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SHORT REPORT

Mindful of the gap: A process for delivering better medical prescribing?

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The causes of drug-related morbidity and mortality are complex, occurring at all stages of the drug use process (Table I) and can be typically categorised as those resulting from inappropriate prescribing, administration (by both health care practitioner and patient) or monitoring. Consequently, the solution to address these problems must draw on expertise that embraces clinical pharmacology and clinical pharmaceutics, an understanding of patients' views and expectations, as well as effective systems to ensure appropriate monitoring and safe drug use.

The problem of poor prescribing is not new and periodically dominates media headlines. A recent editorial by Aronson, Henderson, Webb, and Rawlins (2006) highlighted concerns, widely shared by health care professionals, educators and students, about aspects of junior doctors' training that relate to the prescribing and use of medicines. As junior doctors undertake most hospital-based prescribing it is of no surprise that prescribing by doctors, and the appropriateness of their training, remains the focus of discussion around this issue.

Poor prescribing is thought to be the result of many factors, although the evidence supporting the different claims made is variable (Audit Commission, 2001; Maxwell, Walley, & Ferner, 2002; Barber, Rawlins, & Dean Franklin, 2003). The most common speculation is that there is a problem in the quality of both undergraduate and postgraduate prescribing-related training offered to juniors. However, it should be appreciated that the process of prescribing is becoming more difficult with more potent drugs available, an ageing population, and the frequent need for polypharmacy.

A number of solutions have been proffered to help improve prescribing, with better training for medical students being the most common. Others suggest that a system should be established in which pharmacists support prescribers in a more formalised way, while many recognise that the use of decision support software must play a role in any future approach. The increasing emphasis placed by the National Health Service on competency-based training is exerting pressure to increase individual accountability for the actions they take and to embed the process for maintaining standards. But who should be responsible for the prescribing component of this? And what is the ideal system?

To expect medical students to grasp, in five years, both knowledge and skills to prescribe and use the range of available medicines appropriately is perhaps unrealistic. Maxwell and Walley (2003), on behalf of the British Pharmacological Society (Clinical Section Committee), have set out the key elements of a safe and effective prescribing curriculum that they expect to be achieved at the point of qualification. This is, in our view, more aspirational than deliverable.

Medical school survey

A small survey of prescribing teaching has recently been conducted in medical schools in England to determine the aspects being taught, how many hours were devoted to these activities and how students were assessed. In addition, academics responsible for this element of the programme were invited to comment on how well prepared they considered their graduates to be for the prescribing role. The views of junior

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Table I. Drug use process indicators and associated medication-related problems (Hutchinson, Vogel, & Witte, 1986; Hepler, & Strand, 1990).

DUP stage	Actions	Associated medication-related problem
Need for a drug	Ensure there is an appropriate indication for each drug and that all medical problems are addressed therapeutically	Untreated indication Treatment without indication
Select drug	Select and recommend the most appropriate drug based upon the ability to reach therapeutic goals, with consideration of patient variables, formulary status and cost of therapy	Improper drug selection
Select regimen	Select the most appropriate drug regimen for accomplishing the desired therapeutic goals at the least cost without diminishing effectiveness or causing toxicity	Too little drug Too much drug Drug interaction
Provide drug	Facilitate the dispensing and supply process so that drugs are accurately prepared, dispensed in ready to administer form and delivered to the patient on a timely basis	Too little drug Too much drug
Drug administration	Ensure that appropriate devices and techniques are used for drug administration	Too little drug Too much drug
Monitor drug therapy	Monitor drug therapy for effectiveness or adverse effects in order to determine whether to maintain, modify or discontinue	Non-compliance Adverse drug reaction Drug interaction
Counsel patient	Counsel and educate the patient or caregiver about the patient's therapy to ensure proper use of medicines	Too little drug Too much drug Non-compliance Adverse drug reaction
Evaluate effectiveness	Evaluate the effectiveness of the patient's drug therapy by reviewing all the previous steps of the drug use process and taking appropriate steps to ensure that the therapeutic goals are achieved	Untreated indication Treatment without indication Improper drug selection

doctors on how well their medical school training prepared them for the prescribing role were explored during a focus group discussion (six participants).

Of the 14 medical schools that responded, many indicated that traditional elements relating to clinical pharmacology and prescribing practice were taught (Table II). However, only two schools quantified the hours associated with this aspect (30 and 69 hours) and only one school indicated that prescribing was assessed as a separate entity and that students needed to secure a pass in this element to graduate.

When the assessment methods used are aligned to Miller's triangle (1990) of clinical competence (Figure 1), it seems the majority of respondents relied on approaches that test prescribing at the "knows" and "knows how" level, using methods such as multiple-choice and essay questions. Whilst the objective structured clinical examination (OSCE) is extensively used (in 10 of the 14 schools), as a test at the "shows how" level, the respondents did not distinguish whether prescribing was assessed as part of a battery of OSCEs or whether a series of workstations were devoted to this specific aspect. We suspect that the former is more common, given that in only one school "prescribing competence" was an essential component of graduation. Only two schools used a portfolio assessment (approximating more closely to the "does" level) of student prescribing activity.

