Impact of Explicit, Implicit, and Extra Curricula on Students’ Learning of the History and Physical Examination


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Abstract

**Purpose:** History taking and physical examination (H&P) in a patient-centered manner is central to the practice of medicine. This qualitative case study explored the relative influences of explicit, implicit, and extra curricula on medical students’ learning of the H&P.

**Methods:** The authors conducted semi-structured interviews with 15 fourth-year medical students at Columbia University from September 2015 to January 2016. The authors coded interview transcripts in an iterative process, and clustered coded data into emerging themes to elucidate how curricula shaped students’ learning of the H&P.

**Results:** Students perceived misalignment between curricula, with two predominant patterns: lesser emphasis on patient-centered H&P and greater emphasis on hypothesis-driven H&P in implicit versus explicit curricula. Role models, patient interactions, and clinical context were important influences on students’ learning of patient-centered H&P. Ward rounds, role models, and feedback were particularly impactful for students’ learning of hypothesis-driven H&P. Students reported minimal learning from the extra curriculum.

**Conclusions:** Medical students perceived a misalignment in learning the H&P between the explicit and implicit curricula, with the former being primarily where students developed patient-centeredness in conducting H&Ps and the latter being where students learned to conduct hypothesis-driven H&P. Efforts to align curricula could strengthen H&P training.

**Keywords:** Implicit Curriculum; Explicit Curriculum; History Taking and Physical Examination; Patient-Centeredness
Introduction

Medical educators have expressed concern for deficiencies in the knowledge and skills of history taking and physical examination (H&P) among medical students, noting inadequacies in H&P technique, interpretation of findings, and application of clinical reasoning (Feddock, 2007; Mangione, Nieman, Gracely, & Kaye, 1993; Peitzman & Cuddy, 2015; Mavis et al., 2001). They also express concern for deterioration in attitudes germane to patient-centeredness as students progress through medical school (Feudtner, Christakis, & Christakis, 1994; Haidet et al., 2002; Neumann et al., 2011; Pfeiffer, Madray, Ardolino, & Willms, 1998). Despite these concerns, competent performance of the H&P in a patient-centered manner continues to be valued by the medical profession, as evidenced by the inclusion of the H&P in the AAMC's Core Entrustable Professional Activities for Entering Residency (EPAs) (Association of American Medical Colleges [AAMC], 2014). Specifically, EPA 1 outlines 12 functions that describe the knowledge, skills, and attitudes required for competent, patient-centered performance of an H&P.

Medical educators recognize that learning occurs both within and beyond the explicit (formal) curriculum. Students are explicitly taught how to take a history and how to perform a physical examination in medical school. However, they are also socialized into contexts throughout medical school where "other-than-explicit" curricula shape the development of knowledge, skills, and attitudes related to the H&P (Hafferty, Gaufberg, & O'Donnell, 2015). Yet little has been reported about what students learn about the H&P outside of the explicit curriculum.

Informed by previous research at our medical school (Balmer, Hall, Fink, & Richards, 2013; Balmer et al., 2015) and appreciating the different contexts in which medical students learn, we ask, "What do medical students learn about the H&P in the explicit and in the ‘other-than-explicit’ curricula, namely the implicit and extra curricula?" We defined the explicit curriculum as formal learning activities espoused by the medical school (e.g. learning from course materials and lectures). We defined the implicit curriculum as informal learning that occurred in medical school but was not part of the explicit curriculum (e.g. learning through observation of role models). Building on the seminal work of Eisner (1985), our definition of the “implicit” curriculum includes what Hafferty (1998) and other researchers have defined as both "informal" and "hidden" curricula. Other researchers have likewise grouped "informal" and "hidden" curricula together, as research participants may have difficulty distinguishing between these curricula due to their interrelatedness (Wear & Skillicorn, 2009). Finally, recognizing that learning occurs outside of the confines of medical school, we defined the extra curriculum as optional learning opportunities outside of those required for the completion of medical school (e.g. learning in student-run medical clinics).

