INNOVATIONS IN TOXICOLOGICAL EDUCATION THROUGH MOCK PATIENT CASES AND CRITICAL PEER-TO-PEER EVALUATION

JD King**;JP Vakkalanka**,JL Parker Cote; NP Charlton; CP Holstege
Department of Emergency Medicine
University of Virginia School of Medicine, USA

Objectives: Anecdotal evidence of medical education in the United States suggests that medical students lack both appropriate prescribing skills and awareness of potentially dangerous drug complications. This study used a novel approach to the medical education curriculum that explores teaching of critical concepts in medical toxicology beyond traditional didactics.

Methods: We developed standardized simulated patient cases (SSPC), focusing on three key areas of medication errors commonly encountered in our medical toxicology practice (opioid poisoning, serotonin syndrome, and pediatric prescribing errors). We enrolled fourth year medical students in the medical toxicology elective in two week cohorts, providing opportunities for students to independently manage these simulated medical situations. Investigators evaluated student performance on a scale of 0-4 for each individual SSPC, allowing for a total score between 0-12. In addition, the students were video-taped during the SSPC to facilitate follow up discussion amongst their cohort in a focus-group style evaluation (on a 24 point scale). The study design included a 30 question pre-test and post-test administered at the beginning and end of the study interval, assessing their knowledge of concepts pertaining to the study. Data were analyzed through pair-wise t-tests to evaluate differences in mean scores over the two week period.

Results: A total of 23 students participated in this study. The average score for the pre-test was 16.3 (out of 30) or 54.3%. By the second week, there was an increase of 7.4 points (or 25%) in the post-test (95% CI: 5.6-9.2; $p<0.001$), and reduced variability in test scores. During the first week of the SSPCs, students scored an average of 8.7 (out of 12 overall) compared to 8.2 points in week 2, though this was not statistically significant. By topic, students had a decrease in the assessment score of opioid poisonings (-1.35 points, 95% CI: -1.40, -0.73; $p=0.002$). However, there was an increase of 0.78 points (95% CI: 0.30, 1.30; $p = 0.003$) in the assessment of serotonin syndrome in the second week. There appeared to be no difference in scores in the pediatric prescribing error cases. Students appeared to more critically evaluate themselves before the group discussion; there was an increase of approximately two points each week after viewing and discussing the cases with their peers. However, self-evaluation scores varied little between the two weeks, with average scores of 20 (out of 24) each week. Similar to self-evaluations, there was no difference in mean scores between the first and second week evaluation of peers. For the SSPCs, students ranked them favorably, often identifying them as effective in teaching key concepts and having the opportunity to obtain pertinent information, identify the diagnosis, and manage the case. Unlike the SSPCs, students appeared to have mixed reactions to the peer review and videos. Some cited that they did not feel they added much educational value or see any benefits from this, while others noted it was good to review the cases and see how others reacted to them.

Conclusions: Nearly 100,000 patient deaths occur annually in the United States due to medication errors. These events are preventable, and it is critical to train medical students early in their medical careers regarding appropriate medication utilization. Our study investigated an educational technique that directly engaged students in mock simulations, fostering critical thinking and management. While there was little or no difference in student scores of the intervention, students indicated that it increased their understanding of critical concepts in medical toxicology. Continued evaluation is needed to understand medication errors and the best methods to prevent these oversights.