0. Panellists were asked to reconsider specifically those items which scored between 4.0 and 4.5 in round 1. Those items that subsequently scored >4.5 were added to the list of outcomes and those that did not were excluded.

Results

Thirty experts were invited to participate. A further 18 names were suggested by the snowballing process. Of the total 48 experts who were asked, 28 agreed to take part

Table 1

Outcomes included in the curriculum

Outcome	Mean (SD)
Write an unambiguous, legible, complete and legal prescription, on hospital prescription forms including supplementary charts	5.00 (0.00)
Complete a discharge prescription	5.00 (0.00)
Know their own limits and ask for help when needed	5.00 (0.00)
Elicit and record an accurate medication history, including current and recent medicines	5.00 (0.00)
Recognize situations where their prescribing skills are not sufficient, and seek advice before proceeding*	5.00 (0.00)
Check for contraindications	4.92 (0.27)
Check for special circumstances (e.g. renal or hepatic impairment, pregnancy, breast feeding)	4.92 (0.27)
Define problem(s) to be treated	4.92 (0.27)
Document the rationale for new prescribing decisions in patient notes	4.92 (0.27)
Recognize the expression of drug doses and apply appropriate mathematical techniques to calculate drug doses correctly	4.88 (0.33)
Interpret the medication history, noting specifics such as previous allergies and ADRs	4.88 (0.43)
Follow clinical guidelines/protocols where appropriate	4.88 (0.43)
In doing so, consider possible contraindications, drug–drug interactions, previous ADRs, any special circumstances, age, gender and patient affordability	4.88 (0.43)
Check for drug–drug interactions	4.88 (0.33)
Consider risks and benefits of specific drug therapies	4.88 (0.33)
Check the suitability of a drug for a specific patient	4.85 (0.46)
Take appropriate action in contraindications, interactions and special circumstances	4.85 (0.37)
Define the therapeutic objective(s) for new therapy	4.85 (0.37)
The prescriber has appropriate knowledge of drugs	4.85 (0.37)
The prescriber has appropriate knowledge of the principles of ADRs, interactions and medication errors	4.85 (0.37)
Knowledge of the principles of managing patients in special groups	4.85 (0.37)
Communicate treatment plan to other members of staff, both verbally and in the patient records, discharge prescriptions and letter to GP	4.85 (0.37)
Manage toxicity and overdose	4.81 (0.49)
Ensure over-the-counter, complementary medicines and the pill are specifically included	4.81 (0.40)
Review medication at appropriate intervals	4.81 (0.40)
An appropriate working diagnosis has been made	4.81 (0.40)
Ensure that adequate knowledge of the patient's medical and drug history has been obtained before prescribing*	4.81 (0.51)
Check appropriate parameters before prescribing a drug	4.77 (0.51)
Understand the limits of information sources and compensate for them	4.77 (0.43)
Communicate treatment plan and instructions to patient, at a suitable level of information	4.77 (0.43)
Choose appropriate formulation, dose, route, frequency and duration of the drug	4.77 (0.59)
Recognize the potential for medication errors and take steps to reduce the risks*	4.76 (0.54)
Interact with the multidisciplinary team, and the pharmacist in particular, with regard to prescribing	4.73 (0.45)
Gain information from a variety of sources (including transcription from GP letter)	4.73 (0.45)
*Write a prescription on supplementary prescription forms such as anticoagulation, insulin or infusion charts**	4.72 (0.58)
Write an unambiguous, legible, complete and legal prescription, on general practice prescription forms	4.69 (0.62)
Identify for each drug the original indication, formulation, dose, route, duration and effects	4.69 (0.55)
Consider whether drug treatment is needed for each indication	4.69 (0.55)
Recognize drugs with narrow benefit:harm profile or high potential for serious adverse effects/interactions, and take appropriate precautions when prescribing*	4.67 (0.66)
Use nondrug therapy where appropriate	4.65 (0.69)
The prescriber can assess evidence of safety and efficacy	4.65 (0.56)
Monitor treatment outcomes appropriately	4.65 (0.56)
Initiate appropriate treatment/management of patients suffering from ADR (including stopping drug)	4.65 (0.48)
Calculate appropriate doses for individual patients by weight/body surface area/nomogram	4.62 (0.64)
Avoid abbreviations when writing a prescription	4.62 (0.57)
Select appropriate doses for patients in special groups (or other changes as needed)	4.62 (0.64)
Adapt therapy based on therapeutic drug monitoring or results of other investigations	4.54 (0.65)
Use therapeutic drug monitoring where needed, and interpret it	4.50 (0.71)
Stop drug where patient receiving no benefit from drug	4.50 (0.65)
Use appropriate reference materials to gather information on drugs	4.50 (0.51)

*New outcomes suggested by panellists during the Delphi process. Underlined items are outcomes which were not covered in the 2003 BPS Curriculum, while those with italiziced text are items that have been expanded upon. ADR, adverse drug reaction.

