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Comparison of learning resources for Medical Pharmacology in a Caribbean Medical School

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Abstract

Purpose: To assess which resources help students better to learn Medical Pharmacology in a Caribbean Medical School.

Methods: A questionnaire was completed by 70 students who had successfully passed Pharmacology in their 4th semester at St Matthew's University School of Medicine. Students were asked to rate study resources on a 1-5 scale based on their perceived benefit to their learning Medical Pharmacology, with 1 representing least helpful and 5 being most helpful. Mean scale was calculated.

Results: Students rated helpful resources with a mean scale from high to low as: PowerPoint slides, lecturing, team-based learning (TBL), exam reviews, teacher's individual supervision, USMLEWORLD (UW) Step 1 Q bank, Kaplan Step 1 Q bank, Kaplan lecture notes and video, and Katzung's review, which had a mean scale of highest as 4.6, and lowest 3.0. Teacher assistant session was rated with a mean scale 3.1. All other resources were rated with a mean scale less than 3, including Katzung's Pharmacology text book, BRS Pharmacology, Pretest of Pharmacology, and Exam Master.

Conclusions: Lecturing with our own PowerPoint slides is the preferred mode of learning. The Kaplan lecture notes, video and Q bank, and UW Q bank are also useful.

Practice Points
• PowerPoint slides are the most useful resource to learn Medical Pharmacology
• Team-based learning and review classes and individual supervision by teachers are highly valued by students
• Kaplan lecture notes, video, and Q bank, and UW Q bank are useful
• Teacher assistants from senior students benefit 30% of students

Keywords: Teaching and learning

Article

Introduction

Caribbean Medical schools have less instruction time (3.5 months) for Medical Pharmacology as compared with US medical schools (10 months to 2 years). Efficiently educating students within a compact curriculum is a difficult challenge. Regular feedback from students about their views of the learning experience in pharmacology is necessary for the development of effective curriculum.

There are many resources including text books, review books, question books and Q banks. Which resources most benefit students in a compact instruction period is unknown yet.

The purpose of this study was to assess which resources help students to learn pharmacology, and what reforms can be made for the betterment of teaching in pharmacology in a Caribbean Medical School.

Methods

A questionnaire was completed by a total 70 students who had already successfully passed pharmacology in their 4th semester and entered 5th semester in St Matthew's University, School of Medicine. Students were asked to rate study resources on a 1-5 scale based on their perceived benefit to their learning medical pharmacology, with 1 representing least helpful and 5 being most helpful. Ratings of 4 and 5 were considered positive responses, 3 was considered neutral, and 1 and 2 were considered negative. Frequency was expressed as a percentage, and mean scale was calculated.

Ratings were provided for 16 items: Faculty developed PowerPoint slides (1), lectures delivered by teachers (2), team based learning (TBL) (3), supervision individually by teachers (4), review class at the end of the course (5), review after each exam (6) , UW Step 1 Q bank (7), Kaplan USMLE Step 1 Q bank (8), Kaplan lecture notes of Pharmacology (9), Kaplan video (10), teacher assistant-led review sessions (11), Katzung & Trevor's Pharmacology board review book (12), Board Review Series (BRS) Pharmacology (13), Pretest of Pharmacology (14), Katzung & Trevor's 12th edition Basic and Clinical Pharmacology (text book) (15), Exam Master (16).

Results

As shown in table 1, the most helpful resource was our own teachers' PowerPoint slides, with 92.7% of students rating them positively (rating of 4 and 5) and an average of 4.6. Lectures delivered by teachers were positively rated by 82.9% of students and an average of 4.3.

