What it means to do Pharmacology Curriculum Delivery in a College of Medicine: An Experience of 20 Years

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PhD

Abstract

The pharmacology curriculum at the colleges of medicine of the Iraqi universities is drug-group based one and undergoes a revision by a national meeting of Deans and Heads of departments of the colleges of medicine convenes every five years in Baghdad, the last meeting was held in 2002. It is taught the third year of six-year MBChB course, adopting the traditional teaching system with theory (didactic-lecture style) 90 hours, practical 60 hours and discussion 30 hours. The purpose of this work is to report my personal experience in delivering the pharmacology curriculum at the College of Medicine, University of AL-Anbar.

Curricular Modes of Learning: formal lectures (traditional didactic lecture-style); practical: actual practical sessions (performed by students), demonstration sessions (Demonstrated by the teaching staff), video sessions, seminars; tutorials; free discussions, pharmacological key issues, and medical problems. Assessment: continuous (tutor review in the tutorial process) and formal (occurs by examination at mid and end of year)

It is concluded that 1. Tutorial instructional activities foster better knowledge understanding and skills learning which enhance the ability in reflective practice and in turn eventual self-learning. 2. During the tutorial process, student-generated learning issues may arise as interactional gain from the tutorial to be reviewed by the teaching staff to incorporate modification in the future curricular modes of learning. 3. A better motivation and learning is achieved when interfacing both pharmacology and pathophysiology in the learning process. Appropriate recommendations have been presented.

Key words: Medical Education, Passive learning, Tutorial-based learning

Introduction

The curriculum at the colleges of medicine of the Iraqi universities undergoes a revision by a national (consensus) meeting of Deans and Heads of departments of the colleges of medicine convenes every five years in Baghdad, the last meeting was held in 2002. The MBChB course is six years in duration and no premedical qualification is required. Pharmacology is taught in the third year of MBChB, adopting the traditional teaching system with theory (didactic-lecture style) 90 hours, practical 60 hours and discussion 30 hours. The curricular core content adopts a drug-group oriented system, see Appendix I. In 1997, I attended a national workshop on pharmacology curricular modes of delivery which was held in Baghdad supported by the World Health Organisation. This workshop emphasized on two tasks, one to reduce the high burden of factual information and the other to improve integration with tutorial-based learning, i.e. stressing on skills and attitudes learning.

The real challenge of concerned educators is to be able to define and implement a core curriculum, including prioritizing core content and learning objectives, modes of delivery, and assessments of learning outcomes. There is an increasing interest in recognizing the difference in educational effectiveness between conventional didactic teaching and tutor student interactional learning where the focus shifts from teaching to learning. It is now generally accepted that the latter mode of learning is much better in enhancing the ability in reflective practice and in turn eventual self-directed learning [1, 2, 3]. The purpose of this report is to enhance our understanding of what constitutes effective pharmacology curriculum delivery in a college of medicine.

Methodology

Curricular Modes of Learning

Formal lectures (traditional didactic lecture-style)

Practical

1-Actual practical sessions (performed by students)
2-Demonstration sessions (Demonstrated by the teaching staff)
3-Video sessions
4-Seminars

Tutorials

1-Free discussions (Queries determined in advance by students, or perhaps raised up during the discourse of tutorial are put forward to the tutor who assumes a distinguished role in conducting a constant management of the tutorial)
2-Pharmacological key issues (determined in advance by the tutor)
3-Medical problems (aimed at introducing basic pharmacological principles in clinical pharmacology)

Assessment

1-Continuous (tutor review in the tutorial process)
2-Formal (occurs by examination at mid and end of year)

Discussion

The range of modes of curricular delivery, in Iraq, will vary widely in different colleges

