Doctor of Pharmacy Student Evaluation of a Physical Examination Course

R. Leon Longe
Clinical Pharmacy Program, The Medical College of Georgia, CJ-1020, Augusta GA 30912

Peggy J. Wagner
Department of Family Medicine, Medical College of Georgia, Augusta GA 30912

This paper reports the assessment of student learning in a physical examination course. It reports the degree to which the course objectives were met, student confidence, and perceived value of the course. With students on two campuses, the course was taught via live and televised lectures, a potential learning problem. Recitation strategies included presenting case studies and interpreting medical and physical findings by body system. The skills laboratory included 12-hours total contact taught on one campus by pharmacy faculty and the other campus by junior medical students. The course was evaluated by quiz scores and a knowledge/attitude survey. Three equally weighted quizzes were given to measure student knowledge. Sixty-three students completed the course and 49 students return the survey (78 percent response rate). Cronbach's alpha for recitation items was 0.94 and 0.87 for laboratory items. On a five-point Likert scale, students reported that they "agree" (mean = 3.87, SD = 0.57) with their ability to use physical examination data taught in the recitation. Students report a positive evaluation (mean = 4.12, SD = 0.50) of their ability to perform the laboratory skills. Overall, students judged the course as valuable. Students reported less confidence in their overall ability to do physical examination procedures. Students reported more confidence in the junior medical students than the pharmacy faculty to teach the laboratory. No difference was found between campuses for quiz scores.

INTRODUCTION

The evolving pharmacist role to provide patient care implies direct patient interaction. A key indicator of direct patient care is physical assessment of diseases and their treatments. Therefore, physical examination is a curriculum area evolving in pharmacy education. Longe described an entry-level PharmD degree course at The University of Georgia in the Journal(1).

The purpose of this paper is to report the assessment of student learning in a physical examination course. The specific aims were: (*i*) to measure the degree to which course objectives were met concerning using physical exam data and performing procedures; (*ii*) to evaluate students' confidence; and (*iii*) to estimate the perceived value of the course. Because the course is taught via closed-circuit television between two campuses, we were interested in differences in learning between two campuses. Outcome measures were quiz scores and knowledge/attitude scores. The results suggest areas in which faculty members might compare their physical examination courses, methods to improve the value of developing physical examination courses, and encourage investigation about methods to increase student confidence to learn and use physical examination data.

COURSE DESCRIPTION

In the second semester of the third professional year, students remained on the University campus (Athens) or transferred to the medical center campus (Augusta). Because the students choose either the university campus or the medical center campus, physical examination recitation was taught by closed-circuit televison (distance learning). Because it is a multiple instructor course, each lecture is televised between campuses.

Instructors encourage interactive learning by presenting case studies, and interpreting medical history and physical findings by body system. Using the case studies approach, the instructor related physical examination data to drug therapy decision-making. Multiple teaching techniques such as slides, audiotapes, or videotapes were used for illustrating various common disease physical findings (*e.g.*, hepatomegaly, lung sounds, types of tremors). A major emphasis was demonstration and interpretation of procedures.

The skills laboratory was scheduled for 12 contact hours. During the laboratory experience, students were distributed into four students per instructor groups. The Athens laboratory was held during non-office hours at a student health center and consisted of six, two-hour sessions and the instructors were pharmacy faculty members. The Augusta laboratory used junior medical students, was held at a Family Medicine Center, and consisted of four, three-hour sessions for a total of 12 hours each. The laboratory sites were equipped with patient examination rooms and supplies needed to conduct the course. During the laboratory the instructors demonstrated the procedures and then observed each student perform the procedures on each other. Students recorded their physical findings in their lab manuals for preparing reports.

Table I. Student evaluation by rank order of recitation (N= 49)

Rank	Item	Likert score	
		Mean	SD
1	I can describe the types of information in a medical history.	4.29	0.58
2	I can describe the types of information in a physical examination	4.22*	0.59
3	I can use the patients's chief complaint to guide me to collect physical examination data.	4.04	0.61
4	I can discuss the medical history of selected diseases taught in this course.	3.98	0.63
5	I can write a physical examination report.	3.96	0.82
6	I understand how to do a physical examination.	3.86	0.74
7.5**	I can discuss the physical findings of selected diseases taught in this course	3.84	0.85
7.5**	I can devise a plan to collect physical examination data based on the patient's chief complaint.	3.84	0.66
9	I can select information from a physical examination report to make drug therapy decisions.	3.78*	0.77
10	I can present a verbal report of physical findings	3.76	0.99
11	I can use my knowledge of physical examination to determine the significance and severity of the patient's chief complaint	3.71	0.76
12	I can monitor a patient's drug therapy based on physical examination findings.	3.63*	0.83
13	I can perform appropriate physical examination procedures to obtain pertinent information.	3.51	0.89
14	I can use physical examination data to make drug therapy decisions.	3.47*	0.89
15	I can design a patient's drug therapy based on physical examination findings.	3.31*	1.00

