Clinical Pharmacology: Principles and practice of drug therapy in medical education

Brian Whiting,¹ Nicholas H. G. Holford² & Evan J. Begg³

¹Formerly of the Department of Medicine and Therapeutics, University of Glasgow, Glasgow, Scotland, ²Division of Pharmacology and Clinical Pharmacology, University of Auckland, Auckland and ³Medicine and Clinical Pharmacology, Christchurch School of Medicine, University of Otago, Christchurch, New Zealand

Educational reform has taken place in many Medical Schools. A traditional passive approach has been replaced by a more active, student-centred approach, founded on Problem-Based Learning. This has not been without risk because many well-structured courses have been abandoned, and this is of particular significance to the principles and practice of drug therapy.

Here we outline an approach which could be incorporated into a medical curriculum and suggest some guidelines and a list of questions that should be asked in clinical situations involving drug therapy.

Keywords: advocate, curriculum, problem-based learning, questionnaire

Introduction

The last decade saw dramatic changes in medical education because there was dissatisfaction with the way in which doctors (medical students) were being trained. A basically *passive* education has been replaced by a more *active* approach in the hope that this will train 'better' doctors. The need for this change was expressed by the General Medical Council's (GMC) document 'Tomorrow's Doctors' (GMC, 1993) [1]. Experience in many parts of the world has shown that medical education could be liberated from its traditionally didactic nature by a more active form. Hence the introduction into some schools of small group teaching founded on Problem-Based Learning (PBL) [2–11].

'Tomorrow's Doctors' [1] left it to individual Medical Schools to introduce a new curriculum in keeping with the philosophy of that document. Those convinced about the value of PBL place less emphasis on well-structured lecture courses in favour of 'small group teaching', exposing small groups of 8–10 students to a series of problems or scenarios which have a set of carefully planned learning objectives, worked out by the students' own efforts. Here we suggest four guidelines and a set of

questions which should be considered after basic and clinical pharmacological principles have been established, bearing in mind that training in safe and effective drug use could now easily be jeopardised by an apparent reduction in the formal teaching of Clinical Pharmacology and Therapeutics.

Key questions and guidelines

In the later, predominantly clinical years, one very important question should be focused on

'What do I need to know about this drug?'

The same question should always be asked when any clinical scenario is being considered. The quality and maturity of the answer will depend on a thorough knowledge of underlying principles established earlier in the course, and this should be in the hands of an effective **Advocate** who can oversee the progression of the subject as time advances. We suggest that the important principles should reflect the issues accompanying any potential drug administration and that Clinical Pharmacology and Therapeutics breaks down into (a) **fundamental principles** and (b) **the practicalities of prescribing** in many different clinical situations.

Four guidelines suggest themselves:

- (i) **Don't interfere if not warranted: don't give drugs just for the sake of it.**

Correspondence: Professor Brian Whiting, 2 Milner Road, Glasgow G13 1QL, Scotland.

Received 18 June 2001, accepted 21 December 2001.

- (ii) **Always be mindful of the balance between beneficial and adverse toxic side-effects.**
- (iii) **Start with a low dose and increase the dose gradually if necessary.**
- (iv) **Bear in mind target concentration intervention [12]:**
(the use of a target effect and associated target concentration to make rational individual dosage decisions).

Students on clinical attachments should be able to answer the question posed above – ‘**What do I need to know about this drug?**’. In order to answer this question it may be helpful to consider the following questionnaire:

- 1 Is there an accurate diagnosis?
- 2 Is drug therapy *really* necessary?
- 3 Has the most appropriate drug been chosen?
- 4 Is the drug being used correctly?
- 5 Has account been taken of the influence of any disease or genetic factors?
- 6 Has the age of the patient been considered?
- 7 Is the patient pregnant or lactating?
- 8 Has the influence of food been considered?
- 9 Is drug dependence likely?
- 10 Have the objectives of drug therapy been defined carefully?
- 11 Is there a plan to monitor the effects of the drug?
- 12 Is there a plan to monitor the concentrations of the drug?
- 13 What are the potential side-effects?
- 14 Are there any potential drug interactions?
- 15 Is the route of administration correct?
- 16 Has a clear, concise, correct, legible prescription been written?
- 17 Is there a plan to review all drug therapy periodically?
- 18 Has the drug therapy been explained clearly to the patient?
- 19 Has a complete drug history been taken, including over-the-counter drugs?
- 20 Is there any evidence of drug allergy?

This list covers all the important issues in drug therapy; it could be printed on a small card as an *aide-memoire*. We suggest that such a questionnaire should become integral to all good and safe prescribing.

BW gratefully acknowledges the financial support provided by the Carnegie Trust for the Universities of Scotland and by the University of Glasgow.

References

- 1 General Medical Council. Tomorrow's Doctors. *Recommendations on Undergraduate Medical Education*. London: UK, 1993.
- 2 Schmidt HG. Problem-based learning. Rationale and description. *Med Education* 1983; **17**: 11–16.
- 3 Walton HJ, Matthews MB. Essentials of problem-based learning. *Med Education* 1989; **23**: 542–558.
- 4 Norman GR, Schmidt HG. The psychological basis of problem-based learning: a review of the evidence. *Acad Med* 1992; **67**: 557–565.
- 5 Schmidt HG. Foundations of problem-based learning: some explanatory notes. *Med Education* 1993; **27**: 422–432.
- 6 Barnsley L, Cameron R, Engel CE, *et al*. Ratings of performance of graduates from traditional and non-traditional medical schools. *Teaching Learning Med* 1994; **16**: 179–184.
- 7 Hill J, Rolfe IE, Pearson S-A, Heathcote A. Do junior doctors feel they are prepared for hospital practice? A study of graduates from traditional and non-traditional medical schools. *Med Education* 1998; **32**: 19–24.
- 8 Dolmans D, Schmidt HG. The advantages of problem-based curricula. *Postgrad Med J* 1996; **72**: 535–538.
- 9 Kaufman DM, Mann KV. Comparing achievement on the Medical Council of Canada Qualifying Examination Part 1 of students in conventional and problem-based curricula. *Acad Med* 1998; **73**: 1211–1213.
- 10 Lloyd-Jones G, Bligh JG. Problem-based learning. A coat of many colours. *Med Education* 1998; **32**: 492–494.
- 11 Peters AS, Greenberger-Rosovsky R, Crowder C, Block SD, Moore GT. Long-term outcomes of the New Pathway Program at Harvard Medical School: a randomised controlled trial. *Acad Med* 2000; **75**: 470–479.
- 12 Holford NHG. Target concentration intervention: beyond Y2K. *Br J Clin Pharmacol* 1999; **48**: 9–13.