Teaching Physical Assessment to Doctor of Pharmacy Students

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This paper describes a physical assessment course for entry-level doctor of pharmacy students. The University of Georgia newly revised curriculum is based on nine competencies with terminal and enabling objectives. The physical assessment course is anchored to the competency to "design, implement, evaluate, and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care." Within this competency, the enabling objective, "perform appropriate physical assessment to obtain pertinent information from patients for a patient-specific database," defines the course goal. The three credit-hour course meets two-hours weekly for recitation with a three-hour practicum. Teaching strategies include lecture, demonstrations, visual illustrations of physical findings, audiotapes and problem-based learning. The content focus is the functions of a pharmacist providing patient care—not a discourse on physical diagnosis. The paper discusses classroom topics such as interviewing, fundamental physical assessment techniques and teaching physical assessment by body system. Case studies are used to illustrate pharmacy application. The practicum is a three-hour laboratory using normal subjects. Student performance is evaluated at two levels: knowledge and skills. Knowledge is judged by written examination. Skills are evaluated using performance checklists per body system. The paper describes the process of developing skills performance instruments. Two case study-based tests with a final examination are used to evaluate the cognitive domain. The practicum grade is "pass-fail" using the body system performance checklists to test the psychomotor domain. The primary viewpoint should be the pharmacist, a potential problem with the shortage of qualified pharmacist-instructors or with using other health professionals such as physicians. The practicum is labor intensive and ways to manage this problem are described. If patients are used in the practicum, advantage and disadvantages of different populations and settings are explained. The future direction involves testing computer-assisted multimedia instruction.

INTRODUCTION

Physical assessment is listed as a curriculum content area for the Doctor of Pharmacy degree in the American Association of College of Pharmacy model curriculum(1). However, the pharmacy education literature has limited data describing instructional strategies for setting up a course(2, 3). A series of physical assessment articles was published in *Drug Intelligence and Clinical Pharmacy*(4).

Since 1982 a physical assessment course had been taught as a postbaccalaureate course at The University of Georgia. Recently our curriculum was completely revised to an entry-level Doctor of Pharmacy degree. The purpose of this paper is to describe a physical assessment course for the entry-level PharmD students. The aim of this paper is to encourage reflection on existing courses and courses in development.

COMPETENCIES AND OBJECTIVES

With curriculum revision to an entry-level PharmD degree, the faculty identified nine competency statements (Appendix A). After creating competency statements, terminal and enabling objectives were written. In addition, they were arranged into a learning hierarchy outlined by various educational taxonomies. New and existing courses were created or modified to agree with these competency statements. As an existing course, the physical assessment course needed modification to conform to an entry-level course.

The physical assessment course is anchored primarily within the competency statement to "Design, implement, evaluate, and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care." A terminal objective defined cognitive functions to "integrate patient, disease, and drug data to determine desired therapy decisions for the patient"(5). The enabling objective is to "perform appropriate physical assessment to obtain pertinent information from patients for a patient-specific database." To satisfy this enabling objective, the course teaches the skillful performance of motor acts that involve complex movement patterns. To show mastery of this competency and its objectives, course objectives are to select information from the chart or other patient records, use effective interviewing skills to obtain information, perform appropriate physical assessment skills to obtain pertinent data from a simulated or real patient for making decision s, analyze and organize historical and physical data for making decisions and devise a plan for meeting the patient's health care needs. The course introduces the art and science of the physical examination and provides examples of applying physical assessment to therapeutic decision making. Course topics are listed in Table I.

COURSE DESCRIPTION

Classroom

The three credit-hour course meets two hours weekly for recitation with a three-hour practicum. It is scheduled in

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Table I. Physical assessment

Topics	Lecture hours
Interviewing	0.5
Physical examination techniques	0.5
Mental status examination	1.0
Hair, Skin and Nails	1.0
Eyes and ears	2.0
Head and neck	2.0
Thorax and lungs	2.0
Cardiovascular	2.0
Abdomen	2.0
Musculoskeleton	1.0
Central and peripheral nerves	2.0
Breast	0.5
Female reproduction	1.5
Male reproduction	1.0

the third professional year so that most basic and clinical science courses are finished. Clinical anatomy, medical physiology, pathophysiology and pharmacotherapy are either concurrent or prerequisite courses.

Several teaching strategies are used throughout the course including lecture, demonstration of procedures, various visual illustrations of selected physical findings, audiotapes, and videotapes. The content focus underpins the functions of a pharmacist providing patient care—not a discourse on physical diagnosis.

