ILLUMINATIONS

Preparing incoming pharmacy students for a professional program: utilization of a practice lecture and comparative quizzes as a component of a bridging program

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INTRODUCTION

Transition from an undergraduate curriculum into a rigorous health sciences professional degree program is academically challenging. The transition into a Doctor of Pharmacy (Pharm.D) program may be more challenging than other doctoral level health science programs, such as medical school or physical therapy school, since most Pharm.D programs only require 2 yr of college level prerequisite coursework for admission into the 4-yr Pharm.D program.

Students who struggle with the transition often exhibit difficulties with the intensity of the program: large course loads (~18–19 units/semester) with advanced level content. These students have not developed the academic skills and grit necessary to succeed in a professional degree program. The inability to adapt quickly predisposes students to course failures early in the curriculum, leading to delayed graduation or dismissal from the program. To facilitate a more successful transition, some pharmacy schools have begun to implement bridging programs (4). Bridging programs or courses are short, intensive courses designed to increase knowledge, boost confidence, facilitate academic and social transitions, and enhance student preparation for more advanced coursework (4).

Our pharmacy school implemented a summer bridging program this past year that included, but was not limited to, modules on academic skills training and review of foundational concepts in the basic sciences. One of the first-semester pharmacy courses in which our students struggle the most is an Integrated Biological Sciences (BSI) course (2). Thus a component of the bridging program was a practice BSI lecture and use of comparative quizzes to highlight the disparities between undergraduate and graduate level expectations.

Description of summer bridging program. The bridging program included sessions on time management, goal setting, study skills, test taking skills, review of concepts and coursework for the aforementioned courses, team building exercises, and social events. The BSI sessions included a practice lecture and comparative quizzes to highlight the disparities between undergraduate and graduate level expectations.

Description of BSI practice lecture and comparative quizzes. The practice lecture covered the topic of protein structure. The lecture was the same as that in the BSI course during the first-semester pharmacy curriculum and taught by the same professor. Electronic notes were given to the students 24 h before the class period. The note set was not complete with all details; thus students were required to take additional notes during the lecture. On day 1 of the bridging program, the 45-min lecture was presented. The students were then encouraged to study the lecture notes before coming back to class on day 2, in which they took two quizzes representing the undergraduate level vs. graduate level.

The purpose of the lecture was to expose the students to a BSI lecture that they would experience in their first year to gain an understanding of what to expect. It was also an opportunity for the professor to give tips on class preparation, note-taking, and best practices on how to study particular content. The professor started the class by discussing general guidelines on how to perform well in the BSI course, including the importance of time management, consistency in studying every day, and utilization of active study techniques. As the lecture started, the importance of reading the notes before coming to class and to clarify terms that were not understood were discussed. Throughout the lecture presentation, the professor identified terms that were not defined in the notes and also concepts that were expected to be known from prerequisite coursework. For example, some terms identified during the lecture were as follows: ionized, nonionized, polar, nonpolar, hydrophobic interaction, hydrogen bond, ionic bond, Van der

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Waals attractions, disulfide bond, covalent bond, and noncovalent bond. It was emphasized that it was the responsibility of the student to review these terms and concepts, if necessary, and best practices were discussed for independently seeking out this information using various resources. As specific content was presented, the professor gave advice on which active study techniques might be most beneficial. Even though discussion of general study tips was included in the beginning of the lecture and also incorporated into other modules within the bridging program, students find it helpful to be given advice on how to study specific information. For example, when discussing the amino acids found in proteins and their chemical properties, it was suggested to delete out sections of the table that was presented in class, print multiple copies, and then fill in the missing blanks in the tables. A tip for learning the definitions of the terms was to make and use notecards. Relying on repeatedly reading notes as the primary mode of studying was discouraged, which is a mode that many of the incoming students utilize and which results in poor BSI exam performance. Lastly, to assist with note-taking skills, as the professor verbally expanded on the content contained in the lecture notes, it was pointed out that the information was not included in the notes and thus they would have to add the information themselves when there was missing information. Thus, the importance of reading the notes beforehand to facilitate the note-taking process was discussed. Furthermore, the benefit of printing out the notes before class was explained. A study was shared with the students that concluded that taking notes by hand had been found to be more beneficial for learning and memory than typing notes during class (5). Lastly, the pros and cons of recording and relistening to lectures were discussed.