Recitation scale: 5-point Likert agreement scale, negative items have been reverse scored so that a higher score reflects greater ability.

Recitation scale: 5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1= strongly disagree.

*Denotes statistically significantly different between campuses *(P* < 0.05).

** Reflects a tie with adjacent item.

COURSE EVALUATION

To evaluate the course we used two measures: quiz scores and a knowledge/attitude survey. The objectives of the survey were to measure the degree to which the course objectives were met. The survey items measured the student's knowledge of and attitudes toward use of physical examination data and performance of physical examination procedures. Some items estimated overall course value and confidence in one's ability to perform examinations.

Using the learning objectives, fifteen recitation items were written for assessment of their knowledge/attitude to use physical exam data. Eighteen items were selected from their laboratory manual to measure their abilities to perform the procedures (*e.g.*, measure blood pressure). Each of the 18 procedure items represented a "critical indicator of performance" per body system. These items were required to be done by the student and observed by the instructor when examining a body system. Two items were written to judge the student's opinion of the value of the recitation and laboratory course sections. Finally, two items were used to evaluate the performance confidence of the student and the student's confidence in the laboratory instructors.

A draft survey version was given to several course instructors for their ideas. After revising, it was administered to a student group. Some statements were rewritten for clarity. At the end of the semester, all students enrolled in the course were asked to complete the thirty-seven items.

Three equally weighted quizzes were given to measure any knowledge differences between the groups. Quizzes covered recitation, textbook, course syllabus, and handouts. These tests were case study format with various question types such as brief answers, matching, multiple choice, and fill-in-the blank formats.

The laboratory was graded as "pass/fail" by preparing a physical examination report. The reports were evaluated by the course director several times using subjective criteria. The subjective evaluation was based on reporting all items in a standardized physical examination outline. The reports were graded as "pass," "pass with recommendations," or "fail with recommendations." The final report had to be rated as "pass" to complete the course.

STATISTICAL ANALYSIS

Survey data were entered to a database with negatively worded items reverse scored so that a higher score consistently reflects a more positive evaluation. Data was analyzed by Statistical Package for Social Sciences (SPSS) for Windows. Cronbach's alpha test was calculated to measure the reliability of the recitation and laboratory aspects of the survey. Frequencies, means, and standard deviations for items were calculated for the overall group and by campus groups. Quiz scores were calculated by spreadsheet and analyzed by SPSS for Windows. The independent samples t test was used to compare means differences between groups on continuous variables. Statistical significance level of 0.05 was used for this analysis.

RESULTS

Sixty-three, third year entry-level PharmD students completed the course in the spring semester of 1998. Forty-nine of the students (77.8 percent) completed the knowledge/attitude survey. Cronbach's alpha reliability coefficient for recitation items (Table I) is 0.94 and laboratory items reliability coefficient (Table II) is 0.87. Overall, using the five point Likert scale, students reported that they "agree" (mean = 3.87, SD = 0.57) with their ability to use physical examination data taught in the recitation parts of the course. Students also reported a positive evaluation (mean = 4.12, SD = 0.50) of their ability to perform skills taught in the laboratory sections of the course. Students judged the value of the recitation and laboratory sections as valuable (mean =

Table II. Student evaluation by rank order of laboratory skills (N = 49)

