Teaching physical examination skills consistently, systematically, and cost-effectively poses several challenges for medical educators. Physician faculty, the most expensive clinical teaching resource, commonly lack protected time for teaching, have competing priorities, or may lack interest in teaching and/or confidence in their own teaching skills. In addition, many institutions award less academic recognition for teaching versus clinical care or research. Students’ concerns about learning the physical exam include discomfort about examining their classmates, the lack of emphasis on clinical learning in the preclinical curriculum, and frustration about lack of standardized instructional methods among faculty members.

One strategy to address these challenges is to use trained teaching associates to instruct students in the physical exam. Teaching associates are standardized patients who have received additional training in physical examination skills. Two examples are real patients with stable pathology and lay persons trained to teach intimate physical examinations. The approaches have been reviewed by Wykurz and colleagues. Teaching associates have proved to be effective for teaching focused physical examinations.

Two previous authors report using teaching associates trained by clinicians to instruct students in the full spectrum of physical exam skills. In our study, instead of using clinicians to train the teaching associates, we trained a physical examination teaching associate (PETA) as a “lay expert” to train her peers. A lay expert may be defined as a standardized patient with no previous medical training who masters physical examination skills to teach her peers. Our study’s purpose was to assess the feasibility, acceptability, and costs of teaching physical exam skills to first-year medical students using lay teaching associates trained by an expert lay PETA, with limited input from the clinician course director.

Methods

Rationale for Change

Before our innovation, physical exam skills training at the University of Kansas followed a traditional model. After lecture presentations, first-year students...
practiced exams on each other in groups of six students with one preceptor. Faculty clinicians volunteered or were encouraged to be preceptors but were not explicitly required to do so nor compensated for doing so. Specialty clinicians taught each organ system, so there was no continuity between instructor and small group.

We attempted to standardize teaching content and process by issuing handouts detailing the goals, textbook reference, and preferred examination technique for each organ system. However, many preceptors failed to use these resources, and students reported discrepancies in teaching methodologies among groups. In addition, clinicians were often late or absent when their clinical or research duties took precedence over their teaching duties.

As a result of students’ discomfort in examining colleagues, they frequently did cursory or incorrect exams that remained uncorrected or did not practice the exams at all and left the sessions early. These problems resulted in a non-standard, inconsistent, and expensive approach to teaching physical exam skills that prompted our intervention.

Rationale for an Expert PETA

Two medical schools had previously implemented comprehensive physical examination teaching programs using lay teaching associates.\textsuperscript{15}\textsuperscript{16} However, since we lacked external funding and would have needed a substantial faculty time commitment, we needed a less-expensive way to train our teaching associates to deliver physical examination skills training. Therefore, using previously unreported methodology, we minimized cost and maximized program consistency by using an expert PETA to train her peers. Our institutional Human Subjects Committee granted our study exempt status.

Setting and Subjects

The University of Kansas School of Medicine is a 4-year, state-funded institution with 175 medical students per year. In academic year 2003–2004, our expert PETA trained 10 teaching associates to teach physical examination skills to the class of 2007.

Selecting and Training the Expert PETA

We selected our expert PETA from the clinical skills lab staff. To train the expert PETA, we made detailed videotapes of each organ system exam performed on the expert PETA. It was important for the expert PETA to personally experience the physical examination so that she could accurately teach her colleagues the correct touch and pressure for the different exams. After making the videotapes, the expert PETA compiled a study guide for the other teaching associates in lay language with definitions of important medical terms. The clinician course directors reviewed and revised the guide for accuracy and completeness.

Selecting and Training the Teaching Associates

From our pool of standardized patients, we chose 10 teaching associates, selected for their demonstrated feedback skills, consistent performance, and accuracy when evaluating students. We also sought teaching associates with enthusiastic personalities and an air of authority to keep the students on task. Our teaching associates were ethnically mixed, of both genders, and represented a wide range of ages and professions, including acting and real estate.

