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Collaboration between pharmacy and osteopathic medicine to teach via the Internet

MARC A. SWEENEY, PharmD
MELITA L. SCHUSTER, DO

This article describes the results of a survey from graduate pharmacy students who completed a neurology/psychiatry course taught by a pharmacist and an osteopathic physician via the Internet. Seventeen practicing pharmacists completed the 11-week course, and thirteen students completed the survey provided at the end of the course. Results indicated that students were pleased with the course. Mean evaluation scores ranged from 4.31 to 4.77 on a five-point scale. Additionally, students indicated that the collaboration of medicine and pharmacy provided an educational model that should be duplicated for future courses.

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The Internet is fast becoming the world's most complete reference. Healthcare professionals are beginning to rely on the Internet for its information and communication capabilities. Internet use in the medical field has included administrative scheduling of employees and patients, insurance follow-up, project management, patient education, database management, list serves, research, medical records, and education.[1] The term *telemedicine* has become increasingly popular and incorporates aspects of medical education, diagnosis, patient and colleague communication, and distance consultation.[2]

Dr Sweeney is an assistant clinical professor at Ohio Northern University Raabe College of Pharmacy, Ada, Ohio; and clinical assistant professor of pharmacology at Ohio University College of Osteopathic Medicine. Dr Schuster is associate program director, St Vincent's Mercy Medical Center Family Medicine Residency Program, LaGrange Medical Associates, Toledo, Ohio.

Correspondence to Marc Sweeney, PharmD, Ohio Northern University Raabe College of Pharmacy, 525 S Main St, Ada, OH 45810.

E-mail: *m-sweeney@onu.edu*

According to Fox,[3] graduate medical education may be improved with Internet technology in the following areas: improved communication between healthcare professionals and colleagues; greater exposure to more diverse patient cases; improved efficiency using electronic archiving; greater research opportunities; and increased educational opportunities.

The advantages of the Internet in health education are low cost, longitudinal educational opportunities, various educational mediums (for example, video, sound), more current information, and ubiquitous access.[4] The major disadvantages appear to be lack of control (for example, organizational, confidentiality), user training on software and Internet use, continuous learning with a changing technology, less "face-to-face" contact between students and instructors, and an evolution from the traditional modes of education.[4] However, as technology evolves, increased on-line "face-to-face" interaction may soon be more available.[5]

Due to the widespread nature of the Internet, educational opportunities are expanding for healthcare professionals. To adapt to the changing roles of the pharmacist, Ohio Northern University Raabe College of Pharmacy has implemented a nontraditional Doctor of Pharmacy degree that affords the practicing pharmacist an opportunity to partake in a didactic curriculum via the Internet. The didactic portion of the curriculum precedes the required clinical rotations. The program allows for students to enroll in courses that incorporate synchronous and asynchronous learning, which provides students more flexibility to work or raise families.

Although students are taught primarily by faculty of the college of pharmacy, the course on central nervous system pathophysiology and pharmacotherapeutics (neurology/psychiatry) was taught by a pharmacist and an osteopathic physician to enhance the learning experience. Students who completed the course were surveyed to determine benefits and disadvantages of this educational model.

Methods

Twenty practicing pharmacists from various states were enrolled in the central nervous system (neurology/psychiatry) course. The course coordinator was a pharmacist who works with an osteopathic family medicine residency program and has a Doctor of Pharmacy degree. The co-instructor was an osteopathic physician and the chief family medicine resident at a separate osteopathic residency program. Most of the curriculum was developed by the instructors using the Kemp model (this model is based on a stepwise approach to curriculum development that includes analysis, design, development, implementation, and ongoing evaluation). The course contained approximately 175 pages of material on the Internet, which required an estimated 300 to 350 hours of combined instructor preparation time.

The information for the course was placed on the Internet via WebCT (*www.webct.com*), which allows for password access to the curriculum. The curriculum module was divided into six submodules, with recommended dates of

completion over 11 weeks of instruction. The information was presented in various formats, but the general organization included learning objectives with assigned readings. Students were expected to complete assigned readings and complete the questions in each submodule. The questions were intended to guide the student through the material in an organized fashion and help prioritize information. Additionally, each submodule included clinical "pearls," charts, and information not included in the readings.

Each submodule included a scheduled on-line chat session where students were allowed to participate in case discussions with both instructors. Students were encouraged to work through a case as a group, after which instructors provided additional comments or guidance when necessary. At least 85% of the students attended a given chat session, and each instructor was involved in chat sessions for 10 to 12 hours throughout the course. Questions pertaining to the module were encouraged during asynchronous communication via bulletin board postings. Questions were viewed by all students and answered by other students or the instructors. Some students addressed questions through e-mail. Questions ranged from clarification of the material to specific cases encountered in the students' work environments. The instructors and other students took part in answering questions.