Rank	Item	Likert score	
		Mean	SD
1	I cannot count the radial pulse.	4.59	0.70
2	I cannot inspect the abdomen for scars.	4.57	0.79
3	I can auscultate the abdomen for bowel sounds.	4.39	0.57
4.5**	I cannot measure blood pressure.	4.37	0.76
4.5**	I cannot palpate the lower extremities for edema.	4.37*	0.76
5	I can check coordination by finger to nose testing.	4.49	0.62
6	I cannot check the patient's gait.	4.31	0.85
7	I can test the range of motion in the neck.	4.29	0.71
8	I cannot inspect the buccal mucosa.	4.20	0.79
9	I cannot check pupillary responses to light.	4.14*	0.94
10	I can palpate the scalp and skull for masses and tenderness.	4.08	1.00
11	I can assess visual acuity with a Snellen chart.	3.96	1.00
12	I can auscultate normal breath sounds.	3.92	1.00
13	I can test the Achilles deep tendon reflex.	3.84	0.85
14	I can inspect the conjunctiva and sclera for inflammation.	3.82	1.09
15	I cannot inspect the ear canal using an otoscope.	3.76	1.11
16	I can examine the nasal vestibules for anterior nasal septum deviation.	3.59	1.10
17	I can identify the first and second heart sounds.	3.53	1.06

Laboratory scale: 5-point Likert agreement scale, negative items have been reverse scored so that a higher score reflects greater ability.

Laboratory scale: 5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1= strongly disagree

*Denotes statistically significantly different between campuses ($P < 0.05$).

** Reflects a tie with adjacent item.

Table III. Student evaluation of course: Value and confidence (N = 49)

Item	Likert score	
	Mean	SD
Which statement describes how you value the lecture portion of the course?	2.98	0.99
Which statement describes how you value the laboratory portion of the course?	3.04	1.19
Which statement describes your level of confidence to perform the physical examination procedures?	2.45	1.02
Which statement describes the laboratory instructor's level of confidence to perform the physical examination procedures?	3.67*	1.11

Value scale: 5 = extremely valuable; 4 = very valuable; 3 = valuable; 2 = somewhat valuable; 1 = not valuable.

Confidence scale: 5 = extremely confident; 4 = very confident; 3 = confident; 2 = somewhat confident; 1 = not confident.

*Denotes statistically significantly different between campuses ($P < 0.05$).

2.98, SD = 0.99; mean = 3.04, SD = 1.19 respectively). Students reported confidence in their laboratory instructors (mean 3.67, SD = 1.11). In some contrast to the above positive evaluations of the course, students reported less confidence in their own overall ability to perform physical examination procedures (mean 2.45, SD = 1.02)

When analyzed by campus, scores on five recitation items # 2, 9, 12, 14 and 15 were statistically different between campuses (Table I). Two items describe using physical exam data for decision-making and one item assesses their knowledge of type of physical exam information. The other two relate to using physical exam data for monitoring and designing a patient's drug therapy. For all these recitation items the students at the medical center campus had a higher mean score, showing more favorable responses. When asked to rate the laboratory items (Table II), only two items (checking pupillary response and palpating for edema) were statistically different between campuses. The university campus group showed a higher mean score on pupillary response; the medical center group was higher for palpation for edema. No statistical difference was found between campuses for "valuing" the lecture or laboratory. Student self confidence was not statistically different between groups, but their confidence in their laboratory instructor was significantly different (Table III, $P<0.05$), with students at the medical center expressing greater confidence in their instructors. Students were given three quizzes of equal value. When compared by campus, individual quizzes and final grade scores were not statistically significantly different.

DISCUSSION

With adoption of the Doctor of Pharmacy degree as the entry-level standard, increasing emphasis is being given in pharmacy curricula to teach physical examination courses(2). Pharmacy students must be taught both effective communication and physical examination skills. Many articles have been written about effective communications in pharmacy education literature(3-5). However, the pharmacy education literature is lacking information about teaching physical examination skills.

The University of Georgia Doctor of Pharmacy curriculum is based on nine competency statements with many learning objectives arranged into three learning hierarchy domains: cognitive, affective, and psychomotor. This physical examination course was designed around the

competency statement to "design, implement, evaluate, and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care."(1) Within this competency statement, various learning objectives were written and the physical examination course was designed to achieve this competency.

Students generally rated themselves as mastering the use of physical examination data in the cognitive domain. Compared with Bloom's learning taxonomy, the mean scores were highest for the lower learning levels such as knowledge (*e.g.*, describe, discuss)(6). When asked about "performing," "decision making," "devising," "designing," and "monitoring," the mean scores were lower. When measured for other courses, this learning trend is generally true in our curriculum. As professional students progress through a curriculum one would expect students to function at the "higher" levels of learning. This course is the first exposure to collecting and using physical examination to provide pharmaceutical care. During experiential training, the faculty will need to reassess and reenforce physical examination skills. Before graduating we will need to decide if our graduates are functioning at the higher cognitive learning dimensions.