Methods

Methodology

We conducted a qualitative case study with medical students at Columbia University's College of Physicians and Surgeons (P&S). Consistent with our constructivist research paradigm, we chose to investigate a contemporary phenomenon – i.e., learning the H&P in implicit, explicit and extra curricula – within a real-life, local and specific context (Creswell, 2013; Merriam, 1998). Constructivism, as an educational theory, assumes that individuals generate meaning and knowledge through interactions with the world around them (Brooks, 2013). Similarly, constructivism, as a research paradigm, assumes that individuals, including researchers and research participants, build the realities in which they participate (Charmaz, 2006). We recognized that our experiences and assumptions influenced our interpretations of the data we sought to collect. At the time of the study, MT was a fourth-year medical student at P&S. DG was a course director for the P&S doctoring course, with a focus on teaching the H&P.
DB had experience with the research framework and with qualitative case study methodology (Balmer, Hall, Fink, & Richards, 2013; Balmer et al., 2015).

**Context**

Training at P&S consists of a 16-month pre-clerkship phase, a 12-month clerkship phase, and a 14-month phase of electives (Table 1). Students are offered early clinical exposure and multiple health-related extra-curricular activities.

This qualitative case study was reviewed and approved by the Columbia University Medical Center Institutional Review Board (IRB). MT obtained verbal informed consent immediately prior to each interview.

**Participants**

In September 2015, we sent a single email to all fourth-year medical students in the graduating class of 2016, inviting them to participate in a study about their learning of the H&P. We purposefully limited our study to graduating students because they could reflect on all phases of medical school. Of the 166 eligible students, 15 responded to the email; all respondents were interviewed over the next five months (September 2015-January 2016).

**Study design**

We designed an interview guide that would facilitate an in-depth exploration of students’ learning of the H&P. The guide consisted of three parts.

First, we asked students to read aloud our definitions of explicit, implicit, and extra curricula. We also asked them to read aloud the 12 H&P functions, taken verbatim from the AAMC’s Core EPA Curriculum Developers’ Guide (AAMC, 2014). Then, we asked students to confirm their understanding of the definitions and functions.

Second, we instructed students to "think aloud" while they distributed a total of 100 points to each of the 12 H&P functions according to the proportion of learning that occurred across the explicit, implicit, and extra curricula. In so doing, students gave voice to their judgments about contexts in which they constructed knowledge about the H&P. We chose to use a total of 100 points because students could easily conceive of points as a percentage.

Third, we asked students to respond to open-ended questions about how current H&P learning could be enhanced. We modified these questions iteratively based on insights gained from initial interviews. For example, we asked students how resident and attending role models influenced their learning of the H&P, after role modeling was found to be a prominent emerging category.

MT conducted and audio-recorded one-on-one interviews in a private study room in the medical school from September 2015 to January 2016. Interviews ranged from 60 to 100 minutes. MT also transcribed all interviews verbatim, removing personal identifiers at the time of transcription. We managed interview transcripts in Dedoose.com (Los Angeles, CA: SocioCultural Research Consultants LLC), and numerical data (i.e., point assignments) in Microsoft Excel (2010).
Data analysis

We analyzed data using constant comparison, with data analysis and collection occurring in an iterative fashion (Charmaz, 2006). MT led the analysis and created inductive codes (i.e., words that act as labels for important concepts) from repeated language and prominent ideas in the first five interviews, initially using incident-to-incident coding. Preliminary codes focused on people and events in the learning environment (e.g. role modeling of residents and rounding with attendings). MT, DG, and DB discussed preliminary codes and revised the list of codes to include other contextual influences (e.g. pressures due to limited time) as well as relationships between curricula (e.g. learned in explicit curriculum and de-emphasized in implicit curriculum).

As MT moved through the interviews, she had numerous face-to-face meetings with DG to discuss emergent codes, review primary transcripts, and come to agreement on the final code list, which MT then applied to all transcripts using focused coding. MT and DG continued face-to-face meetings for the purpose of clustering codes into several conceptual categories (e.g. motivating factors that supported H&P learning) and ultimately into two overarching themes. To support a richer understanding of the data, MT and DG consulted DB at pivotal points in the final analysis to critique the code list, conceptual categories, and overall process of analysis. Given the volume of data derived from the interviews and consistency in the two overarching themes within the data, additional interviews were not pursued.

