

Incorporation of Technology Into Teaching Physical Assessment

Seth P. Brownlee¹, Robb McGory¹, Susan P. Bruce¹, Paul Lecat²

Department of Pharmacy Practice, Northeastern Ohio Universities College of Pharmacy (NEOUCOP)¹,
Rootstown, Ohio 44272

Department of Medicine, Akron General Medical Center², Akron, Ohio 44305

Abstract:

Objectives: Objective, Structured, Clinical Examination (OSCE) is a well accepted training exercise using actors to simulate real life experiences. In reality, actors rarely exhibit physical limitations and pertinent auscultatory findings. To improve recognition of abnormal sounds, a marketed simulation stethoscope was introduced into physical assessment exercises. **Methods:** The pharmacotherapeutic disease sequence is divided into modules reflecting organ systems. A series of lectures / laboratories is scheduled for each organ to cover the pertinent physical findings of the disease. The simulation stethoscope (Ventriloscope, Tallmadge, Ohio) is introduced where appropriate to recreate pulmonary, cardiovascular and abdominal sounds on a live patient or a mannequin. Students are exposed to the stethoscope in a general overview session and will use it with each appropriate module. Students are tested on recognition of sounds through written and practical examination associated with each module. Students will assess the instrument as a component of end of course evaluations. **Results/Outcomes:** All students completed a general introduction to the device and heard a variety of breath, cardiac and bowel sounds. The exposure was met with curiosity and enthusiasm. All students appear to be interested in applying the technology as they progress through the course. **Implications:** Physical examination is becoming more important to the practicing pharmacist. Reading descriptions of sounds or hearing recordings in isolation of the patient may not be as effective of a learning tool as incorporating the sounds in the context of the "whole" patient. Using technology during learning may result in a more competent practitioner.



Background:

The role of pharmacists as providers of medication therapy management (MTM) continues to evolve. In order to optimize therapeutic outcomes for patients, pharmacists will need to be able to perform patient assessment related to medication therapy in order to determine efficacy and tolerability. The Accreditation Council for Pharmacy Education (ACPE) lists patient assessment laboratory as an essential subject for the development of pharmacists.

At NEOUCOP, patient assessment skills are incorporated throughout the curriculum, beginning in the first professional year. Disease state pathophysiology, clinical presentation and therapeutic considerations are integrated in the Pharmacotherapeutics course, within organ system themed modules. The "hands-on" physical assessment skills are taught during workshops in the Pharmacist Patient Care Experiences (PPCE) course to focus on appropriate technique and allow adequate student practice time. Students also participate in OSCE activities, utilizing standardized patients, at the Wasson Center for Clinical Skills during these courses.

Actors used in OSCE activities rarely exhibit all of the required physical limitations and pertinent auscultatory findings. Unfortunately, changes in the healthcare environment, including managed care restrictions on treatments and length of stay, have limited student access to patients with different types of diseases. Lack of patient access can have a negative impact on a learner's education by limiting exposure and practice time.

One way to minimize the impact of limited patient access is through the expanded use of medical simulation technologies. Unique benefits of simulation include providing a safe, risk-free controlled practice environment; expanded practice time; and quick feedback to learners. The Ventriloscope® is one such simulation device that can broadcast normal and abnormal auscultatory findings to a relatively normal looking stethoscope.

The purpose of this project was to introduce a marketed simulation stethoscope into physical assessment exercises to improve student recognition of auscultatory findings.



Figure 1: Ventriloscope®

Methods:

The Ventriloscope® (Figure 1) utilizes a wireless transmitter to send medically appropriate sounds to a training stethoscope. The transmitter holds up to 12 sounds, in MP3 format, on a Secure Digital (SD) card at one time. The device comes with 12 common sounds, but any MP3 file of the instructors choice may be used to simulate pulmonary, cardiac, vascular and abdominal sounds. (See examples below)

Cardiac Card	Pulmonary Card
A1 Aortic Insufficiency, simulated	A1 Crackles, subtle end inspiratory
A2 Aortic Stenosis	A2 Wheezes, inspiratory
A3 Mitral Stenosis, simulated	A3 Inspiration, diminished
A4 Quadruple rhythm, simulated	A4 Expiration, diminished
B1 Summation gallop, simulated	B1 Stridor, inspiratory
B2 Atrial Fibrillation, rate 80	B2 Crackles, early inspiratory
B3 Atrial Fibrillation, rate 120	B3 Crackles, mid inspiratory
B4 Atrial Fibrillation, rate 180	B4 Crackles, early inspiratory w/diminished BS
C1 Aortic Sclerosis	C1 Crackles end expiratory
C2 Mitral Insufficiency, soft	C2 Pleural rub inspiratory
C3 S2 split, narrow	C3 Pleural rub expiratory
C4 S2 split, wide	

Physical assessment lectures and workshops were developed in PPCE to correspond with the Renal and Cardiology modules in Pharmacotherapeutics. Lectures were to be given by a family medicine physician and workshops supported by pharmacy faculty. Following a didactic lecture, students were to be divided into small groups to work through a series of related skills stations. The Ventriloscope® was incorporated into stations to simulate pertinent normal and abnormal auscultatory findings.

A six-step case-based practical examination was developed to assess student understanding, knowledge and skills in the renal module. One step of the exam involved physical assessment: identifying physical findings from photographs and listening to recordings of breath sounds to determine if consistent with a patient's condition.

Outcomes:

Sixty-two (62) P2 students were enrolled in the PPCE course and participated in the physical assessment activities. One physical assessment session was conducted during each of the Renal and Cardiac modules (1 hr. didactic, 3 hr. practice). A brief introduction to the Ventriloscope® was included with the first session. Students were also allowed supervised practice with the Ventriloscope® outside of scheduled class time.

Student response to the Ventriloscope® was positive during the sessions. Most students felt the practice time was beneficial and that the stethoscope contributed to their learning. Only a limited number of students used the device during additional practice time. On course evaluations, 100% of the students agreed that small group sessions were useful and helpful and prepared them for more advanced study in the area.

On the practical exam, 71% of the students correctly answered the question related to identification of the breath sounds.

Limitations: Logistical issues during the practical exam may have altered student performance. The Ventriloscope® requires someone to select the sounds and can only play 12 sounds from one memory card. It also does not function as a true stethoscope, therefore may necessitate the use of other devices to complete necessary teaching.

Implications: Overall, the use of the simulation stethoscope was well received by students and faculty and appeared to improve their understanding of relevant disease states and associated patient symptoms. It was easy to operate and provided reliable sounds. The stethoscope is currently planned to be incorporated into future physical assessment exercises in the pulmonary and gastrointestinal modules. In addition, we are in the process of developing an elective in advanced physical assessment with plans to incorporate additional technology, including the Ventriloscope®.