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Research Note

Comparison of long-term knowledge retention in lecture-based versus flipped team-based learning course delivery

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ABSTRACT

Objectives: To determine whether team based learning (TBL) is superior to traditional lecture-based learning in confidence and knowledge retention one year later.

Design: A survey was administered 17 months after a completion of a required over-the-counter/self-care (OTC) course to two different cohorts of students. The survey assessed confidence and knowledge related to OTC topics. The lecture group had a traditional lecture based classroom experience; the intervention group experienced a TBL format throughout the entire course.

Assessment: One hundred forty-seven students of 283 enrolled (51.9%) in the lecture group and 222 of 305 (72.8%) students in the TBL group participated in the knowledge assessment and survey. Demographic data including student grade point averages (GPA) and confidence were similar in both groups. Mean assessment scores (\pm SD) on OTC knowledge was significantly higher in the traditional lecture based group versus the TBL group; 62.9 ± 19.3 vs. 54.9 ± 15.7 ($p=0.001$).

Conclusion: Although TBL is thought to improve student engagement and mastery of material, after an initial implementation of TBL, knowledge retention in the long term appears to be lower than lecture based learning

Introduction

The changing landscape of healthcare delivery endorses pharmacists to provide team-based, patient-centered collaborative care.¹ To effectively provide such care, student pharmacists need skill sets beyond knowledge mastery and comprehension. Development of critical thinking and problem solving skills along with proficiency in communication is paramount. Pharmacy educators are continuously tasked with refining curricula to provide meaningful learning opportunities that carefully balance foundational knowledge acquisition with application of real-world, clinical scenarios. Many colleges and universities continue to employ traditional lecture-based teaching methods, despite evidence that students retain less information and perform less favorably when compared to active-learning methods.² In fact, educational literature states that students' active engagement with the content and

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assuming larger responsibility for learning is the key to knowledge retention.³

The Accreditation Council for Pharmacy Education (ACPE) Standards identifies the need to promote active, learner-centered environments that foster problem solving skills, critical thinking and enhanced communication throughout pharmacy curricula.⁴ In response, many colleges and schools of pharmacy have integrated the team-based learning (TBL) framework within core and elective courses with marked success.^{5–13} The tenets of TBL suggest that adults learn most effectively when the process of discovery is experiential, social, and active.¹⁴ Through self-directed and team-based learning, students work in small groups to solve (clinical) problems, discuss and defend their responses and receive instantaneous feedback regarding their performance.¹⁵

The short-term benefits of TBL are numerous and well documented across health professions curricula. Students exposed to TBL have higher satisfaction with their learning experiences, improved short-term knowledge acquisition, enhanced critical thinking skills, and higher exam scores.^{16–19} However, formal assessments of the impact of TBL on long-term knowledge retention are less substantiated. Published reports evaluating longer term outcome markers on performance and knowledge retention are generally limited to less than one-year post-course completion.^{20–22}

Several schools and colleges of pharmacy have sought to add to this existing body of literature by examining the correlation between use of TBL and long-term knowledge retention. Farland and colleagues¹³ evaluated 35 out of 128 (27%) students enrolled in a seven-week, required Therapeutics course taught in the third professional year. Long-term knowledge retention was assessed five months after course completion with a multiple choice exam of eight course topics; four delivered via TBL and four delivered via lecture. There was no significant difference in long-term exam performance between TBL and lecture-based methods. In contrast, Lucas and colleagues⁸ found that students exposed to TBL in required pharmacotherapy modules in the second and third years had higher retention of core knowledge when assessed by multiple choice examination in the fourth year (after completion of five out of eight required clinical rotations).

Our faculty teaching in a large required self-care course in the third professional year (P3) had the impression that even if students performed well in the classroom setting, a year later on clinical rotations (P4) many had difficulty with retaining the knowledge and applying it during patient encounters. Because the large majority of courses taught in the curriculum were delivered in lecture-based format, faculty in the self-care course hypothesized that integration of TBL would improve student's long-term retention of knowledge. The purpose of the present study seeks to discover the impact of TBL on long-term knowledge retention versus traditional lecture-based format by comparing student knowledge of over-the-counter /self-care subject matter after the completion of all clinical rotations, seventeen months after course completion.

Methods

Context

Prior to 2013, the Over-the-Counter Drugs/Self-Care Products (OTC) course at Massachusetts College of Pharmacy and Health Sciences (MCPHS) University was team taught by pharmacy practice faculty delivering the course in a traditional lecture based format. Active learning was incorporated into each lecture by including one or two faculty-directed cases as well as other elements (e.g., audience response clickers, think-pair-share). All students met for a 150-min lecture in a large stadium style lecture hall. Final course grade was calculated with eighty percent based on individual performance during examinations and twenty percent based on various participation activities.

Design

The University's Institutional Review Board approved the research and all research materials. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Due to a growing body of literature conferring benefits of team-based, active learning, course delivery was changed to a flipped format with team-based learning sessions. The flipped description of the pedagogy refers to students watching short recorded lectures in preparation for in class activities. The TBL description refers to incorporation of all the elements of TBL as described by Michaelson.¹⁵ A flipped/TBL format allowed us to accommodate a growing class size (305 students), provide consistent delivery of topics and attempt to increase knowledge retention. Our research evaluated student perceptions and performance, but our main goal was to compare long-term knowledge retention of content delivered via both formats.⁵

Our restructured, required self-care course intended to prepare students to handle routine questions in their clinical rotations and future practice and continued to be offered as a three-credit course in the third professional year (P3) year of the curriculum. The course objectives included: utilizing appropriate techniques for selecting over-the-counter (OTC) drugs and implementing effective patient counseling strategies; discussing common regulations pertaining to the use of OTC drugs; recognizing specific active and inactive ingredients in OTC products and comparing and contrasting their properties to make correct therapeutic decisions; and incorporating safety information into counseling patients. Covered course content included a collection of commonly sold categories of over-the-counter drugs and self-care products.⁵

To promote team work in the new format, a large one-level function hall was set up with small rectangular tables facing each other to accommodate small teams participating in live application exercises for 75 min. Approximately 300 students were divided into two sections and then randomly assigned to permanent teams of four or five. Students were assigned pre-recorded materials (approximately 75–100 min in length) in preparation for class. Lectures were recorded with iSpring® (iSpring Solutions; Alexandria, VA)²³ and posted online along with handouts via Blackboard® (Blackboard, Inc.; Washington, DC) learning management system.

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