Consistent with the qualitative nature of our study, we limited quantitative analysis to descriptive statistics. The purpose of the quantitative data was to provide a general, graphical depiction of curricular interplay. We calculated median and range of points assigned to explicit, implicit, and extra curricula for each of the 12 H&P functions.

Results

Fifteen students in the class of 2016 participated (10 male, 5 female). Students were applying for a variety of specialties: internal medicine (4), general surgery (3), pediatrics (3), surgical subspecialties (2), anesthesia (2), and obstetrics/gynecology (1).

Median values of quantitative data are shown in Figure 1; ranges (not shown) tended to be wide, indicating variation in contexts in which students constructed knowledge of H&P. Students primarily reported learning the H&P in the explicit and implicit curricula (Figure 1). Although students in this study did not report substantive learning about the H&P in the extra curriculum, there were a few exceptions. One student described a substantial amount of learning of most H&P functions in a student-run clinic. About half of students described some learning from personal life experiences of three functions related to patient-centeredness (Figure 1).

Some people seem to care more about cultural stuff, just from whatever experiences they had prior. Some people just seem to never care about psychosocial issues at all. So I guess it comes from volunteering, whatever friends you had, whatever community service, other cultural experiences you had coming into med school and were able to continue or pick up in med school.

Learning the H&P in the explicit and implicit curricula was largely associated with phase of training. The explicit curriculum was predominant in the pre-clerkship period, whereas the implicit curriculum was predominant in the clerkship and elective periods. Beyond the numbers, analysis of the transcripts revealed two overarching themes, both stemming from misalignment of implicit and explicit curricula.
**Patient-centeredness: explicitly learned, implicitly "unlearned"**

For this report, we use the term patient-centeredness to include knowledge, skills, and attitudes that facilitate a partnership between practitioners and patients, and that ensure patients’ wants, needs, and preferences are respected (Committee on Quality of Health Care in America, Institute of Medicine, 2001). We identified four H&P functions as particularly relevant to patient-centeredness: (2) patient-centered interview, (5) cultural factors, (8) humility and bias, and (12) patient-centered physical (Table 2).

Quantitative data showed a considerable amount of learning of patient-centeredness in both implicit and explicit curricula (Figure 1). However, qualitative data from the interviews revealed a misalignment: students’ learning in the explicit curriculum was highly supportive of patient-centered H&P, but that learning was frequently challenged in the implicit curriculum. Influences on learning in the implicit curriculum – in order of frequency discussed by students in relation to patient-centeredness – included observations of role models, interactions with patients, and the clinical context. Students described that learning from interactions with patients aligned with learning in the explicit curriculum, whereas learning from role models was more variable. Students described a clinical context that often opposed what they had learned about patient-centered H&Ps from the explicit curriculum.

**Role models**

All students talked about the impact of role models on learning of patient-centered H&P. Many students described learning valuable lessons from both "good" and "bad" role models.

For instance, one student described a role model examining patients in the ICU in a way that supported learning of patient-centered H&P.

> *This resident would go in, he would say, 'Hi, good morning Mr. or Mrs. So-and-so.' Even though they probably couldn’t hear them. And do the exam, 'Ok, now we're going to do this, now we're going to do that.' […] And the patients wouldn’t respond. Some of them maybe could have heard him. And even if they couldn’t, still he was being so respectful to the patients. So I started doing that.*

In contrast, one student described watching residents perform H&Ps when patients were being admitted to the wards.

> *I have memories of people yelling loudly in English to people who clearly only spoke Spanish. And I think that's like the opposite of cultural sensitivity. The idea of like, "Oh it's fine. All we need to do is yell, and we don't need a translator."*

**Patient Interactions**

Students often stressed the importance of their interactions with patients, typically reporting that these interactions supported their learning of the patient-centered H&P. "A big part of it is watching the guy’s face when you ask particular types of questions, and sort of learning from your experience with particular patients." Overwhelmingly, students perceived that implicit learning through patient interactions was aligned with explicit learning of patient
centeredness. One student described, "I think it just comes from having more patient interaction – where you see these things they taught us in the explicit curriculum that sounded important really are important."

Clinical Context

Students often described a context during clerkships that seemed to neglect performance of patient-centered H&Ps. One student stated, "[Culturally sensitive interviewing] is just not a thing we stop and talk about." Another student discussed feeling frustrated by the following scenario on inpatient rounds: "We would all just go in the room, in a group of 20 people, and poke at people and not tell them what was going on and just leave."