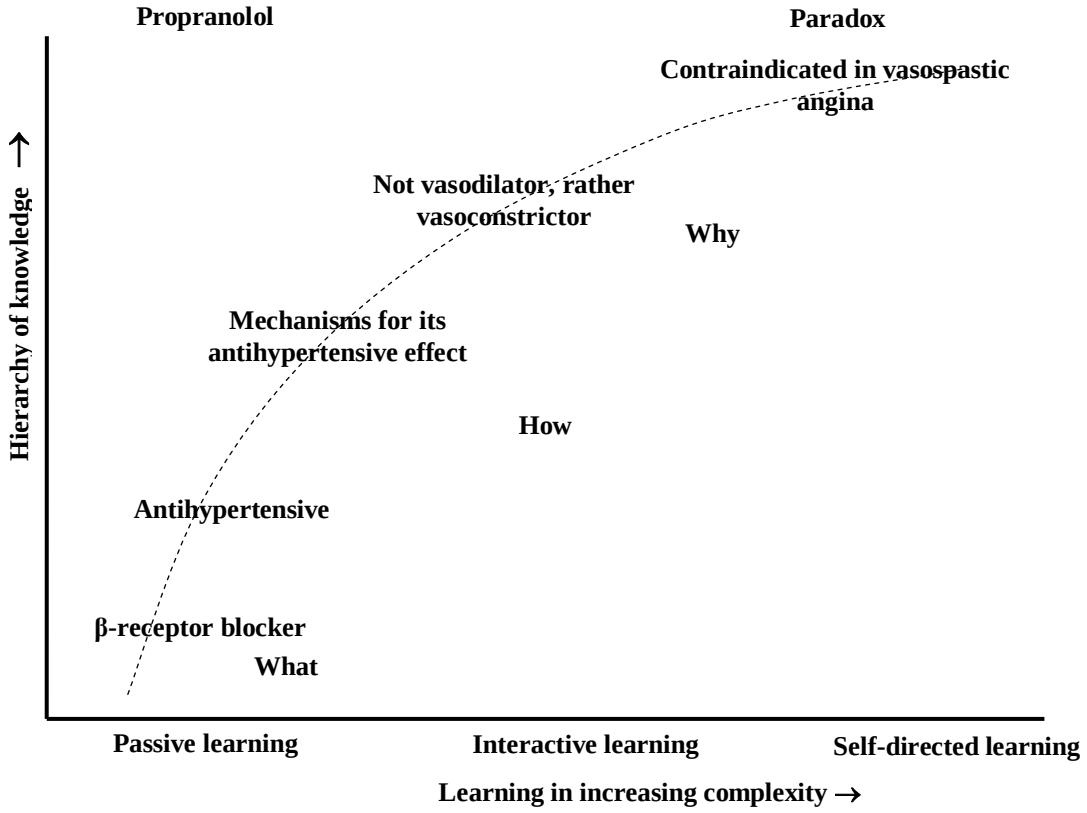
according to local preference. The guidelines defined by the consensus group approach (a national meeting convenes every five years) for the development of curriculum and its implementation including modes of delivery are vague and limited to stating the number of hours allocated for theory, practical, and discussion modes of delivery. Therefore, as a junior teacher starting his career in a newly established college, I inevitably adopted the modes of delivery that I have been accustomed to as a student in my undergraduate years (BSc in Pharmacology) at School of Pharmacy, Portsmouth, England.

In 1994, we performed a study [(4)] on the sessional examination outcome in anatomy and pharmacology conducted in May 1994 for medical students in the first three years of the College of Medicine in Ramadi. Results have shown that students did well on questions directly based on one lecture, i.e. memorization type, but failed in the group of questions that required reasoning and linking between lectures. It was concluded that substantial defects may exist in our educational system. This experience prompted me to pursue this educational issue which later I understood better as knowledge (passive) learning and skills (inquisitive) learning reflecting different modes of delivery.

The didactic lectured-based teaching is allocated 90 hours against both practical (60 hours) and discussion (30 hours). This educational approach is still essential as in delivering factual knowledge in a broad overview of individual topics but just one of several approaches to learning [(3)]. Thus, in our educational system, weaknesses in the learning process may appear with an excess of didactic lectured-based teaching rather than active tutorial-based learning. In theory, practical sessions should contribute a great deal towards active learning but in practice, in our setting, this form of delivery is largely a waste of time. Practical sessions are labour and staff intensive besides the tutor should be well informed and motivated. We usually have problems in securing the essential requirements for conducting authentic skills learning practical sessions that should be in small groups. Thus, repetition of practical classes makes it more labour and staff intensive with little willingness for members of staff to undertake such teaching activities in a serious manner.