Generally, the students could perform the procedures taught in the laboratory. When compared with the recitation, on the average the mean laboratory scores were higher. This may be partly due to the discrete objective nature of the statements. For example, a student either could or could not measure blood pressure. The laboratory instructors taught psychomotor skills by showing the procedures to the students. Then the instructors would observe and correct the students, providing immediate responses. The procedures in the laboratory manual were "step-by-step" statements explaining how to examine a particular body system systematically. We would expect more objective rating by the students.

Value of the physical examination course was not as highly rated by the students as we expected. We do not know if the problem is that they do not see its application to practicing pharmacy or the organization of the course needs improving. In the traditional practice, pharmacists use physical examination skills to various degrees. Students may have difficulty connecting with their perception of traditional practice and the move toward the pharmaceutical care model. Medical, dental, nursing, physician assistant, and many other healthcare students view physical examination data as important to their practice. When pharmacists routinely examine patients, pharmacy students will value physical examination training. When college course evaluations were examined, the scores and student written comments were very positive which suggests the students did not have a problem with course structure or content. To put more value into the course, a practical laboratory final may be needed to encourage the students to value the material.

Self-confidence to perform physical examination was low. This finding is expected, considering this is their first experience with physical examination. It appears from observations that pharmacy students are reluctant to "touch" another person, a potential initial barrier. In the laboratory the instructor had to lead the students to overcome this barrier. The students had to become comfortable with physical examination. Also, the students were mechanical in learning new skills, looking for continuous encouragement from their laboratory instructor. In the early development of a new psychomotor function, the students imitate their instructor. As they gain self confidence, students advance toward proficient, highly coordinated motor skills. During experiential training, developing self confidence by examining patients will be important for the students.

Student confidence in the laboratory instructors was high. Because of available resources, we used pharmacy faculty members and junior medical students. A physician was hired to coordinate the Athens campus laboratory. The pharmacy faculty consisted of both practice and basic science faculty. Their training in physical examination was extremely variable; some have extensive experience and others with none. The junior medical students have had two physical examination courses and were in clinical training. Although the pharmacy students rated the pharmacy faculty positively, many faculty members have requested formal training since completing the course. This may explain the statistical difference between the campuses.

A concern was simultaneously teaching the course at separated campuses. Quiz and final grade scores did not suggest a problem with learning. However, we did find some attitudinal differences between the campuses with the survey. The medical center group had a more favorable rating in using physical examination data. Because this group "elected" to move to the medical center, they may be more oriented toward clinical practice. The medical center students had higher means scores in self confidence, laboratory value, and instructor confidence. In the laboratory, the university campus group had more favorable response to check eye pupil response while the medical campus group responded more favorably to check for edema. The difference may show a difference in how the laboratory was taught, a potential quality control problem which needs to be consistently monitored whenever multiple teaching venues are used.

SUMMARY

As measured by survey scores and quiz scores the course objectives were met in this physical examination course for Doctor of Pharmacy students. The students believed they could use physical examination data and perform the specific skills and expressed confidence in their instructors. Results suggest that student perceptions of the course's value in their curriculum and their own level of self-confidence to perform the skills need to be raised. Value and confidence remain critical educational issues.

Am. J. Pharm. Educ., **63**, 64-67(1999); received 7/22/98, accepted 12/18/98.

References

(1) Longe, R.L., "Teaching physical assessment to doctor of pharmacy students," *Am. J. Pharm. Educ.*, **59**, 151-155(1995).
(2) da Camara, C.C., D'Elia, R.P., Swanson, L. N., "Survey of physical assessment course offering in American colleges of pharmacy," *ibid.,* **60**, 343-347(1996).
(3) Hurd, P.D., "Questions and critical thinking, *ibid.,* **58**, 422-423(1994).
(4) Hunter, K.A., "Poster presentations: an alternative to traditional classroom lecture," *ibid.,* **61**, 78-80(1997).
(5) Parkhurst, C., "Assessing and improving students' verbal communication abilities in pharmacy courses," *ibid.* **58**, 50-55(1994)
(6) Krathwothal, D.R. and Bloom, B.S., *Taxonomy of Educational Objectives, Handbook 1: Cognitive*, Longman Group, United Kingdom (1984)