Experience with an Online Clinical Pharmacology Elective Course

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**ABSTRACT**

There is a need to expand and integrate basic science education into the clinical training years in a meaningful manner. Repackaging of basic science content that was presented in years 1 and 2 of medical school might be somewhat helpful. However, the need for students to have application exercises where they can understand and experience the relevance of basic science concepts in clinical situations is strong. This need was well documented by Cooke, Irby, and O'Brien in their book, *Educating Physicians*, where they listed the key findings of their study of medical education. This included a greater focus on standardizing the delivery of basic science, a facilitation of learning, integration of clinical experiences into the learning process, development of lifelong learning habits and skills, and formation of professional identity (Cooke, et al., 2010). To provide some appropriate basic science conceptual and experimental activities for 4th year medical students, an online clinical pharmacology course was developed. Faculty members met with the Associate Dean for Clinical Affairs to determine what content would be most beneficial for students. The faculty wanted to achieve several goals with the course. The first goal was to revisit basic principles of pharmacology in a clinically relevant manner; reminding students of the importance of the basic concepts of pharmacokinetics and pharmacodynamics. Second, was to enhance or enrich student understanding of important drug classes and special pharmacologic considerations, such as drug interactions, adverse events, and therapeutic considerations for special populations, including infants, pregnant and lactating women, and the elderly. Third, was to use this opportunity to present information that was not presented in the basic medical pharmacology course, such as prescription writing and evidence-based medicine for support of clinical decisions. Last, there was an opportunity to have students analyze important and challenging clinical presentations. Formal objectives were developed based on the objectives for Clinical Pharmacology developed by the Association of Medical School Pharmacology Chairs (AMSPC) at the following website: http://www.aspet.org/AMSPC/Knowledge_Objectives//files/14-Clinical_Pharmacology.htm

The overall objectives of this course are to:

1. increase the student's knowledge of the core principles of clinical pharmacology,
2. improve the student's ability to evaluate and effectively utilize drug information resources, and
3. help develop the student's competence to rationally prescribe drugs for a variety of individual patients.

After discussions, it was determined that there were four unit topic areas that were critically needed in this course. They include: Principles of Clinical Pharmacology; Rational and Ethical Drug Prescribing Practices; Individual Variability in Drug Responses; and Therapeutic Challenges. The next challenge was to find a platform to allow the efficient development of modules with easy delivery to a learning system platform for distribution via the Internet. SoftChalk™ was chosen because it readily integrated into most popular Learning Management Systems, such as Blackboard™, WebCT™, Moodle™, and several others. It functions as a word processor, accepts graphics and video embedded into the modules, and compiles everything into html format for use as needed.

The course is delivered to medical students enrolled at our institution via Blackboard™. It is an 80 hour elective course delivered to students asynchronously, completely online. Students have the option of taking the course as one of their regular electives during a scheduled 2 week period, or taking the course concurrently during a 3 month period while also taking other rotations. Each of the four unit topic areas contains several modules which have been created by individual faculty members in the Department of Pharmacology. Students work through each module, which usually includes some reading, interactive activities, and writing, and they submit any assessments to the faculty member responsible for that module. Pass/Fail assessment is based on student submissions, either via email or directly via Blackboard.

Student registration for this course has increased each of the years it has been offered, from the first year at 24% to the current year at 59%. Regional clinical sites encourage students to participate in this course as a way to review and strengthen their understanding of basic science concepts. Students have volunteered positive comments about the course, noting that it reinforced basic concepts and principles of pharmacology from their second year and that it helped them better understand applications of drugs and drug classes in clinical settings. Survey information is currently being collected and analyzed for more specific feedback about the course.

**METHODS**

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**POST COURSE SURVEY**

![FIGURE 2](image2.png) Figure 2. Post-Course Survey Responses of the Class of 2010. Each colored bar corresponds to the question represented on the Post-Course Clinical Pharmacology Elective Survey shown earlier. Data are represented as Mean Score +/- S.D. N=10.

**FIGURE 3**

![FIGURE 3](image3.png) Figure 3. Post-Course Survey Responses of the Class of 2011. Each colored bar corresponds to the question represented on the Post-Course Clinical Pharmacology Elective Survey shown earlier. Data are represented as Mean Score +/- S.D. N=24.

**SUMMARY**

Development of a Clinical Pharmacology Elective for 4th year medical students is a positive way to incorporate basic science concepts into clinical training.

Students are eager for ways to better understand scientific concepts underlying clinical decisions.

Students will actively participate in learning activities that enhance their understanding of scientific concepts related to the clinical decision making process.