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Assessment of the integration of cumulative case-based quizzes in two pharmacotherapy courses: An exploratory study

Erenie Guirguis, PharmD, BCPS*, Yasmin F. Grace, PharmD, Amy Henneman, PharmD, BCPS, CDE, Jamie L. Fairclough, MPH, PhD, MSPharm, Angela N. Skaff, BS, Pharm D. Candidate, Hannah A. Morris, Pharm D. Candidate

Lloyd L. Gregory School of Pharmacy, Palm Beach Atlantic University, West Palm Beach, FL

Abstract

Objective: To evaluate student perceptions of the benefit of integration of cumulative, case-based quizzes. Additionally, this study discusses whether the integration of cumulative, case-based quizzes enhances student retention and aids in the development of improved critical thinking skills.

Methods: Current second- and third-year pharmacy student were administered six to seven cumulative, case-based quizzes, as an integrated component of both the Cardiovascular and Special Topics Pharmacotherapy courses. Current pharmacy students completed online pre- and post-course surveys that included questions assessing the student's perceived benefit of the quizzes and demographic information. Final exam grades and final course grades of students who completed the two pharmacotherapy courses this year were compared to final exam and final course grades of students who completed the courses the prior year. Performances on higher-level Bloom's taxonomy questions on the final exams were also compared to those of students from the prior year in order to evaluate whether critical thinking skills improved.

Results: A total of 97 students completed the pre- and post-course surveys. There was a statistically significant difference in student perception regarding the potential benefits of case-based quizzes in the two pharmacotherapy courses ($p < 0.001$). Student responses exhibited an improved perception regarding the impact of case implementation at the conclusion of the semester.

Conclusion: Students in both pharmacotherapy courses perceived cumulative case-based quizzes as beneficial. Students believed cumulative case-based quizzes aided in their learning and retention of the course material and will improve their clinical skills as future pharmacists.

Keywords: Case-based; Lifelong learning; Pharmacotherapy; Assessment; Therapeutics

Introduction/background

As the field of pharmacy continues to evolve, pharmacy schools are challenged to produce competent professionals and practitioners equipped to lead and adapt to the rapidly advancing profession. Schools are encouraged to find ways to assist pharmacy students in building a strong foundation for lifelong learning. As is the case within all fields of medicine, pharmacists must be able to retain and build upon knowledge gained throughout their didactic years and beyond. The American Association of Colleges of Pharmacy (AACP) Commission to Implement Change in

* Corresponding author: Erenie Guirguis, PharmD, BCPS, Lloyd L. Gregory School of Pharmacy, Palm Beach Atlantic University, 901 S. Flagler Drive, West Palm Beach, FL 33416-4708.

E-mail: erenie_guirguis@pba.edu

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Pharmaceutical Education has identified six general outcomes foundational to the education of professionals. These include the ability of professionals to think logically and analytically and to problem-solve in order to make accurate decisions.[1] Additionally, the Accreditation Council for Pharmacy Education (ACPE) encourages schools of pharmacy to engage in active-learning methods to reinforce curricular content. They emphasize the need for the development of critical thinking and problem-solving skills within the pharmacy curriculum in order to produce pharmacists who are lifelong learners.[2] However, the implementation of an appropriate active-learning strategy that effectively reinforces curricular content, assists in retention of material, and develops critical thinking skills as well as their assessment is often challenging.

Students have been noted to retain knowledge better when the clinical relevance is perceived.[3] Harris et al.[4] concluded that when knowledge gained is not directly relevant or applicable to clinical context, it is lost rather quickly; thus, information must be relevant in order to increase the likelihood of retention. When students perceive a subject to be relevant, it facilitates knowledge retention and application. Implementation of active-learning activities is one way to help students to better understand the clinical context and relevance of course materials. While students may recognize the need for a variety of activities and assessments to assist in this process, many are accustomed to the traditional format of lecture culminating in a traditional written assessment. Although this format may be most comfortable to the student, it was noted many years ago that this passive acquisition of information, particularly in medical education, is often ineffective.[5] In a small study comparing problem-based learning to didactic lectures in a pharmacy curriculum, Nii and Chin[6] noted the difficulty with conventional didactic lectures is that they often fail to involve the student in making independent clinical judgments as well as fail to develop adequate therapeutic problem-solving skills, with an emphasis instead on fact memorization. Others have noted the difficulty with lecture to be the limited act of integration of basic science education to a clinical career as well as the inability of lecture to aid students in developing habits of lifelong learners.[6–9]

A strategy that has been used in many science and medical education settings to encourage a deeper understanding of course material is learning through case-based assessments.[3,10] It involves advanced preparation by the students but provides a framework for the learner to approach problem-solving in the context of a clinical case.[11,12] In a review of case-based learning, Williams[10] notes this method helps foster competence, promotes a deeper level of understanding, and provides opportunities for vertical and horizontal integration of the syllabus. It seems, however, that in order for case-based learning to be effective, the students must perceive its benefit. In a study comparing the effectiveness of traditional lecturing to a more patient-based, hands-on approach in a pharmacy clerkship, Cheng et al.[13] found that those students who were responsible for some degree of self-teaching "perceived a greater value in the educational experience and expressed a greater degree of confidence." Students participating in problem-based learning situations felt that their participation had increased their skill level in several areas as well as making them better prepared on clerkships.[13,14]

Rationale and objectives

Currently at Palm Beach Atlantic University, the main assessment method for curricular content within the pharmacotherapy sequence is routine written or electronic examination culminating in a cumulative final exam. Students have limited time within the course to practice higher-level learning prior to assessment by examination. Also, there are no mechanisms in place to ensure retention of material throughout the semester prior to the cumulative final exam. This study sought to determine the student's perception regarding the use of cumulative case-based quizzes within an integrated pharmacotherapy sequence. The primary objective of this study was to evaluate student perceptions of the benefit of cumulative case-based quizzes on their learning prior to and then after their implementation. Secondary objectives include assessment of perceptions on individual survey questions. Additionally, student satisfaction on course evaluations, average course grades, cumulative final exam grades, and performance on higher-level Bloom's Taxonomy questions on the cumulative final exam was compared to the performance of students in the previous academic year.

Materials and methods

Course design

Case-based quizzes were implemented in two required 16-weeklong pharmacotherapy courses, Cardiovascular Pharmacotherapy (P2 year) and Special Topics Pharmacotherapy (P3 year), in the Fall 2013. Cardiovascular Pharmacotherapy is a five-credit hour integrated therapeutics course that includes five examinations, seven cumulative case-based quizzes, and a cumulative final exam worth 25% of the final course grade. Special Topics Pharmacotherapy is a two-credit hour integrated therapeutics course that includes two examinations, six cumulative case-based quizzes, and a cumulative final exam worth 30% of the final course grade. Multiple disciplines are integrated in both courses and include pharmacologists, medicinal chemists, and clinical practice faculty. The cumulative case-based quizzes were worth 10% of the total grade in Cardiovascular Pharmacotherapy and 15% in Special Topics Pharmacotherapy.