Many students reported that situational pressures – namely workload and time constraints – tended to work in opposition to patient-centeredness and create a context where conducting an H&P was "really rushed." Students spoke about how these same situational pressures influenced what they learned from role models.

People I found [in clinical settings] were usually just [unkind] to patients when they were really rushed. And that's a reasonable human response, even if it's not the right thing to do.

Hypothesis-driven H&P: learned predominantly in implicit curriculum

For the purpose of this report, we use the term 'hypothesis-driven' to include skills of gathering information in an iterative process during the H&P, using clinical problem solving and hypothesis testing (Kassirer, 1983). We identified four H&P functions as particularly relevant to performing hypothesis-driven H&P: (3) pertinent history elements, (4) focused histories, (7) clinical reasoning, and (10) focused physicals (see Table 2).

Quantitative data showed a considerable amount of learning of these functions in the implicit curriculum, with less in the explicit curriculum (Figure 1). Qualitative data substantiated these findings, and students described feeling frustrated by this curricular misalignment. In the explicit curriculum, students described practicing the H&P "by rote memorization" but not learning how to incorporate hypothesis testing. When students were asked what they would most want to change about the curriculum, the majority responded that they would have liked more explicit learning of hypothesis-driven H&Ps. Learning of hypothesis-driven H&P in the implicit curriculum was most strongly influenced by discussions on rounds, observations of role models, and direct feedback about performance. These factors are listed in order of frequency mentioned by students while discussing functions related to hypothesis-driven H&P.

Ward rounds

Most students reported learning hypothesis-driven H&Ps when they participated in discussions of patients on ward rounds. For example, students described learning to identify relevant H&P elements. "[You go] on rounds and you get asked certain questions by attendings, and you're like, 'Oh wait, I should have done that.' And you learn it for the next time." Another student stated, "I think the only way you can develop clinical reasoning is by being forced to do it, and have your plan discussed, and changed by others. On rounds usually."
Role models

Students often reported learning hypothesis-driven H&P skills by observing efficient resident and attending role models. A student described “watching residents… who were taking 1/100th the amount of time that we took to do an exam, to accomplish the same goals, and get the same information.”

However, in contrast to what they had learned in the explicit curriculum, several students reported that role models sometimes under-emphasized the utility of the H&P as a part of the diagnostic process. Students occasionally described observing residents whose clinical reasoning process did not incorporate the H&P and instead relied heavily on the electronic medical record, laboratory testing, and diagnostic imaging for data gathering.

By the time I was a Sub-[Intern], I really felt like I was functioning at the level of a resident. Which meant that I was like, ‘OK let me admit this patient. Let me look at their previous notes. Let me look at their labs first. Oh look, they already had a CT done. Let me scan this CT chest. Oh it’s probably pneumonia.’ And then I’d go down there. That helped me in itself do a focused history and physical, because I already had a diagnosis in my head before I met the patient.

Feedback

Students reported that direct feedback was highly influential for learning of hypothesis-driven H&P. Many students described receiving feedback on write-ups and presentations about discriminating pertinent features of an H&P.

It isn’t until someone takes a look at what you’ve compiled and says, ‘This is not necessary, this is good, these are other things that we should look for.’ I feel like it’s not until that moment that we really learn.

Several students, however, described the negative impact of receiving non-constructive feedback. One student discussed receiving such feedback about H&P performance from a pre-clinical preceptor.

He was saying, you know, you will never be a good doctor. I think that really hindered my learning because I didn’t want to be with him again. And that was a time when I was supposed to be practicing my skills.

Discussion

Using an explicit, implicit, and extra curricula framework enabled us to explore the whole of the student lived experience in medical school as it relates to learning the knowledge, skills, and attitudes necessary for competent, patient-centered performance of H&Ps. Based on the perspective of students in our qualitative case study, considerable learning about the H&P occurs in the implicit and explicit curriculum, but not the extra curriculum, and these curricula do not necessarily align with one another. As others have reported, misalignment between the explicit and ‘other-than-explicit’ curricula may create a challenging learning environment typified by confusion and frustration for students (Hafferty, Gaufberg, & O'Donnell, 2015; O'Donnell, 2014).

