

Recovering Critical Curriculum: Hypothesis-Driven Physical Examination as a Method to Increase Clinical Skills Teaching When Bedside Teaching Remains Limited

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Medical students have re-entered their clinical training in a milieu that is vastly different from the one familiar to us. The coronavirus disease 2019 (COVID-19) pandemic shifted vital curriculum into the virtual setting; however, some aspects of clinical education are immobile because they are rooted to one thing: bedside teaching. Physical examination (PE) is one such example. The atrophy of PE skills leads to the increased cost of care and diagnostic error, making the teaching of these skills indispensable.¹ The need to conserve personal protective equipment and limitations on student–patient interactions decrease learner time at the bedside. The pandemic also placed limitations on radiographic test ordering because of the increased time required to sterilize equipment and rooms. As such, teaching methods that encourage students to rely on PE as part of their diagnostic reasoning are needed. This education must be flexible, balancing the need for time at the bedside with methods that allow some of the teaching to occur away from the patient to reduce potential viral exposure.

Medical students are frequently taught the “head-to-toe” (HTT) examination before clerkships, but clinical teachers lack the time to teach and provide feedback on this method. Experienced clinicians tailor the PE for a specific patient based on their history and clinical presentation. The hypothesis-driven physical examination (HDPE) is a framework that applies the PE in a context-specific, directed approach based on the likelihood of a suspected diagnosis.² This approach places PE teaching within the framework of clinical reasoning, more closely reflecting the PEs performed by practicing physicians. A survey of 106 Liaison Committee on Medical Education–accredited medical schools revealed that 56% of medical schools taught a combination of a comprehensive (HTT) approach combined with a clinical

reasoning approach (HDPE or core + clusters) during the pre-clinical curriculum.³ Assessment of preclinical HDPE curricula has frequently used standardized patients and the extent to which students transfer the educational philosophy and knowledge of clinical reasoning–based PE teaching to practice during their clerkships is unclear. In fact, one study indicated that PE skills were only demonstrated or taught 14.6% of the time on supervised attending rounds.⁴ Clinical teachers play a critical role in bridging the gap between what students learn in their pre-clinical years and what they observe attending physicians perform on rounds. The HDPE provides a strategy to intentionally explain the rationale by which experienced clinicians select and interpret PE maneuvers in a specific patient context. By doing so, the HDPE framework offers clinical educators a significant opportunity to increase the quantity of PE teaching provided to individual medical students. This is vital as we renew our emphasis on bedside clinical skills teaching through the remainder of the pandemic and after.⁵

HPDE

The HPDE is a valuable educational method for teaching PE in stand-alone workshops⁶ and within structured clinical skills curriculum.^{7,8} At our institution, we piloted this approach in a longitudinal integrated clerkship. The HDPE small-group sessions are well described in the literature and contain four components: anticipation, eliciting findings, interpretation, and reflection^{6,7}:

1. Students anticipate and select PE maneuvers that are likely to alter the posttest probability of disease based on their differential diagnosis. The role of the facilitator is to assess preexisting knowledge and guide the student toward selecting examination findings that are likely to affect diagnostic decision making.
2. At the bedside, students perform selected examination findings while engaging with patients. The attending provides feedback on examination technique, bedside manner, and communication.
3. Students interpret normal and abnormal findings within the clinical context to justify a working diagnosis and additional diagnostic testing. The facilitator discusses the evidence base and diagnostic characteristics of the selected examination findings.
4. Finally, debriefing and reflection can ensure that teaching objectives are met and students have time to ask learner-driven questions to guide future learning.

Relevant to the current restrictions in face-to-face encounters, steps 1, 3, and 4 can be accomplished in a small-group format away from direct contact with the patient.

Transitioning HDPE from Workshops to Bedside Rounds

As the climate of medical education evolves during the pandemic, clinical instructors find themselves with a decreased ability to have larger groups of students evaluate real or standardized patients under direct observation. Within these constraints, there is value to applying the HDPE framework during clinical clerkships with smaller groups of learners. In this setting, it is more

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feasible to select one to two individual HDPE components for further discussion. For example, for a patient presenting with edema, a clinical teacher may respond to various elements of the student presentation by focusing on why assessing jugular venous pressure (JVP) is helpful (anticipation), provide feedback on measuring jugular venous pressure (JVP) (eliciting findings), or provide correction of a student's diagnostic reasoning based on PE findings (interpretation). Ideally, a consistent focus on a few key findings in selected patients with high diagnostic yield can reinforce the importance of PE. Teaching the diagnostic importance of anticipated examination findings affects data gathering and reinforces students' need to focus on their examination technique. Reinforcing correct examination technique will improve the accuracy of their findings, and therefore, the ability to incorporate the examination findings into their diagnostic reasoning. If incrementally applied over several patients, then this significantly increases the overall amount of PE teaching students receive during their clerkships.

Discussion

Long-standing tradition has taught us that PE teaching can occur only at the bedside or with a patient. It is a skill, and procedural skills require practice. It also is known that clinicians are better at recognizing abnormal findings when we have a diagnosis or "hypothesis" in mind. Experienced clinicians "co-select" the salient features being assessed along with the diagnostic categories in the differential diagnosis.⁹ This point highlights the importance of the cognitive elements of PE knowledge and illness scripts, in addition to the procedural element. Teaching HDPE offers an alternative strategy that unites these two elements. Direct observation of the PE must occur at the bedside and provides an opportunity for the reinforcement of technical skills. Building a foundation to approach the patient in a hypothesis-driven manner and elaborating upon the context of the examination findings can continue outside the patient's room without unnecessary risk of viral exposure. When applied in this context, students receive immediate feedback: Did their examination findings lead to the correct diagnosis or next best test? Did the selected treatment result in improved examination findings (eg, resolution of wheezing or edema)? These elements of deductive reasoning and reflection are inherent in the structure of HDPE. Structured reflection on whether examination findings were anticipated, elicited, or interpreted correctly is an essential part of applying dedicated practice to a student's development of PE skills.

Even before the COVID-19 pandemic, the barriers in clinical rotations to teaching and reinforcing the HTT examination demanded alternative approaches to PE teaching. Focusing on one to two selected examination findings can occur efficiently on rounds while maintaining the imperatives of protecting students and patients from unnecessary potential viral exposure and preserving personal protective equipment. The focus in HDPE on how to use PE findings to alter the posttest probability of disease and justify additional testing is a crucial skill for students, given the current constraints upon radiographic test ordering, and will serve us well postpandemic in creating physicians who are skilled and cost-conscious diagnosticians. Knowing the components of HDPE can provide clinician educators with an intuitive framework to increase students' PE knowledge and practice. COVID-19 has presented us with challenges to adapt the way we teach, yet many of these adaptations will fade away once the pandemic ends. The need to educate students in this core clinical skill will always remain. HDPE is a technique that has advantages for the clinical teacher seeking to improve PE teaching in a climate that mandates moving learners away from the bedside.

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