In the opening classroom sessions, the philosophical basis of physical assessment, principles of monitoring drug actions and interviewing techniques are taught. The students are introduced to the processes of information gathering for developing and testing clinical hypotheses, illustrating the limits of clinical data (*i. e.*, the sensitivity and specificity of symptoms, signs, and laboratory data). The interview lecture covers traditional methods of subjective data collection such as pre-interview preparation, nonverbal communication skills, and the verbal techniques of interpretation, reflection, clarification, empathy, facilitation and confrontation. The last introductory session covers medication history-taking, patient counseling, and response to treatment evaluation. After these foundational lectures, the remaining classroom sessions are devoted to teaching physical assessment of specific body systems and evaluating drug therapy.

Following the introductory lectures, the approach shifts to teaching physical assessment of each body system. Each recitation reviews basic anatomy and physiology, methods of physical examination, normal and abnormal physical findings of selected diseases, medical terminology and common medical abbreviations. Reviewing topographical anatomy and basic physiology connects the information to the application of physical examination skills. An essential activity is showing how to perform the examination and explaining its relationship to drug therapy. For example, showing the student how to check dependent edema easily relates to various edematous states managed with diuretics (*e.g.*, congestive heart failure).

The lecture includes a case study describing a patient situation with discussion of a disease and its management, stressing physical findings and their evaluation. To learn physical assessment, the student needs to comprehend its integration with therapeutics and pathophysiology. The patient situation helps bridge this knowledge gap and teaches clinical decision making.

Practicum

Being an introductory entry-level course, the three-hour practicum is conducted on normal subjects (*i.e.*, students). At the beginning of each practicum session the instructor demonstrates all examination procedures on various body systems. Students are not expected to achieve skills mastery of all procedures. For example, when studying the cardiovascular examination the student is expected to achieve skill mastery of measuring blood pressure, but not heart sound auscultation. The students group into pairs to practice specific procedures. A skills checklist by body system is used by the instructor to judge performance (Appendix B).

During the practicum, student performance is evaluated at two levels: knowledge and skills. Students show knowledge level mastery of the examination procedure by discussing test measurement, implementation, and interpretation of findings on recitation tests. Using the checklist method, the student demonstrates skills mastery by correct procedure performance.

The practicum correlates with the recitation subject. For example, following cardiovascular recitation, the practicum is used to demonstrate and clarify knowledge and skills for evaluating cardiovascular drug therapy. The students examine each other to gain confidence and perfect their skills with the instructor supervising student skills and competence.

As one would predict, teaching skills consume the most resources (time, personnel, supplies and equipment). For the practicum the students provide their own a pen light, watch and stethoscope; other equipment is furnished. A common equipment mistake is the use of a poor quality stethoscope. A fifty dollar investment in the purchase of a good stethoscope will reward the student with quality performance for many years. Table II lists equipment and supplies with their approximate costs. Acquisition and maintenance costs vary with class size and types of skills being taught.

EVALUATION

Two tests with a final examination are used to evaluate knowledge. These tests are case studies with short answer, matching, multiple-choice, and fill-in-the-blank questions. Questioning emphasizes drug monitoring by physical methods, how one does the examination, and interpretation of the physical findings (Appendix C).

The practicum grade is "pass-fail." Calculating a numeric grade is difficult, therefore a "pass-fail" method simplifies grading. Using a checklist method, "critical indicators" of performance are monitored during the practicum (Appendix B). The laboratory instructor observes and checks the form in the appropriate column as "pass" or "fail." To "pass" the "critical indicators" of performance must be performed by the student.

DISCUSSION

In the enabling objective of this course, the statement "perform appropriate physical assessment skills" places boundaries around the skills one expects the entry-level PharmD student to perform. Clearly defining the basic skills that an entry-level PharmD needs to make drug therapy decisions calls for faculty consensus. For example, measuring blood pressure would be an "appropriate" basic skill, but checking for abdominal rebound tenderness may be "inappropriate."

