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Research

Implementing an elective toxicology course through integration of emergency medicine resident physicians into didactic lectures

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Abstract

Objectives: To design, implement, and evaluate an elective clinical toxicology course through the integration of emergency medicine physicians into case-based lectures to pharmacy students.

Design: An introductory clinical toxicology course with an emphasis on overdose prevention, overdose patient diagnosis/assessment, and general medical management approaches was developed. Interprofessional interaction opportunity for pharmacy students was provided through integration of emergency medicine resident physicians into didactic lectures. Case-based lectures were created and delivered throughout the course to illustrate the application of the general toxicology knowledge to patient care.

Assessment: The outcome of the course design and implementation were assessed through students' self-assessment survey, standard course evaluation, and overall course grades from class students.

Conclusion: Students perceived the integration of emergency medicine resident physicians as beneficial. The course design promoted students to value different viewpoints, and the method of content delivery helped them to develop real world professional skills through interprofessional interactions. The course survey, evaluations, and overall course grades demonstrated that the course met its predefined educational outcome.

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Keywords: Elective course; Toxicology; Interprofessional interaction; Case-based

Introduction

Clinical toxicology is a discipline that focuses on diseases that are caused by, or are uniquely associated with toxic substances.¹ Physicians working with clinical toxicologists are on the frontlines, treating patients who are poisoned by drugs and other toxic substances. Pharmacists also play a major role in patient care since they have an in-depth understanding of drug action and adverse drug effects. In addition, since pharmacists are the most

accessible health care professionals,² they could potentially serve as first responders in the community.

The 2016 Accreditation Council for Pharmacy Education (ACPE) Standards list toxicology as a component central to a contemporary, high-quality pharmacy education and should be incorporated at an appropriate breadth and depth in the required didactic Doctor of Pharmacy (PharmD) curriculum.³ The prevention and treatment of the toxic effects of drugs and poisons should be an important component of toxicology education. With appropriate pharmacy education and postgraduate training in clinical toxicology, overdose prevention and management could become part of pharmacists' professional responsibility in delivering pharmaceutical care. The 2016 ACPE Standards also emphasize the need and the value of interprofessional interaction in both didactic and experiential pharmacy

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education.³ A variety of collaborations and activities with other health care professionals can be developed providing a rich learning experiences for pharmacy students, and help to achieve this standard requirement.

A search of pharmacy literature reveals only a limited number of publications on the design and implementation of clinical toxicology education in the pharmacy curriculum. A standardized, patient-oriented approach to teaching clinical toxicology facilitated students' exposure and interest in this important area of practice.⁴ A case-based clinical toxicology elective course offered to second-year and third-year pharmacy students assessed its impact on student learning in related required courses, and student performance on the Pharmacy Curriculum Outcomes Assessment (PCOA) examination.⁵ Student perceptions of an online toxicology course delivered to honors pharmacy students and forensic chemistry majors were assessed along with perceived comparisons between online and traditional environments.⁶ Finally, student knowledge and confidence in an elective clinical toxicology course using active-learning techniques was described.⁷ However, the current body of knowledge lacks descriptive literature regarding the implementation and assessment of a toxicology course through the integration of medical professionals into didactic teaching.

This report describes the implementation and evaluation of a clinical toxicology elective course for pharmacy students through the integration of emergency medicine (EM) resident physicians into didactic teaching. The course was designed to introduce basic clinical toxicology knowledge to pharmacy students with an emphasis on overdose prevention, patient diagnosis/assessment, and general approaches to medical management. The format of the course delivery provided students the opportunity for interprofessional interactions with medical professionals early in the pharmacy curriculum. The specific objectives of this study were to (1) assess learners' self-reported changes related to the learning outcomes through retrospective post-then-pre design survey, (2) evaluate student satisfaction on the course design and method of knowledge content delivery through standard institution course evaluation, and (3) assess student comprehension of the lecture materials through course assessments.

Methods

Course design

The Management of Acute Overdose and Poisoning (MAOP) class is a three-credit hour elective course at Western New England University College of Pharmacy. It is designed to cover overdose topics related to common therapeutic drug categories, and common non-drug poisons, such as toxic plants, heavy metals, toxic alcohols, etc. The course is usually offered to professional year two (P2) students with the potential to enroll to a mixture of P2 and P3 students in later offerings. The five course objectives listed below were mapped to the college core competencies,

and to Bloom's Taxonomy of Learning.⁸ All lecture content and assessments were developed based on these objectives.

1. Explain the general principles of clinical toxicology.
2. Describe the clinical presentations, patient assessment, and management of common poisonings.
3. Describe the resources that are available to clinicians in the management of poisonings.
4. Create a management plan using evidence-based practice strategies for selected poisoning scenarios.
5. Describe the role of pharmacists in the prevention of unintentional overdose and management of acute poisonings.

The MAOP course met twice weekly for three hours (one hour on Monday and two hours on Tuesday) during the fall semester of 2014. The course content was delivered in 35 lectures. Students enrolled in this course had completed their first year of PharmD classroom-based work, which included basic science courses, pharmacy informatics, communication, and evidence-based practice. The elective course ran concurrently with pharmacology, pharmacokinetics, and medicinal chemistry.

The online learning management system (LMS) had links to all the course lessons, primary literature articles, selected textbook chapters, and links to helpful web sites on poisoning prevention and treatment. The first part of the course provided foundational introductory knowledge on clinical pharmacology as well as pharmacokinetics and toxicokinetics. The course then unfolded in the following order: general principles of patient management in overdose, clinical toxidromes, and specific categories of drug overdose and poisons (Table 1). The learning objectives for these topics were linked to the course outcomes with the emphasis on the overdose prevention, patient diagnosis/assessment, and general medical management approaches. While students had not yet taken therapeutics courses, the diagnosis/assessment and medical management was built upon principles previously covered in pathophysiology and evidence-based practice. Additionally, as the course ran concurrently with a patient assessment laboratory, physicians were able to provide insight into more complex physical assessments. Where appropriate, the role of pharmacist in overdose prevention and management was highlighted throughout lectures.

To facilitate classroom discussion, assigned readings for each lecture were provided to students, who were required to complete an online quiz prior to each lecture based on the reading. To encourage student class attendance, comprehension, and active classroom participation, one-minute articles were randomly completed during the lecture. These prompted students to reflect on clear and unclear points, and were reviewed by the instructors. The pre-class quizzes and in-class one-minute articles together counted for 30% of the overall final grade.

Three examinations were administered during the course to assess student knowledge and to ensure curricular content was

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