The value of teaching at the patient’s bedside has been recognized by generations of clinical teachers and students. In today’s complex and fast-paced medical environment, clinical instructors teach at the bedside less frequently than in the past.1,2 When learning the physical examination, medical students are often taught a series of 100+ anatomy-focused maneuvers.3 The “head-to-toe” approach can help students practice complex maneuvers and develop an awareness of normal findings, but it has limitations in emphasizing the diagnostic relevance of the physical examination.4 Teachers should guide students to transition from a head-to-toe physical examination to one used to support or refute potential diagnoses.

Emphasizing the physical examination’s critical role in clinical reasoning can help to support improved diagnostic skills5,6 and may lead to a cost conscious approach to testing. Numerous recommendations in the Choosing Wisely compendium highlight the critical role of the physical examination in high value care.7 As part of the ongoing Council on Medical Student Education in Pediatrics series on skills used by great clinical teachers, this article introduces the Hypothesis Driven Physical Exam (HDPE).5,6

**CONNECTING THE PHYSICAL EXAMINATION TO CLINICAL REASONING**

An overview of clinical reasoning has been previously outlined in the series of articles from the Council on Medical Student Education in Pediatrics.8 Perhaps the most important concept relevant to the physical examination is the search for, or anticipation of, specific findings identified from the history to confirm or exclude diagnoses. Experienced clinical teachers do this without conscious thought by activating stored medical knowledge. The sum of their learning and experience is bundled in the form of illness scripts: packaged information, which consists of memory points on mechanism, epidemiology, natural history, and clinical presentation of disease. Emphasizing how certain elements of the physical examination link to the “clinical presentation” or to other parts of an illness script is a fundamental element of teaching the HDPE.9

**THE HDPE IN ACTION**

Walking through a case can illustrate ways to emphasize the HDPE approach to clinical diagnosis.

**A CASE**

A 4-year-old boy is brought to clinic with a rash on his lower extremities. He is afebrile with...
normal vital signs and is not ill appearing. The clinic nurse mentions to you the child seems to have petechiae on both legs. The student, preparing to see the patient, tells you she plans to ask questions about recent fever, illness, trauma, exposures, and travel, as well as the child’s immunization history. You quickly guide the student through a differential diagnosis of lower extremity petechiae in a well-appearing, afebrile child by using a HDPE framework. The differential diagnosis, limited for this example, would include immune thrombocytopenic purpura, Henoch-Schonlein purpura, and papular-purpuric gloves and stockings syndrome caused by parvovirus B19. You also caution the student not to miss a potentially devastating diagnosis such as rickettsial disease, meningococcemia, and leukemia. Thus, the key features of the physical examination would be useful to consider (Table 1).

### Table 1: Key Features of the Physical Examination

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Rash Characteristics and Distribution</th>
<th>Other Relevant Physical Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune thrombocytopenic purpura</td>
<td>Soft tissue bruising</td>
<td>Oral mucosal bleeding</td>
</tr>
<tr>
<td></td>
<td>Numerous diffuse petechiae with scattered purpura</td>
<td>Absent splenomegaly</td>
</tr>
<tr>
<td>Henoch-Schonlein purpura</td>
<td>Raised “palpable” petechiae with some coalescence to purpura, often from waist down</td>
<td>Abdominal tenderness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scrotal swelling</td>
</tr>
<tr>
<td>Papular-purpuric gloves and stockings syndrome caused by parvovirus B19</td>
<td>Stocking and glove distribution of petechiae, often with sharp demarcation</td>
<td>Rash involves the genitalia and circumsoral areas</td>
</tr>
<tr>
<td>Rickettsial disease</td>
<td>Acral distribution</td>
<td>Cervical lymphadenopathy</td>
</tr>
<tr>
<td></td>
<td>Macular/macular papular component</td>
<td>Child may appear unwell or have nuchal rigidity</td>
</tr>
<tr>
<td></td>
<td>Palm and sole involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Petechiae may be fewer in number</td>
<td></td>
</tr>
<tr>
<td>Meningococcemia</td>
<td>Petechiae and purpura may be present, distribution often lower extremities if still well appearing</td>
<td>Child may appear unwell or mildly tachycardic</td>
</tr>
<tr>
<td>Leukemia or other hematologic malignancy</td>
<td>Nonspecific distribution of petechiae or purpura</td>
<td>Possible hepatosplenomegaly, mucosal bleeding, or lymphadenopathy</td>
</tr>
</tbody>
</table>

### Reviewing Notes

You read the student’s note on the 4-year-old boy with petechiae. The note includes many nonrelevant findings that do not help support the student’s assessment or plan.

1. Inform the student in advance that the physical examination sections of written notes are reviewed for diagnostic relevance and reasoning.
2. Review the note with specific attention to:
   - The student’s documentation of relevant parts of the examination. For example, a detailed description of the distribution of the petechiae.
   - Negative findings of importance. For example, lack of splenomegaly.

### Promoting and Integrating the HDPE into Daily Practice: Strategies

#### Direct Observation

You elect to join the student and directly observe her assess the patient.
A patient’s assessment and differential diagnosis supported by the physical examination.

3. Guide the student through making connections between physical findings and the diagnostic possibilities.

4. Follow-up with review of subsequent notes for improvement.

Small Group Teaching

You decide to discuss the case of the child with petechiae the following day with multiple students in a case-based learning session. One student presents the patient’s history and then you facilitate a discussion.

1. Ask each student to list a limited number of important features they would seek on the patient’s physical examination. “Based on the patient’s history thus far, and our working differential diagnosis, what are 3 or 4 specific findings you would look for on the patient’s physical exam?” (eg, palpable petechiae, splenomegaly, mucosal lesions, joint swelling).

2. Guide the students further: “How would each physical finding, or lack of the finding, support your diagnostic hypotheses?”

Additional Learning Exercises

Emphasizing the physical examination’s role in clinical reasoning can also be accomplished by assigning students brief learning exercises before or after a patient encounter or clinic session. Examples of such exercises include script sorting and the use of visual Venn diagrams. These exercises can be completed by the student during a prescribed amount of time (overnight, before the next clinical session or patient, etc.) and can then be reviewed with a preceptor.

Script Sorting

Script sorting allows students to assign a weight or priority to certain competing diagnoses on the basis of elements of the history or, as in this example, the physical examination of a child with a red eye. The teacher and/or the student create the grid for the student to complete (Table 2).

Visual Venn Diagrams

A visual representation of the diagnostic possibilities can be an effective teaching method. Students are asked to contribute common or shared features (in areas where circles overlap) and should prioritize eliciting findings that are specific or differentiating (nonoverlapping areas). An example is presented for abdominal pain (Fig 1).

CONCLUSIONS

The HDPE can be used on a daily basis and need not be a time-intensive teaching strategy. Learning the physical examination in a rote head-to-toe manner may be an effective early learning strategy for students, but the physical examination’s clinical utility will be increased if driven by diagnostic hypotheses. The HDPE can be a stimulus to return to bedside teaching. Furthermore, the great clinical teacher can emphasize the role of the physical examination, putting focus on the important concepts of clinical reasoning and high value care.
### Updated Information & Services

Including high resolution figures, can be found at:
/content/early/2016/02/21/peds.2015-4511.full.html

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Pediatrics; originally published online February 23, 2016;
DOI: 10.1542/peds.2015-4511

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