Improving Comprehension and Communication of Pharmaceutical Theoretical Concepts

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INTRODUCTION

To enhance the comprehension of pharmaceutical science theories and the communication of the underlying causes of disease states, the first semester of the Professional Development of the Student Pharmacist course was redesigned to increase the integration and application of pharmaceutical principles of biochemistry, anatomy and physiology to patient cases.

DESIGN

Using a team-based approach, students were asked to apply theoretical principles taught in their biochemistry and anatomy and physiology courses to two patient cases. Both patients were adults: one with hyperlipidemia and the other with hypertension and chronic obstructive pulmonary disease (COPD). The teams were asked to describe the principles in layman's terms for both cases and then tailor the information to the patients by either description or diagram using analogies. Faculty from biochemistry and anatomy and physiology facilitated the debriefing of both case-based exercises.

EVALUATION AND ASSESSMENT

A multi-method assessment was used to assess the effectiveness of learning methods. Students' performance on a Objective Structured Clinical Examination (OSCE) question that asked to define HDL and LDL were compared to peers in previous classes. Team performance on effectively communicating the disease states of hyperlipidemia and COPD were analyzed. Student perception of the impact of learning activities on comprehension and communication were assessed through Qualtrics, a secure survey software.

EXAM RESULTS

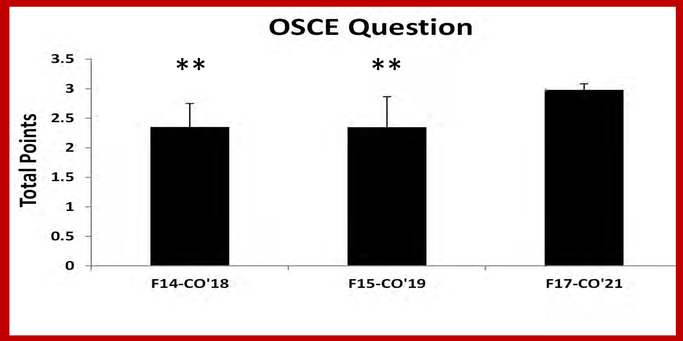

Fig. 1: A comparison of scores from the LDL/HDL question in two previous years prior to the introduction of Layman's descriptions to the current year (***p<0.01*)

SURVEY RESULTS

	Survey Questions	Strongly Disagree	Disagree	Agree	Strongly Agree
Perceptions of Activities in Impacting Comprehension	Explaining hyperlipidemia to 45 year old Eric Miller ("what is cholesterol", "what's the difference between HDL and LDL" "how does my statin medication work" "my friends who take medication have bad muscle cramps")			100 % (37)	
				20	17
	Explaining how atherosclerosis forms to Eric Miller's 7 year old nephew using an analogy.		3	91.9 % (34)	
				17	17
	Explaining hypertension to Kara Danvers ("what is it?" What is an ACE inhibitor?" "How does an ACE inhibitor reduce my blood pressure?" "What do diuretics do in my body?" "How could diuretics help in reducing my blood pressure?")		1	97.3 % (36)	
				19	17
	Explaining how losing weight and changing diet can help to lower high blood pressure.		1	97.3 % (36)	
				18	18
	Explaining the difference between asthma and COPD.		1	97.3 % (36)	
				20	16
	Creating a diagram to explain to Kara what it means to have ventilation and perfusion problems.	1	4	86.5 % (32)	
				16	16
Perceptions of Activities in Impacting Communication	Answering the questions about hyperlipidemia made me feel more confident in my ability to communicate this disease in layman's terms.		1	97.3 % (36)	
				22	14
	Having to explain atherosclerosis to a 7 year old using an analogy made me feel more confident that I could explain this disease in layman's terms.		2	94.6 % (35)	
				17	18
	Creating a diagram to explain what happens when someone is experiencing ventilation and perfusion problems made me feel more confident in my ability to communicate these processes in laymen's terms.		7	81.2 % (30)	
				19	11
	Answering the questions on hypertension made me feel more confident in my ability to describe this disease in layman's terms.			100 % (37)	
				22	15
	The patient presentations on hyperlipidemia and hypertension made me feel more confident in my ability to communicate with a health care provider.		1	97.3 %	
				24	12

Three main themes were identified after asking students for additional comments

Students found that the multiple and varied learning activities and the repetition and practice helped in their comprehension of the underlying principles of diseases

"I think if we practice more, we will be able to learn more." "There should be more activities that reinforce the material continuously. This will allow us not to forget." "Reinforcement of the topics discussed in the debriefing of Anatomy/Biochemical Principles helped build a better understanding. I felt simplifying the disease states and analogies was helpful."

The slower pace of processing material and feedback from facilitators in the debrief sessions aided in comprehension

"I *definitely feel like being able to take our time going through the cases and having the debrief sessions with professors helped me to fully understand the disease states we were learning during class. I also think that if we had done more cases during the semester I would not have the understanding that I have on those disease states and the confidence that I have to counsel patients." "Getting feedback from professors was helpful for me in being able to more fully understand what I was doing and to provide other view points on how to improve my performance. The setup of the activities was well formatted so it was helpful."*

Having to relay information in laymen's terms helped students both in comprehension of the scientific principals and their confidence in relaying the information to patients

"This was a great way to develop the skills needed to effectively convey medical information to a patient so they truly understand what is going on." "The new method definitely helped me to get a better understanding of each disease state and how to relate it to patients." "I really liked how we were able to give a better explanation to patients about what a disease state was."

SAMPLE STUDENT ANALOGIES USED TO COMMUNICATE WITH PATIENTS

Pathogenesis of Atherosclerosis

"Atherosclerosis forms a lot like how a beaver blocks up a river. The cholesterol or LDL acts a lot like sticks and logs that the beaver uses. As time goes on the beaver gathers more and more debris to block the river and after a while the river becomes completely blocked. Your Uncle's arteries work the same way."

"If you eat too many Krabby Patties like Patrick, you will eat too much fat and it will block and harden the blood tubes in your body. Your blood will move in your tubes as slow as Gary the snail. Instead of eating so many Krabby patties, eat more nuts like Sandy Cheeks, and work out like Larry the Lobster."

Mechanism of Action of Diuretics

"Too much salt in your body can cause extra fluid to build up in your blood vessels, which raises your blood pressure. Diuretics affect your kidneys by causing an increase in the amount of salt and water to pass through the urine, which lowers your blood pressure."

SUMMARY

This study analyzed the effects of redesigning the course to focus more on the process of learning rather than the number of disease states covered. This enabled the incorporation of a variety of active learning methods to help students integrate, comprehend, and communicate the underlying scientific principles of disease states. Explaining the scientific principles in layman's terms and tailoring the information to patients of different age or educational background increased comprehension and the ability to communicate the material.

FUTURE DIRECTIONS

Based on the success of the revised course, the new structure will be adopted in future sequences of the PDSP series. Additionally, plans are in process to evaluate student performance on exams in Anatomy and Physiology and Biochemistry in the disease states that were the included in PDSP I.

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