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# Flipping the Physical Examination: Web-Based Instruction and Live Assessment of Bedside Technique

**Dustyn E. Williams, MD, John W. Thornton, III, MD**

Department of Internal Medicine, Baton Rouge General Medical Center, Baton Rouge, LA
Department of Internal Medicine, Tulane University School of Medicine, New Orleans, LA

**Background:** The skill of physicians teaching the physical examination skill has decreased, with newer faculty underperforming compared to their seniors. Improved methods of instruction with an emphasis on physical examinations are necessary to both improve the quality of medical education and alleviate the teaching burden of faculty physicians.

**Methods:** We developed a curriculum that combines web-based instruction with real-life practice and features individualized feedback.

**Results:** This innovative medical education model should allow the physical examination to be taught and assessed in an effective manner. The model is under study at Baton Rouge General Medical Center.

**Conclusion:** Our goals are to limit faculty burden, maximize student involvement as learners and evaluators, and effectively develop students' critical skills in performing bedside assessments.

***Keywords:*** *Clinical clerkship, education–medical–undergraduate, faculty–medical, physical examination, schools–medical, students–medical*

*Address correspondence to Dustyn E. Williams, MD, Department of Internal Medicine, Baton Rouge General Medical Center, 3700 Florida Blvd., Baton Rouge, LA 70810. Tel: (225) 255-0368. Email: dustyn.williams@brgeneral.org*

## INTRODUCTION

Many practicing physicians identify the physical examination as their trademark,[1] and it is acknowledged as an important tool for developing rapport with patients.[2] Patients desire and expect a close and careful physical examination.[3] Despite the importance of the physical examination, the skills of faculty and trainees have decreased, with newer faculty underperforming compared to their seniors.[4-6] Completion of medical school and residency seem to have no impact on the improvement of these skills[4,6] or reported self-confidence.[7] It is no surprise, then, that academia is calling for improved methods of education with a reemphasis on physical examinations.[8-10]

## TEACHING PHYSICAL EXAMINATION SKILLS

### Challenges

Physicians must be able to use the physical examination to connect with their patients and extract the necessary data to make diagnostic decisions. The physical examination can be a powerful tool, yet few young physicians are appropriately trained in its implementation and interpretation. Fourth-year medical students who selected the Advanced Internal Medicine elective that focused on enhancing physical examination skills were observed performing physical examinations. They were unprepared for even the fundamentals, despite a 99.5% pass rate on the United States Medical Licensing Examination (USMLE) Step 2 Clinical Skills and the Tulane University Objective Structured Clinical Examination (OSCE) module.

The students want bedside training; they recognize its importance, yet few are actually taught the skill.[11] The reasons are likely multifactorial. For one, a great deal of student time is dedicated to learning new diagnostic modalities (ie, interpreting ordered tests). The foundation of our education may also be to blame. Current faculty members are not as skilled in physical examinations as their predecessors and therefore are less likely to teach the skill. The number of students also continues to grow, while the number of faculty to support them largely remains the same. Finally, standardizing the learning process for all students is difficult because the patients who present with pathological findings are variable.

### Simulation and Standardized Patients

Deliberate practice is necessary to develop any skill, including medical skills.[12] With the increasing size of medical schools, the growth of required medical knowledge, and the decline in the number of quality educators who can provide instruction in the physical examination, many medical schools have turned to technology for assistance. Standardized patients (actors who train and evaluate the skills performed) and simulation centers have become crucial to educate the expanding student population. These activities have been successful,[13-15] but success

depends on the synergy of simulation training with deliberate practice and technology coupled with real patients.

While simulation has alleviated some of the time burden of faculty members, reduced costs, and improved success rates, the very nature of this training is against the nature of the skill acquired. The usual method of evaluating physical examinations has been with yes-no checklists.[16,17] This type of evaluation mirrors the standardized testing evaluation—the OSCE or the USMLE Step 2 Clinical Skills—in which it matters more that the student thinks of doing an examination maneuver rather than how well the student actually does it. The value of this type of testing, and therefore of this type of training, has been disputed.[8] Training and evaluation should focus on the actual desired skill: a physical examination performed correctly so that the results can be reliably interpreted.

### Millennial Students and Web-Based Instruction

With the wave of Millennials entering medical school, learning expectations are shifting. Millennial medical students prefer hands-on learning experiences in a noncompetitive environment, behaviorally based and individualized feedback, and the use of technology to manage information.[18] Most Millennials enrolled in medical school see technology as necessary for their education; they welcome it.[19] All new curricula developed must take into account the expectations and limitations of this generation.