The majority of responders (9 out of 14) indicated that their graduates were adequately prepared to undertake the prescribing role as required of a doctor in foundation training (year 1, F1); four were unsure, whilst one school felt that their graduates were inadequately prepared. The focus group participants were unanimous in the view that their undergraduate medical training had not prepared them for the prescribing role and identified a number of themes that they considered important aspects of prescribing training. These ranged from selecting and adjusting drug dosages to the practicalities associated with writing a prescription and the importance of a system to support junior doctors in this role.

Although we recognise the limitations of this small study, it appears to suggest (and confirm the views expressed recently) that there may be a disconnection between the medical schools' view of education on

Table II. Elements of clinical pharmacology and prescribing taught in medical schools (England only; $n = 14$).

Element of clinical pharmacology and prescribing	Number of medical schools covering element
Clinical pharmacology	
Mechanism of drug action	14
Basic pharmacokinetic principles	13
Therapeutic drug monitoring	13
Pharmacogenetics	12
Prescribing practice	
Writing a prescription	14
Application of information sources to support prescribing	13
Taking a drug history	11
Prescribing for patients with renal impairment	10
Prescribing for patient with hepatic impairment	10
Monitor the outcome of prescribed therapy	8

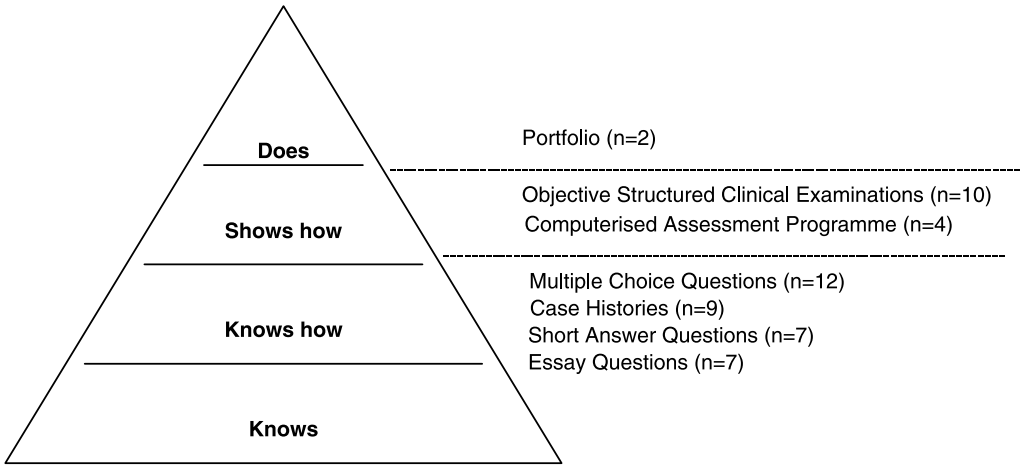

Figure 1. Assessment of prescribing at medical schools, surveyed across England, described using Miller's (1990) triangle of clinical competence.

drug therapy and prescribing and junior doctors' sense of preparedness for prescribing in practice. Proposed solutions that seek to deliver more teaching in this area during the undergraduate curriculum may not be a realistic approach to resolving this perceived gap.

It would appear that a broad review of prescribing training is overdue, especially given the extension of independent prescribing to non-medical practitioners, and which should address two important issues. Firstly, what is the curriculum (probably already well described, but located in different professional groups) and at what stage should knowledge, skills and aptitudes be developed? Secondly, once prescribing competence has been assured, how might the performance of prescribers be reviewed in line with acceptable standards of care?

All health care practitioners who prescribe should demonstrate their attainment of series of core competencies. These can be synthesised from domains of knowledge and understanding, skills and attitudes and assessment methods should be aligned with appropriate levels of Miller's triangle (Figure 2). This would result in a focus on the underpinning knowledge and understanding during undergraduate curricula and a clear emphasis on acquiring the skills to use medicines safely. During F1, the requirement could be to collect evidence to demonstrate safe and effective prescribing practice, before undertaking a competency-based assessment to confirm that the core competencies have been attained at the point of full registration with the General Medical Council.

During the second year of foundation training (F2), the focus should shift more to a performance management approach, with a regular review of the decision making process when prescribing for a range of common conditions. This could bring together a range of healthcare professionals: in particular doctors, nurses and pharmacists, in an attempt to develop the culture of medication safety.

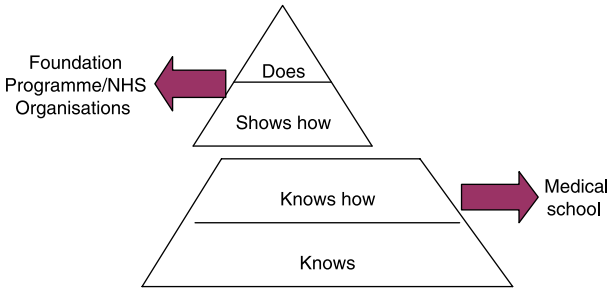

Figure 2. Future assessment of prescribing described using Miller's (1990) triangle of clinical competence.

Adopting such a system would support the vision expressed in the Foundation Programme and be more likely to produce safe and effective prescribers.

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