**Abstract**

Background: Pharmacists’ awareness of medication errors is a critical component of pharmacy education and patient care.

Purpose: To promote first year (P1) pharmacy students’ awareness of medication errors to improve patient safety and link medication errors to P1 curriculum to support student learning in biomedical and pharmaceutical sciences.

Methods: We have created a novel curriculum activity referred to as “Medication Errors and Sciences Applications (MESA)”. Three P1 classes (14 teams/class) implemented the MESA activity by working on authentic medication errors and generated professional reports and presentations that integrated biomedical and pharmaceutical sciences. Descriptive statistics were used to analyze assessment data.

Results: The assessment results indicated that 76-85% of students believed that the MESA activity improved student learning in biomedical and pharmaceutical sciences. Approximately 90% of students agreed that the MESA activity introduced them to medication errors and to the importance that patient education played in preventing medication errors. Approximately, 90% of students agreed that the MESA activity increased their team work dynamics, integrated the knowledge they developed through the P1 curriculum, promoted active learning, critical-thinking and self-directed learning. Our data indicated that 90% of students stated that the achievement of Bloom’s Taxonomy learning objectives were promoted by completing the MESA activity.

Conclusion: The MESA activity encouraged discussions of patient safety among pharmacy students to link medication errors to biomedical and pharmaceutical sciences which ultimately promoted and reinforced student learning in P1 curriculum.

**Results**

Figure 2 demonstrates the positive role the MESA activity played on student learning in different subject areas of the first year curriculum.

We assessed student perception of the role the MESA activity played on promoting students’ knowledge or skills. Table 1 indicates teamwork, active learning, critical-thinking and self-directed learning skills were positively affected by the MESA activity.

Table 2 indicates the role of the MESA activity on various levels of learning as indicated in Bloom’s taxonomy. All of these levels were highly rated, with the lowest rating (88.7%) in Evaluation and Highest in Analysis and Application domains (94.6%).

Figure 1. The Step-by-step process to generate and present a MESA report.

**Discussion**

The MESA activity was designed to integrate and reinforce student learning in biomedical & pharmaceutical sciences. Our data indicated that students’ knowledge base in these sciences were enhanced as a result of completing the MESA activity (Figure 2).

Pharmacists are well trained and widely accessible to patients and their families in both community and health system pharmacy settings. Accordingly, they play a vital role in providing patient education and reducing medication errors. Approximately, 98% of students indicated that after working with the MESA project, they believed patient education played an important role in the prevention of a medication error (Table 1). Additionally, our assessment data indicated that more than 90% of students believed that the MESA activity promoted both critical-thinking and active learning (Table 1).

Bloom taxonomy educational objectives (i.e., Evaluation, Analysis, Synthesis, Application, Comprehension and Knowledge were applicable to the MESA activity. In order to gather accurate data, we directly incorporated descriptions of Bloom’s taxonomy into our survey instrument. As Table 2 indicates, approximately, 90% of students that perceived the achievement of all six objectives were promoted by completing the MESA activity.

**Conclusion**

We generated a new teaching tool referred to as “Medication Errors and Sciences Applications” (MESA). Three P1 cohorts (approximately 95 students/cohorts) implemented the MESA activity. We built at least 14 student teams (6-7 students/team) per cohort. Students were asked to generate a 2-3 page MESA report and/or PowerPoint presentations over a two hour in class session. All three cohorts followed a consistent step-by-step process to generate their MESA reports (Figure 1).

Each MESA report included an authentic medication error related to a specific drug product. Student teams were asked to integrate biochemistry, medicinal chemistry, pharmacology, pharmacokinetics, pharmacometrics, and immunology topics to the select drug product and its medication error.

Student teams presented a 15-minute MESA report to their peers. After completion of all presentations, a survey tool was administered to assess the effectiveness of MESA activity. Approximately 220 students (~75% of each cohort) completed the survey.

**Methods**

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