Team-based learning (TBL) was highly positive rated (72.9%), with mean scale 4.2. Positive responses to exam reviews and review class at the end of the course were 70% and 64.3% respectively, as mean scale of 4. Some students liked individual supervision by teachers (66.2%), whose mean scale was 4.1, and some enjoyed review sessions by senior students (teacher assistant) (33%) with mean scale 3.1. Among the supplemental resources for pharmacology, the Kaplan's lecture notes, videos, and Step 1 Q bank were positively rated 56%, 46.8%, 60.3%, respectively, with mean scale 3.4 to 3.7. The UW Step 1 Q bank had 52.6% positive response, mean scale 3.8. Katzung's Medical Pharmacology text book was positively rated 33%, and its board review book was 37.4%, with mean scale 2.7 and 3, respectively. Pretest of Pharmacology and Board Review Series (BRS) of Pharmacology were 28% and 20% positively rated, respectively, with mean scale 2.7. Exam Master was 12% positively rated, and its mean scale was 2.1.

Discussion

Resources with average scale higher than 4 include our PowerPoint slides, lecturing, TBL, teacher supervision, and review classes. Resources with average scale above 3 but less than 4 include UW Q bank, Kaplan's Q bank and lecture notes and video, teacher assistants, and Katzung's board review.

There are many text books and review books for pharmacology. Our faculty's PowerPoint slides were judged the most valuable study resource for our students, as compared with Kaplan lecture notes of Pharmacology, BRS Pharmacology, and Katzung and & Trevor's Basic and Clinical Pharmacology. Katzung & Trevor's's pharmacology book is almost always the assigned textbook in

American medical schools. It has very good explanations of pathophysiology and detailed pharmacokinetics for most drugs, but is a heavy load for students to cover in a short period of 3.5 months. In addition, there will always be information that isn't in the book, as pharmacology is a rapidly progressing science. For example, apixaban was FDA approved in August 2014 but the book still shows that this drug is in clinical trial. BRS is a more concise review book, but lacks much useful and important detail. The Katzung and & Trevor's board review is a shorter version, and has practice questions. Our students' opinion of it was neutral. Kaplan lecture notes is a good review book, especially as a review for students who've finished Pharmacology, but is not very good for students who are new to the subject and prefer detail explanations.

Our approach has been to organize our PowerPoint slides to stress the important drugs and concepts, adopting contents from all the above resources. To lessen the burden on students, we highlight the representative drugs in a drug group, instructing students to know all aspects of that drug. A similar approach was used by a Mexican medical schools (Rodriguez et al. 2009), which focused on a total of 139 key drugs. Also, our teaching experience has shown that students sometimes can resolve very complicated questions on exams, but forget basic concepts, so at the end of each PowerPoint we add 15-30 one-sentence questions about the basic concepts. For example, "What is the mechanism of digoxin?" and "How does plasma potassium affect digoxin effect?". Although chemotherapy topics are an exception, where in place of review questions, we require students to generate tables including mechanisms, resistant mechanisms, coverage, side effects, contraindications and drug-drug interaction for all drug groups. In our lectures we introduce diseases and symptoms, and give students a sense of how a patient feel after the drugs, as combining basic and clinical pharmacology is necessary for students to properly learn Pharmacology (Karpa et al. 2013; Marshall et al. 2010), especially 4th semester students in our school have not learned organ system pathology and Introduction of Clinical Medine.

As compared with textbooks, our PowerPoint slides are concise, emphasizing essential concepts. Compared to review books, our PowerPoint slides provide more details about key concepts. More importantly, having achieved high scores on the USMLE Step 1 test, our instructors are able to address high yield concepts at the end of each PowerPoint slides. Other study has proposed to reintroduce traditional blackboard teaching instead of PowerPoint slides (Dellipizzi 2000), with purported benefit coming from students writing their own notes. We find that most students, after attending lectures, write more concentrated, personalized notes based on our PowerPoint slides.

Team based learning (TBL), review classes after each exam, and a final review class at the end of the course all had a mean scale more than 4 in term of benefit learning. TBL has been adopted in many schools (Bou et al. 2012; Nishiwaki et al. 2014; Zgheib et al. 2010), and we've used TBL for more than 4 years. Fifteen to 25 USMLE Step 1 type questions are in each TBL section. Students first take the test online in our online moodle individually in a timed manner, with 1.3 minutes per question as in Step 1. Then students are separated into groups of 6-7 students. Students discuss each question, and develop a unified answer, as each student brings different strengths to a discussion. In addition, this teamwork strengthens the connection between students, enhancing their ability to work within a team in later clinical rotation, resident training and clinic practice. Some students are very shy to answer questions in a lecture class, and TBL activity may encourage them to express themselves among their peers.