In 2008, Criley et al demonstrated that a web-based curriculum with minimal hospitalist engagement can result in improved outcomes in the physical examination for postgraduate year 1 residents and that outcomes were sustained after 1 year.[20]

### Teaching Methods and Curriculum Evaluation

The best method for teaching physical examination skills has not been determined; it is likely a combination of multiple modalities.[21] Merely providing lectures will not improve skills.[22] While increased time spent at the bedside improves clinical skills,[23] modern medical education has insufficient manpower and man-hours to provide such needed bedside teaching.

The means of evaluating a curriculum have yet to be determined. While student satisfaction surveys have been favored for their ease of acquisition, that method of evaluation fails to assess whether an actual skill has been cultivated. Checklists are likewise insufficient.

## CONSTRUCTING A CURRICULUM

To address deficiencies in physical examination training and the widening gap between available faculty and student needs, we are currently studying an innovative method of instruction at Baton Rouge General Medical Center. The goal of the study is to reduce faculty time burden by assessing whether faculty members need to be present for evaluations and whether students can learn a skill through web-based video instruction combined with real-life practice.

We constructed a curriculum that satisfies the following criteria: (1) trains the skill we desire; (2) incorporates technology to build the necessary skills prior to engaging patients; (3) is standardized, scalable, and reproducible; (4) includes a web-based platform but also includes collaboration and focused feedback and is noncompetitive to cater to Millennials' expectations; (5) minimizes faculty time while providing sufficient deliberate practice experience; and (6) includes an evaluation that reflects the end goals of the training: that the physical examination not only be performed but be performed well. If this curriculum model is successful, additional web-based content can be developed to expand on the physical examination skill alone. Once students can perform the skill well, they can learn to interpret the results with greater accuracy.

### Course Structure

Students' perceptions of their own skills and of the utility of the physical examination are assessed at the beginning and the end of the 8-week internal medicine block. The curriculum consists of four 2-hour sessions divided equally throughout the 8-week internal medicine core clerkship. Each 2-hour session has an associated 20-minute video lecture prepared by faculty at Tulane University School of Medicine. Students are asked to review the video as many times as necessary until they are comfortable with the material prior to arriving to the session. During the actual session, the faculty member guides students through the hospital wards, and students perform and interpret physical examinations. Individual feedback in a group setting is given to each student during the 2-hour block.

### Testing and Evaluation

The first testing occurs during orientation in the first week of the block and is recorded on camera. Each student is asked to perform a physical examination focused on a single organ system, independent of peers and faculty, on a hospitalized patient after consent is obtained from that patient.

The second testing occurs during examinations in the final week of the block. The same process is repeated: the student performs an on-camera physical examination focused on a single organ system, independent of peers and faculty, on a hospitalized patient after consent is obtained from that patient.

A faculty member will be designated to identify patients with significant physical examination findings. That faculty member will document the physical examination findings independently of the students. Students will document their physical findings after the patient encounter. Student and faculty findings will be compared for accuracy.

Students watch their own and their peers' physical examination videos during the final week of the block. They provide both peer and self-evaluations of the physical examinations performed at the beginning of the block and at the end of the block.

The students are instructed that their performance is part of their final grade for the block. Their score on this part of the curriculum is based both on the faculty evaluation (how well they actually did) and how closely their evaluations reflect the evaluations of the faculty members (how the scores they gave compare to the scores given by faculty members). This dual scoring explanation is provided to ensure the students attempt to perform at their highest level during the session and to promote accurate peer scoring rather than giving all highest marks in an attempt to assist

their peers. Their performance on peer scoring actually has no impact on their final score; the illusion that their score matters to their final grade is used as a motivational tactic to ensure engagement in the process so that they score each other as accurately as possible.

Faculty members are meant to be excluded from this model of instruction except during the four 2-hour sessions with students. However, for the study, faculty will evaluate student performance. Precourse and postcourse evaluations from faculty and students will be compared to assess whether the physical examination skills have improved and to determine whether peers can evaluate each other as well as faculty. If peers approximate faculty evaluations, future iterations of the curriculum could actually exclude faculty evaluations. The illusion remains, but no grade is actually given, further freeing faculty involvement.

## CONCLUSION

Our innovative method of instruction in physical examination skills is currently under study at Baton Rouge General Medical Center. The goal is to reduce faculty time burden by assessing whether faculty members need to be present for evaluations and whether students can learn a skill through web-based video instruction and real-life practice.

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*Dr Dustyn Williams is the clerkship director in internal medicine for the Tulane University School of Medicine campus in Baton Rouge, LA, and is cofounder of OnlineMedEd, an online video-based medical education provider. Dr John W. Thornton, III, is an internal medicine resident at Baton Rouge Medical Center*.

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