Table II. Equipment and supplies

Item	Approximate costs
Stethoscope	$ 50.00
Sphygmomanometer	140.00
Oto-ophthalmoscope	425.00
Transilluminator	60.00
Goniometer	25.00
Neurological hammer	12.00
Glass oral thermometers	20.00/box
Otoscope insufflator	6.00
Pen light	2.00
Tongue depressors	20.00/box
Tuning forks 128/1024 cps	20.00-30.00/each
Isopropyl alcohol	1.00/pint
Sterile cotton balls	16.00/4000
Latex rubber gloves	60.00/48 pair
Lung and Heart sound tapes[a]	

[a] Wilkins, R.L., Hodgkins, J.E. and Lopez, B., *Lung Sounds: A Practical Approach*, C.V. Mosby Company, St. Louis, MO (1988); Tilkian, A.G. *and Conover*,.,*Understanding Heart Sounds and Murmurs, W .B. Saunders* Company, Philadelphia PA (1979). Stein, E., *Rapid Interpretation of Heart Sounds and Murmurs*, Lea and Febiger, Philadelphia, PA (1983).

The basic "appropriate" skills were identified by a questionnaire approach. Manipulative skills per body system were listed into performance checklists. Practice faculty and selected practitioners were surveyed. To identify basic skills the respondents were to check either "yes" or "no" beside each manipulative statement. Statements rating a "yes" majority were selected as "appropriate" skills for an entry-level course. Performance checklists have been developed for these basic skills which are used in the practicum.

As a clinical science, qualified pharmacy instructors may be lacking in our colleges to teach a physical assessment course. The primary instructors should be pharmacists actively using physical assessment in providing patient care. If none are available, physicians, physician assistants or nurse practitioners may be employed with a clear understanding of the course objectives. Non-pharmacy instructors may stress physical diagnosis and might not emphasize drug therapy decision making. The pharmacy faculty must work closely with other health professionals to ensure the students correlate physical findings with drug therapy.

In the practicum the student needs constant supervision and direction. The instructor must directly observe the student performing examination skills and interpreting findings. Without direct observation and evaluation a student can learn the wrong manipulative skills (6-8). Skills learned incorrectly are useless and possibly dangerous for decision making. A small student-teacher ratio is important to managing the quality. This is a problem in this course and will probably increase as more students enter the doctoral program. A small ratio is difficult to achieve in pharmacy school faculties without more qualified pharmacy teachers.

More advanced techniques can be taught within the limits of the experiential specialty areas. For example, a student could study abnormal heart sounds on a cardiology clerkship or various psychiatric testing skills with a psychiatric pharmacist. The proficiency would be controlled by future practice goals of the student and expectation of the pharmacist preceptor. To further refine assessment skills, the student could take a clinical specialty residency.

In clinical clerkships, physical assessment skills must be used repeatedly for students to become more efficient and proficient. Practitioners who routinely use physical assessment must be observed by students. This is a major barrier in getting students to value and apply this subject in practice. Clinical pharmacists trained in physical assessment must maintain their skills and serve as role models.

This course can be costly, both for the college and student. If using non-pharmacy faculty, the college may have to pay for instructional time. Some colleges hire other health professionals that add costs and may not achieve the course goal, *i.e*., correlating drug therapies with physical assessment. These costs could be avoided by training a few pharmacy faculty in physical examination. Medical equipment and supplies are costly, and each student must be adequately supplied. For example, an oto-ophthalmoscope set costs $350-500. Supply and equipment costs are directly proportional to class size and types of skills.

Physical assessment skills can be taught with either normal subjects or patients. Normal subjects are usually volunteer students or healthy patients. Quality control is easier to maintain with these subjects. One instructor can supervise more students; students feel less threatened; clinical facilities are not needed; and normal subjects are cooperative. However, if a goal is to learn evaluation of drug therapy with physical assessment, normal subjects will not accomplish the goal. One now moves into the more challenging realm of clinical training.

Clinical facilities and patients are needed to study advanced skills. Outpatients are useful for teaching community-based diseases and their treatments. Acute care hospitalized patients offer a good source for a variety of drug therapies and acute problems. However, both settings have problems. Hospitalized patients are often too ill to cooperate, and the ambulatory patient cannot give one to two hours for a student examination (9). Shorter length of stay in the hospital is also an impediment just as is a private, convenient space in both settings.