Students are encouraged to review material with teachers in the office, and around 60% of students found this type of interaction valuable. Teacher individual review not only clarifies content where there is confusion, but can be used to reinforce important ideas via asking a student to explain them. Teacher Assistants who give review classes were used by only about 30% of students. So maybe

lecturing by teacher assistant is not a good approach because students are not ready for more lecturing time. Having Teacher Assistants sit with a small group of students, asking them questions and analyzing with them could be a better approach for teacher assistants. Other institutes have had similar observations. The Medical University of South Carolina's Center (Wong et al. 2007) began to hire upper-level medical students to teach a small group of junior peers since 1997, primarily in basic science topics, and found that students who had this approach had higher score of USMLE Step1 than previous students who did not have this help.

Practice, practice, and more practice make one perfect. Students always ask which question resource is a better one. We always suggest that all questions are helpful - the more, the better - no matter if they are difficult or easy. Our students tell us they value the UW Step 1 Q bank and Kaplan Step 1 Q bank more better than the Katzung board review, Pretest and Exam Master. Pretest and Exam Master questions usually are simple, and straight forward. They are good resources for the beginner to master basic concepts. The Kaplan Step 1 Q bank is more focused on pathophysiology, and the UW Q bank questions are relatively more complicated. These two resources are good for students to prepare for USMLE Step 1.

It is a significant challenge for Caribbean medical school students to learn Medical Pharmacology in 3.5 months. To achieve high performance, PowerPoint slides & lectures, TBL, and more practice questions are better ways to learn.

Lectures featuring targeted, well designed PowerPoint slides are the preferred mode of instruction in this setting. The Kaplan lecture notes, video and Q bank, and the UW Q bank are also useful tools. Rapport between teachers and students is important to some students. Although only 30% of students benefit from review sessions with senior students, such sessions can be a good supplemental learning method for students who need it.

Notes on contributors

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Table 1. Results of response (N=70)

	Items	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean scale	SD	Median
Q1	PowerPoint slides	0.0	0.0	7.2	27.5	65.2	4.6	0.6	5
Q2	lecturing by teachers	1.4	0.0	15.7	30.0	52.9	4.3	0.8	5
Q3	TBL	1.4	4.3	21.4	22.9	50.0	4.2	1.0	4.5
Q4	Teacher individual supervision	2.9	2.9	27.9	20.6	45.6	4.1	1.0	4
Q5	Review class at the end	1.5	9.0	25.4	20.9	43.3	4.0	1.1	4
Q6	Exam review after each exam	2.9	2.9	24.3	31.4	38.6	4.0	1.0	4
Q7	UW Q bank	8.8	5.3	17.5	35.1	33.3	3.8	1.2	4
Q8	Kaplan Q bank	6.3	9.5	23.8	31.7	28.6	3.7	1.1	4
Q9	Kaplan lecture notes	3.0	12.1	28.8	34.8	21.2	3.6	1.0	4
Q10	Kaplan video pharmacology	8.5	14.9	29.8	25.5	21.3	3.4	1.2	3
Q11	Teacher assistant session	13.3	15.6	37.8	13.3	20.0	3.1	1.3	3
Q12	Katzung & Trevor's Review	21.6	5.4	35.1	32.4	5.4	3.0	1.2	3
Q13	BRS pharmacology	15.4	17.9	38.5	20.5	7.7	2.9	1.2	3
Q14	Pretest Pharmacology	25.0	15.0	30.0	25.0	5.0	2.7	1.3	3
Q15	Text book (Katzung)	32.3	11.3	24.2	21.0	11.3	2.7	1.4	3
Q16	Exam Master	46.9	10.2	30.6	8.2	4.1	2.1	1.2	2