Our study highlights two areas of misalignment with regard to learning H&P. First, students reported learning patient-centeredness in the explicit curriculum, yet they felt that learning was often not reinforced in the implicit curriculum. Second, students reported gaining competence in hypothesis-driven H&P primarily in the implicit curriculum during clerkships without much attention to hypothesis-driven H&P in the explicit curriculum. A third
area of concern, one that was somewhat outside of the original scope of this study, was learning to abandon the H&P as a part of the diagnostic process and instead favoring information from labs, imaging studies, and electronic chart review. This phenomenon has been described by other medical educators (Drazen, 2016; Verghese, 2008), and further raises concern for both loss of patient-centeredness and loss of incorporation of hypothesis-driven H&P into the clinical reasoning process.

A recent scoping review pointed to a link between the hidden curriculum and loss of attributes related to patient-centeredness (Martimianakis et al, 2015). However, our findings suggest that learning of patient-centered H&Ps was not entirely subject to the perceived negative influences of the clinical environment. Indeed, students described role models who transcended contextual pressures and modeled patient-centered H&Ps. Additionally, students described learning "what not to do" from role models who did not model patient-centered behavior. While some role models stood out as exemplary, our findings support that efforts on a systems level rather than an individual level may be necessary to promote humanism and patient-centeredness (Martimianakis & Hafferty, 2016). Students in our study identified specific aspects of the clinical context – time constraints and workload - as barriers to the practice of patient-centered H&Ps. Efforts to reform these systemic issues may be difficult but also essential to promoting learning of patient-centered H&P in the implicit curriculum.

Consistent with previous research (Wilkerson & Lee, 2003), students in our study reported that learning how to perform complete H&Ps "by rote memorization" in the explicit curriculum did not adequately prepare them to perform focused H&Ps guided by clinical reasoning on clinical rotations. Medical educators have suggested moving from the traditional head-to-toe teaching model to the hypothesis-driven H&P, as this latter method better prepares students to use H&Ps diagnostically in the clinical setting (Alexander, 2008; Benbassat, Baumal, Heyman, & Brezis, 2005). Our findings suggest that aligning skills taught in the explicit curriculum with those expected in the implicit curriculum may better prepare students to practice hypothesis-driven H&Ps during clerkships. Additionally, within the implicit curriculum, interventions aimed at ward rounds and feedback sessions may provide role models with opportunities to enhance learning of hypothesis-driven H&Ps for medical students.

Our finding that students attributed a small amount learning of H&P to the extra curriculum contrasts with previous study by Balmer et al (2013) that showed a more significant amount of learning about H&P in the extra curriculum. Our more granular look at learning of the H&P may better reflect the limited learning of H&P in the extra curriculum; alternatively, it is possible that this finding was driven by a sample did not include many students who participated in student-run clinics.

We acknowledge limitations to our qualitative case study. By defining P&S as a single case, we did not include students from other medical schools with different curricula. Although we purposefully chose to speak to fourth-year students, ours was a convenience sample. In general, responses may reflect a subset of students interested in education. Furthermore, responses may be subject to recency bias. That said, we were interested in how students generated meaning from their learning experiences at the end of medical school, a point in training that seems ripe for reflection.

**Conclusions**

We used the framework of explicit, implicit, and extra curricula to explore students' perceptions of learning the H&P as delineated by the functions of EPA1. By increasing our understanding of what students learn about the H&P across curricula, our work may inform educational efforts to strengthen clinical skills training by aligning medical school curricula. Our findings support that systems issues, such as heavy workload, could be targeted in order to
improve learning of patient-centered H&P in the implicit curriculum. Additionally, increasing learning opportunities related to the hypothesis-driven H&P in the explicit curriculum may allow students to feel more comfortable practicing and building on these skills in the clinical environment.

Disclosures

This study was approved by the Columbia University Medical Center Institutional Review Board on September 5, 2015. The opinions expressed in this article are those of the authors alone and do not reflect the views of their respective institutions.

Take Home Messages

• Aligning explicit and implicit curricula can help to improve medical students' learning of the history and physical examination.