This background prompted me to resort to the active tutorial-based learning. Free-discussion tutorial is characterized by queries determined in advance by students, or perhaps raised up during the discourse of tutorial are put forward to the tutor who assumes a distinguished role in conducting a constant management of the tutorial. This knowledge-display activity requires pervasive mutual orientation between tutor and student in a way that every moment is a thoroughly interactional gain produced by both tutor and student. In such process, inevitably knowledge deficiencies are recognized and dealt with appropriately by the tutor during the session; in addition, student-generated learning issues may arise as interactional gain from the tutorial to be reviewed by the teaching staff to incorporate modification in the future curricular modes of learning. Thus, it is true 'the best way to learn is to teach'.

Further, pharmacological key issues tutorial is characterized by key topics being identified in advance and are revisited and developed in increasing depth throughout the course of the year to provide a rational sequence of increasing complexity, e.g. apparent volume of distribution (V_d), therapeutic index, plasma half-life ($t½$), zero-order kinetics, tolerance, selection and emergence of antimicrobial resistance, and cautions/contraindications or preference of selected drugs in co-morbidities. Furthermore, medical problems tutorial is characterized by introducing basic pharmacological principles in clinical pharmacology in the form of selected clinical scenarios, to prepare for the use of basic pharmacology in clinical setting then for the following years in therapeutics. The tutor's leading questions provide a form of "scaffolding" [(5)] in that they offer a framework for reasoning about the topic and applying prior knowledge **(See figure 1).** It is well recognized that the most important factor affecting student learning is the teacher. Effective teachers appear to be effective with students of all achievement levels, regardless of the level of heterogeneity in their classrooms [(6)].



Recently a new learning approach has been introduced (academic year 2008-2009) in our department. This delivery mode consists of realistic simulations of virtual pharmacology practical modules including experimental animal preparations like *in vivo* blood pressure preparation and phrenic nerve diaphragm preparation. This pharmacology microlabs collection has been presented to us as a gift from Dr. Henk van Wilgenburg, Academic Medical Centre, University of Amsterdam. Thus, virtual pharmacology teaching approach is a good alternative to conventional practical sessions as the former is not labour and staff intensive but the tutor should be well informed and motivated.

Figure 1. A simplified illustration of learning in increasing complexity and its relation with the hierarchy of knowledge is applied to the pharmacology of the β-blocker propranolol. Factual information about the drug lies within the passive learning (under the category what) and on a low level on the hierarchy of knowledge (explicit knowledge). Further, information requiring more cognitive learning lies within the interactive learning (under the category how) and on a higher range of knowledge (implicit knowledge). Furthermore, paradoxes require reasoning (under the category why) representing higher faculties of learning and knowledge.

Assessment of students' learning has been progressive, and test factual knowledge, as well as skills. 1. Continuous: (tutor review in the tutorial process) tutors continuously evaluate each student's developing understanding by monitoring individual contributions to the group discussion, quizzes) 2. Formal: (occurs by examination at mid and end of year). The integrated knowledge component is assessed by multiple choice questions (true-false and most appropriate one), extended matching items and free-response questions. Clinical reasoning, including appraisal of evidence, is assessed by critical reading questions.

Monitoring students' learning by utilizing pre- and post-assessments provides timely and informative feedback, and revisiting material to emphasize recurrent patterns of thought that can be offered to students in subsequent learning sessions. Such coordination should

help facilitate the process of knowledge understanding and integration (bringing together) to achieve sufficient contextualization for effective delivery of concepts that require a rational sequence in increasing complexity. This is particularly true when teaching concepts like (V_d), zero-order kinetics and tolerance; understanding such concepts cannot be achieved by only a didactic lecture in the beginning of the third year. In fact, several timely revisits throughout the year are required to refine and consolidate good knowledge understanding of the issue to ensure that the student will be able to demonstrate competence in articulating this knowledge in relation to pathophysiology and eventually to clinical therapeutics. This learning approach enhances not only skills learning but also attitudes learning and thus students would also learn to identify the limitation of their own knowledge and be ready to use reference sources or seek advice when necessary. Such extension of learning opportunities have been emphasized elsewhere [7].