Students were encouraged to take the on-line quiz on completion of each submodule. The open-book quizzes were multiple choice, matching, and true/false in format. Quizzes were of various lengths with a corresponding time limit to minimize the amount of student research time. Questions were randomly selected from a question database pertaining to the area of testing. Consequently, each student had a slightly different quiz. Each quiz was graded by the software, WebCT. The final examination consisted of a random selection of questions from all the quizzes and one essay question pertaining to a patient case. All quizzes and the final examination were focused on application of information; thus, numerous patient cases were used. On completion of the examination, students were asked to complete a survey regarding course content, teaching methods, etc.

Table
Student Survey

Survey question*	Mean score ± SD (n=13)
☐ How would you rate the course syllabus in explaining the learning objectives?	4.69±0.48
☐ How would you rate the instructors' organization of the course materials?	4.69±0.48
☐ How would you rate the instructors' interest in and enthusiasm for the subject?	4.77±0.60
☐ How would you rate the instructors' responsiveness to your questions?	4.69±0.63
☐ How would you rate the overall willingness of the instructors to assist you?	4.69±0.63
☐ How would you rate the assignments and/or examinations in fulfilling the learning objectives?	4.31±0.48
☐ How would you rate the instructors' presentation of the material using the Web-based format?	4.31±0.75
☐ How would you rate the instructors' ability to explain the material in a clear and understandable manner?	4.62±0.65
☐ If textbooks were required, how would you rate the appropriateness?	4.62±0.51

*All questions rated on 5-point scale.

Results

Seventeen of the 20 students completed the course in 11 weeks. Two students did not complete the course, and one student dropped out of the program. Students spent an average of 141 (range, 44 to 300) hours studying for the course (according to the survey). Although this is a wide range of hours, a wide range would be expected based on the students' prior experiences. Some students had been pharmacists in environments in which there was frequent management of patients with neurologic or psychiatric disorders. Students without prior experience with these types of patients would be expected to spend more time learning the information.

Thirteen students completed the survey prior to final grades being posted (76.5% response). One additional student completed the survey after the final grades were posted, but the results of that survey were not included in the analysis due to the potential bias of the survey. The questions that were asked of the students are listed in the *Table*. Students were allowed to respond to each question by the following responses: excellent, good, average, below average, and poor. For analysis, the following numbers were assigned to the responses: 5, excellent; 4, good; 3, average; 2, below average; and 1, poor. On a 5-point Likert scale, the mean scores for all questions are also listed in the *Table*.

Students were also allowed to provide open-ended comments. Overall, the comments from students were positive. Among those aspects viewed as favor-

able were the chat-session interactions and the real-life examples provided as the result of having an osteopathic physician as one of the instructors. The students also appreciated the insight into how a physician thinks clinically, as it brought a different perspective to their discussions. One student, however, thought that less emphasis should have been placed on diagnosis and that there should have been more questions on clinical situations in drug therapy (for example, drug choice with rationale, side effects, monitoring, interactions).

Comments

Results of the survey indicate a positive experience from the perspective of the students. To fully understand pharmacotherapeutics, students must be knowledgeable about disease states and their pathophysiology. Students were expected to be familiar with the epidemiology, clinical presentation, diagnosis, and pathophysiology of the various neurologic and psychiatric diseases, in addition to the pharmacodynamics, pharmacokinetics, and literature-based evidence of drug use. Although 11 weeks do not allow time for an in-depth coverage of these areas, the insight of an osteopathic physician during chat sessions and answering questions provided a greater perspective in providing patient care. It was apparent during this course that physicians approach patient care from a different perspective than pharmacists; however, in a collaborative environment, a synergy developed that may potentially improve patient care.

Although the positive aspects of this course are noted, some important concerns arose as well. A concern was raised regarding the greater focus on "diagnosis" for pharmacist training. Obviously, this concern is one that needs to be addressed in this type of model, as not to weigh too heavily on diagnostic curriculum. Additionally, as the curriculum focused more on the disease states, the intensity of the pharmacotherapeutics may have been compromised.

During the course, the students gained an appreciation for the physician's perspective. Both instructors learned from each other, allowing for a positive learning environment. The use of the Internet to teach allows for greater flexibility of scheduling physician instruction, as physicians may teach from any location that affords Internet access. This flexibility allows for more involvement in collaborative teaching, which was not previously viable.

As medicine becomes more advanced, so should the venues by which medical education is delivered. We are in the information age, and technology will be moving forward much faster in the future. By increasing the opportunities for collaborative teaching between healthcare providers, a greater quality of education will soon evolve. Additionally, collaborative teaching between on-campus and off-campus faculty may increase with this type of educational model. Traditional educational models are being shifted to new paradigms, which will improve not only student education, but also improve faculty development.

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