(58%). Twenty-six round 1 replies were received in response to the 28 that were sent out (93%). Twenty-one experts responded to round 2 (81%). The characteristics of the participants are listed in the online supplement Appendix S1.

Forty-five outcomes were included from the original list of 53. A further nine outcomes were suggested by panellists, of which five were included. The wording of three outcomes was changed in line with suggestions from the panellists. Table 1 shows the agreed learning outcomes.

Table 2
Excluded outcomes

Outcome	Mean (SD)
Encourage shared decision making	4.42 (0.58)
Select appropriate end-points to assess efficacy	4.38 (0.75)
Select an appropriate drug for the condition based on evaluation of the evidence for its safety, efficacy and cost	4.29 (0.78)
Minimize waste in prescribing	4.27 (0.60)
Identify when there is a pharmacological prophylaxis should be given with the main drug being prescribed*	4.25 (0.86)
Administer medicines parenterally (s.c., i.m., i.v.)	4.19 (0.75)
Complete a yellow 'card' for a suspected ADR	4.19 (0.63)
Encourage patient compliance*	4.10 (0.79)
Participate in audit of prescribing*	4.05 (0.80)
Use capital letters when writing a prescription	4.00 (0.89)
Prepare parenteral medications	3.88 (0.91)
Assess cost–benefit for specific therapies in specific patients*	3.57 (0.50)

*New outcomes suggested by panellists during the Delphi process. Underlined items are those that were previously in the 2003 BPS curriculum, or in the British National Formulary. ADR, adverse drug reaction.

Underlined items are those that were not previously listed in the 2003 BPS curriculum, while those with *italicized* text represent items similar to those from 2003, but with a more detailed specification of the competency.

The new items underlined generally relate to the important areas of medication review, and checking suitability of the drug for the individual patient. Enhanced communication with the patient and healthcare team, better documentation in the notes and discharge letters are also key areas that are emphasized in this update. The learning outcomes, sorted according to prescribing theme, are available in online supplementary Appendix S2.

Table 2 shows those that were rejected during the Delphi; interestingly, a number of these items (in shaded boxes) were present in the 2003 BPS curriculum, while one excluded item 'use capital letters when writing a prescription' is a recommendation from the British National Formulary.

Discussion

This Delphi exercise provides additional information that builds on the existing 2003 CPT curriculum [13] by focusing specifically on prescribing and providing a detailed framework for teaching, learning and assessment of prescribing competence. The increasing concern about medication errors, patient safety and teamwork is reflected in several additional outcomes emphasizing the need to 'check' or 'review', as well as 'document' and 'communicate' prescribing decisions to the patient and healthcare team. Similarly, polypharmacy receives added attention in this list of competencies, with specific items relating to appreciation of nondrug therapy, review of medication with consideration as to whether each drug is genuinely indicated, and the awareness of the need to stop a drug if the patient is receiving little or no benefit. Being alert to danger is also rightfully emphasized, where the competent prescriber should recognize high-risk' situations and 'take appropriate precautions/action' for preventing or managing adverse drug reactions.

A few of the outcomes that were excluded may seem unexpected, but may also reflect current practice, e.g. the reduced role of doctors in preparing and administering drugs for parenteral use. Some traditionally important factors such as writing in capital letters or calculating drug doses in complex circumstances are considered less important than the prescriber knowing their limits and using appropriate resources. This may be because of the vast increase in numbers of drugs (making it impossible to learn clinical pharmacology in depth for every agent), the use of guidelines and the increasing availability of electronic systems. In particular, panellists felt that a new graduate's ability to reach a working diagnosis, define the therapeutic objective (as in the WHO Guide to Good Prescribing) and follow treatment guidelines for that condition was perhaps more relevant than being able to choose a drug based on cost–benefit considerations, or to assess appropriate end-points. These latter skills, although of undoubted importance, were possibly thought to be more suited to postgraduate training.

This study may have been limited by the size of the panel; however, this is line with recommendations for a Delphi study and should provide a reliable consensus [16]. There was a poor response from junior doctors. This was most likely due to the time involved in participating in a Delphi study. While this response was less than had been hoped for, the majority of other panellists are clinically active if more senior. The overall response rate was good in comparison with other studies, highlighting the perceived importance of the topic.

Overall, a consensus on 50 learning outcomes that should be included in the BPS Core Curriculum for Prescribing has been reached. We believe that this list of outcomes accurately reflects the recent emphasis on teamwork and communication, as well as the need to minimize polypharmacy and medication errors. We plan to use these outcomes in developing teaching and assessment material that will be disseminated widely across a broader spectrum of trainee prescribers. This should enable us to evolve and refine further the prescribing curriculum in the drive to improve patient safety, with the hope that certification of practical prescribing competency will become a reality, not just for junior doctors but for nonmedical prescribers as well.

Competing interests

There are no competing interests to declare.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1
Delphi panellists
Appendix S2
Outcomes in stepwise order

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