Two quizzes were given the following day. The first quiz was representative of a freshman-level undergraduate biology course and included 10 multiple-choice or true/false questions, which were primarily knowledge based in regards to Bloom’s taxonomy, described by Kim et al. (3). After completing the first quiz, the students took a second quiz that was representative of questions that would be asked in the BSI course. This quiz consisted of seven multiple-choice or true/false questions, with the majority being application based. The students took paper versions of the quizzes, not electronic. Once completed, the students exchanged quizzes with a neighbor. The answers were reviewed, and the quizzes were scored. Best practices in test taking were discussed, as the questions and answers were reviewed in class.

OUTCOMES AND DISCUSSION

Thirty-seven students participated in the summer bridging program and took the comparative quizzes. The mean scores on the first and second quizzes were 89 and 66%, respectively ($P < 0.0001$). Students found the second quiz much more difficult and expressed that it was an eye-opening experience. Many of the incoming pharmacy students have only experienced lower level basic science courses, since advanced level courses are usually taught in the junior and senior years of college. This is the reason we used a freshman-level quiz to compare with graduate level. The students believed that the lecture and quizzes better prepared them to know what to expect in the BSI course.

One of the goals for administering the lecture and comparative quizzes was to improve student performance on the first BSI exam, which is the first pharmacy school exam that they take. The performance on the first BSI exam is a strong indicator of performance throughout the curriculum (1). Historically, meeting with students after failing the first BSI exam revealed that most failed because they did not know what to expect and thus prepared for the exam the same way they did as an undergraduate student. They expressed that they struggled adjusting to a high-demand course and curriculum. They realized that consistent studying over a longer period of time and utilization of active study techniques were necessary to be successful in a professional-level basic science course, such as BSI. The expectation from the BSI portion of the bridging program was that the students would make this realization by the start of pharmacy school, well before taking the first BSI exam.

Comparing the mean scores of the first BSI exam between those who attended the bridging program ($n = 37$) and those who did not ($n = 38$), there was a trend for better performance among those who attended, although it did not reach statistical significance (86.1 vs 82.3%, $P = 0.15$). However, out of the group who attended, 16 students earned “A” grades with only 2 failures, compared with 10 “A” grades and 7 failures in the comparison group. It was determined that both groups had an equal mix of incoming “at risk” students based on a formula developed by the school of pharmacy utilizing predmission data. The formula included prerequisite grade point average, Pharmacy College Admissions Test scores, and performance in core prerequisite courses. Thus the practice lecture and quizzes during the bridging program may have had some benefit on their preparation for the first BSI exam. It is worth noting that all of the students in the BSI course, and, therefore, those who did not attend the bridging program, did receive some generalized messaging at the beginning of the course on academic skills training topics that were covered in the bridging program. However, the messaging was not linked to a lecture or any specific course content, and time spent on the discussion was limited. The students who did not attend the bridging program were not exposed to the comparative quizzes.

A survey was distributed to the students on the last day of the bridging program to determine if the goals of the program were achieved. Pertaining to the BSI module, Likert-scale questions revealed that students believed that the program improved their confidence in their ability to succeed in BSI, that they better understood how to study for BSI, and that they were better aware of the differences between an undergraduate exam and graduate level BSI exams. In the comments section of the survey, students stated that the BSI lectures and discussion helped to reduce some stress and anxiety that they had toward BSI and pharmacy school in general.

In conclusion, a practice lecture and comparative quizzes may be useful tools as a component of a bridging program. Not only could it be used for transition into a professional degree program from an undergraduate program, but it could also be used for transition into an undergraduate program from high school.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author.
AUTHOR CONTRIBUTIONS
A.J.D.-N. conceived and designed research; analyzed data; interpreted results of experiments; drafted manuscript; edited and revised manuscript; approved final version of manuscript.

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