To train the teaching associates, the expert PETA led one 3-hour group training session on each of seven organ systems. During the first 30 minutes of each training session, teaching associates viewed the training videotape and reviewed the study guide. Then, guided by the expert PETA, they practiced the physical examination skills on each other and discussed teaching techniques. During the final 30 minutes of each training session, the clinician course director refined the teaching associates’ examination and teaching techniques and conducted a question and answer session. The teaching associates received copies of the training videos and study guides to review and study on their own time.

Program Implementation

Our 10 teaching associates plus the expert PETA taught the full physical examination to 175 students in seven 2-hour organ-based modules in 28 sessions over 1 academic year. We taught each module four times to groups of approximately 45 students divided into 10 or 11 small groups of four. Each small group was led by one teaching associate who taught the organ system on himself four times to four different small groups. One or two clinicians rotated among groups during each session to answer questions and review important points. Our previous teaching model had required seven or eight faculty in attendance.

Program Evaluation

Following participation in the program, we evaluated student satisfaction with a 5-item survey using a 5-point Likert scale from strongly agree to strongly disagree. We also encouraged free text comments. We evaluated cost savings by comparing actual costs for teaching associate training and teaching versus historic faculty costs. For faculty costs, we included estimates of salary and benefits but not lost income from missed clinic sessions. Therefore, our faculty costs are underestimates of the true figure.

Results

Student Satisfaction

Of 175 students, 160 returned usable surveys, for a response rate of 91% (Table 1). Ninety-eight percent of students evaluated the program positively (agree
or strongly agree), and 96% reported that their physical examination skills improved. Eighty-nine percent reported having adequate time to learn the skills, and 77% expressed confidence in their ability to examine patients, despite this being most students’ first exposure to physical examination techniques.

In the written comments, many students spontaneously stated that they appreciated not examining each other. Despite having an annotated guide to the physical exam, many students also requested copies of the teaching associates’ study guides (which were written in lay language). From a process perspective, we were able to teach physical exam skills in smaller groups than before (four students versus six). Also, most students used the full time available to practice the exam, in contrast to the previous model in which students left early.

**Cost Savings**

The cost of using teaching associates to teach a single organ system to a class of 175 students was approximately $2,000 in salary costs ($15/hour training, $20/hour performance). We saved approximately 30 hours of clinician time per organ system. Estimating faculty costs at $110/hour, this represents approximate cost savings per organ system of $1,300 or $9,100 for the full physical exam. By using an expert PETA to train the teaching associates, we realized significant cost savings. Had we used clinicians as trainers (as is done at the Tulane University15) we would have saved less faculty time and money (approximately $1,025 per organ system).

**Discussion**

We successfully implemented our program and taught all 175 first-year clinical skills students using teaching associates trained by our expert PETA. Our model of using an expert PETA to train the teaching associates is important because we proved that the model is feasible and can generate high student satisfaction while minimizing faculty time commitment. In addition, our program also achieved additional clinician cost savings over other teaching associate programs in which the associates are trained by clinician faculty.

Our study is limited, however, by being performed at a single institution with evaluation limited to student satisfaction. We do not know if students learned physical examination skills better with the previous teaching model or with the teaching associate program. However, the quality of the teaching associate program demonstrated high face validity. At least six clinicians observed teaching associate sessions and universally reported that the teaching associates competently taught the techniques of and rationale behind basic physical examination skills. Despite these evaluation limitations, we reached useful conclusions in our setting and successfully taught physical examination skills to students using an expert PETA model, while achieving significant savings in clinician costs.

We believe our expert PETA model is highly practical and generalizable to other institutions. We have adopted the program in our institution and look forward to working with other schools to implement similar programs.

**Acknowledgments:** No extramural support was used in this project. This project was funded wholly by the Office of Medical Education at the University of Kansas.

*Data from this paper were presented in abstract form at the 2004 Annual Meeting of the Society for General Internal Medicine in Chicago.*

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**REFERENCES**