In a conventional drug-group oriented curriculum like ours, when lectures are assigned to different members of staff the key issues relating to drugs may be dispersed across many different lectures and throughout the year. This arrangement presents practical difficulties and thus it is necessary to coordinate the pharmacology learning opportunities to avoid such dispersion. In these circumstances, it is important to provide clear intradepartmental leadership for the 'thesis' throughout the year. Interdepartmental coordination is likewise essential to avoid unnecessary repetition of instructional material and to emphasise on only essential core knowledge ensuring appropriate and minimal factual information burden. Tomorrow's Doctors 2002 emphasized the need to involve individuals with an appropriate range of expertise and knowledge to oversee the implementation of these coordination arrangements [8]; similar suggestions were made in a previous report [4].

Not all new comers to our department have accepted this tutorial-based mode of learning and the related coordination of the learning opportunities; in fact a number of them have displayed severe anxiety and unwillingness to change. At the University of Liverpool, similar observations were reported [9]. The authors suggested that change itself is unsettling and occasionally, threatening and may also be seen as implicit criticism of the status quo and so may encourage defensive attitudes opposing change.

Conclusion

It is concluded that 1. Tutorial instructional activities foster better knowledge understanding and skills learning which enhance the ability in reflective practice and in turn eventual self-learning. 2. During the tutorial process, student-generated learning issues may arise as interactional gain from the tutorial to be reviewed by the teaching staff to incorporate modification in the future curricular modes of learning. 3. A better motivation and learning is achieved when interfacing both pharmacology and pathophysiology in the learning process.

Recommendations

- Dedicate sufficient time for instructional preparation and reflection, present attractively and update annually.
- Maximize instructional time via effective learning session management and organization.
- Enhance instruction by varying instructional strategies, activities, and assignments.
- Present content to students in a meaningful way that fosters understanding.
- Avoid overwhelming students by the large number of drugs that they encounter during the third year. This can be rather demoralizing and may lead to lack of clarity and objectivity in learning.
- Monitor students' learning for clear knowledge deficiencies and learning issues by timely and informative feedback, and carefully link activities to them and extend the learning opportunities by revisiting key concept until students achieve mastery.

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Appendix I.

PHARMACOLOGY CURRICULUM

As cited in the 2002 issue of the curricula for colleges of medicine in Iraq (Ministry of Higher Education and Scientific Research)
Total: 90 hours (but only 78 hours appear in the table!!)
Year: third

Title	Hours
I. GENERAL PHARMACOLOGY	
-General Principles: Pharmacodynamics and Pharmacokinetics	6
-Cholinergic System	4
-Adrenergic System	6
-Antianginal Drugs	1
-Histamine and Antihistamine	2
-Serotonin, Kinins and Prostaglandins	3
II. SYSTEMIC PHARMACOLOGY	
1. Central Nervous System	
-General Principles	2
-Antipsychotics	1
-Antidepressants	1
-Antiepileptic and antiparkinsonism drugs	2
-Narcotic Analgesics	2
-Non-Narcotic and NSAIDs	2
-Drugs for gout	1
-Drug treatment for headache	1
-General Anaesthesia	2
-Local Anaesthesia	1
2. Drugs acting on GIT	3
3. Drugs acting on respiratory tract	2
4. Diuretics	2
5. Drugs acting on heart	
-Antihypertensive	1
-Antiarrhythmic Drugs	2
-Digitalis	2
6. Blood	
-Anticoagulants	2
-Anti-anaemic drugs and vitamins	2
7. Antimicrobials	
-Antibiotics, antifungal, anitviral	8
-Antiprotozoal and antihelminthics	2
-Antiseptics	1
8. Hormones	
-Corticosteroids	2
-Antidiabetics	2
-Thyroid hormones and antithyroid	2
-Vasopressin, oxytocin and tocolytic drugs	2
-Sex hormones, contraceptive drugs	2
-Immunopharmacology	1
-Drugs interactions	1
9. Herbal medicine	2