Some medical schools use nursing homes as settings for teaching physical diagnosis (10-12). Nursing home patients are excellent subjects for teaching physical assessment for several reasons. By knowing the medical histories, physical findings and drug therapies, the instructor can choose patients to make instruction more individualized. This also calls for less preparation time for the teacher, making more efficient use of teaching time. Elderly patients have many disease state physical findings. They are willing and eager to talk, and are readily available. The elderly usually have multiple drug therapies and can be examined in the privacy of their room. In addition, the long length of stay allows repeat visits for extended study. For example, a student could be assigned a patient throughout the course for repeat visits until a complete examination is finished. In the nursing home, the students have fewer interruptions, and quality of the physical exam is similar to the hospitalized patient (9). Compared to hospitalized patients, the nursing home patient has been well accepted by medical faculty and students for teaching physical examination (7-9). As a postbaccalaureate course with a low student-instructor ratio, this strategy was done successfully in this course.

There are drawbacks in the nursing home setting, however. The student evaluates mostly chronic diseases and their treatment but does not experience acute care problems. Clerkship experiences could overcome this limitation. Some students have negative attitudes about interacting with the chronically ill nursing home patients. Multiple

diseases and multiple drugs are difficult to evaluate for inexperienced students. The instructor must be readily available to give guidance with these multifactorial patients. Only mentally competent, informed patients must be selected by the instructor for the examination.

FUTURE DIRECTION

With the move to a single entry-level doctoral degree, college administration and faculties will be challenged to maintain quality with limited resources. New resources or better utilization of existing resources will be needed. Additional qualified teachers are difficult to obtain, and existing faculties are stretched with other duties. New technologies to deliver information may help maximize faculty time (*e.g.*, computer-assisted instruction) and should be evaluated for their effectiveness and efficiency. Currently, a computer-assisted (CAI) multimedia experimental lesson has been developed by the author and is being tested in this course. The experimental lesson is about the "Chest and Lung" examination. It has interactive text, video, audio, color illustrations, animation and interactive case study questions. If valuable, additional lessons per body system will be developed. Multimedia CAI may be a cost-effective strategy for teaching both knowledge and skills of physical assessment. If judged valuable, a complete course could be developed for on-campus and distance learning.

Until recently a physical assessment textbook has not been available for pharmacists. Many courses used a physical diagnosis textbook. *Physical Assessment: A Guide for Evaluating Drug Therapy* was recently published (13).

CONCLUSION

Physical examination skills and knowledge are essential to evaluate drug therapies and diseases. The benefits to the student include improved communication skills with patients and other health care providers, improved data collection and evaluation, better decision making and improved role perception by students, patients and other health care providers.

Clinicians know the importance of interviewing and physical examination to build a foundation for reaching decisions. Students need to see clinical pharmacists applying physical assessment in problem-solving. Students should also be provided opportunities throughout their clinical clerkships to practice and refine their physical assessment skills.

The evaluation of drug therapies is more meaningful when physical data are collected and evaluated in clinical decision making. Relying on other clinicians (physicians, nurses) to collect physical data has its pitfalls; inaccurate data and the lack of appropriate data being major problems. The medical literature has shown repetitively inter- and intra-observer variability (7-9). When possible, personally collecting and analyzing historical and physical data is within reasonable functions of a pharmacist. Pharmacy faculties should carefully consider physical assessment as important to the pharmacy graduate who will provide patient care. The AACP Board of Directors has endorsed the Commission to Implement Change in Pharmaceutical Education model curriculum on the entry-level education in pharmacy (1). When fully implemented, physical assessment will be central in training students to be competent practitioners enabling them to provide quality pharmaceutical care.

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APPENDIX A. CURRICULUM COMPETENCY STATEMENTS

1. Evaluate drug orders or prescriptions consistent with patient history and current health status and legal requirements; accurately and safely prepare dosage forms/drug delivery systems; appropriately select, package, label and dispense drug products.
2. Collect and evaluate patient data to determine appropriate courses of action (*i.e.*, nonprescription drug therapy, non-drug therapy, or referral to another health care professional).
3. Design, implement, evaluate, and modify patient pharmacotherapy based on scientific principles to ensure effective, safe and economical patient care.
4. Communicate effectively on issues related to drug therapy and health.
5. Retrieve, analyze and interpret the professional, lay and scientific literature to provide drug information to patients, caregivers, health professionals and the general public.
6. Evaluate, integrate, and manage human, economic, scientific, and technologic resources for the effective provision of pharmaceutical care.
7. Apply legal and ethical principles and regulatory requirements in the conduct of professional activities.
8. Recognize potential risks and consequences of substance abuse by pharmacists; provide professional guidance and scientific information to the public and health professionals regarding substance abuse, chemical dependency, and management of toxic substances.
9. Identify and pursue appropriate means for life-long personal and professional development.