• Explicit learning of hypothesis-driven H&P can help medical students more comfortably practice hypothesis-driven H&P in the clinical setting.

• Efforts to reform systemic issues, such as heavy workload and time constraints, would help to promote learning of patient-centered H&Ps for medical students.

Notes On Contributors

Mollie B. Tucker, MD, is a resident physician in internal medicine at Yale New Haven Hospital. She studied medicine at Columbia University College of Physicians and Surgeons. Her interests include clinical skills education and humanism in medicine.

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Appendices
### Table 1: P&S Curriculum Overview

<table>
<thead>
<tr>
<th>Category (Name at P&amp;S)</th>
<th>Pre-clerkship (Fundamentals)</th>
<th>Clerkship (Major Clinical Year)</th>
<th>Electives (Differentiation and Integration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of time</td>
<td>16 months</td>
<td>12 months</td>
<td>14 months</td>
</tr>
<tr>
<td>Learning activities</td>
<td>Classroom didactics</td>
<td>Core clinical rotations</td>
<td>• 5+ months of clinical electives</td>
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<tr>
<td></td>
<td>Small group learning</td>
<td>• Internal medicine</td>
<td>• 1+ months of classroom electives</td>
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<tr>
<td></td>
<td>Supervised clinical</td>
<td>• General surgery and</td>
<td>• 4 months of a scholarly research project</td>
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<td></td>
<td>experience aimed at</td>
<td>subspecialties</td>
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<td></td>
<td>building H&amp;P skills with</td>
<td>• Pediatrics</td>
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<td></td>
<td>patients</td>
<td>• Obstetrics and gynecology</td>
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<td>• Psychiatry</td>
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<td>• Primary care</td>
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<td>• Neurology</td>
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</tbody>
</table>

### Table 2: Functions from EPA1 with corresponding numbers and abbreviated definitions

<table>
<thead>
<tr>
<th>Function number and abbreviated name</th>
<th>Full wording of function (Taken verbatim from <a href="https://doi.org/10.15694/mep.2017.000136">EPA1</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Complete history</td>
<td>Obtain a complete and accurate history in an organized fashion.</td>
</tr>
<tr>
<td>2. Patient-centered interview</td>
<td>Demonstrate patient-centered interview skills (attentive to patient verbal and nonverbal cues, patient/family culture, social determinants of health, need for interpretive or adaptive services; seeks conceptual context of illness; approaches the patient holistically and demonstrates active listening skills).</td>
</tr>
<tr>
<td>3. Pertinent history elements</td>
<td>Identify pertinent history elements in common presenting situations, symptoms, complaints, and disease states (acute and chronic).</td>
</tr>
<tr>
<td>4. Focused history</td>
<td>Obtain focused, pertinent histories in urgent, emergent, and consultative settings.</td>
</tr>
<tr>
<td>5. Cultural factors</td>
<td>Consider cultural and other factors that may influence the patient's description of symptoms.</td>
</tr>
<tr>
<td>6. Alternate sources</td>
<td>Identify and use alternate sources of information to obtain history when needed, including but not limited to family members, primary care physicians, living facility, and pharmacy staff.</td>
</tr>
<tr>
<td>7. Clinical reasoning</td>
<td>Demonstrate clinical reasoning in gathering focused information relevant to a patient’s case.</td>
</tr>
<tr>
<td>8. Humility and bias</td>
<td>Demonstrate cultural awareness and humility (for example, by recognizing that one’s own cultural models may be different from others) and awareness of potential for bias (conscious and unconscious) in interactions with patients.</td>
</tr>
<tr>
<td>9. Complete physical</td>
<td>Perform a complete and accurate physical exam in logical and fluid sequence.</td>
</tr>
<tr>
<td>10. Focused physical</td>
<td>Perform a clinically relevant, focused physical exam pertinent to the setting and purpose of the patient visit.</td>
</tr>
<tr>
<td>11. Abnormal findings</td>
<td>Identify, describe, and document abnormal physical exam findings.</td>
</tr>
<tr>
<td>12. Patient-centered physical</td>
<td>Demonstrate patient-centered examination techniques that reflect respect for patient privacy, comfort, and safety (e.g., explaining physical exam maneuvers, telling the patient what one is doing at each step, keeping patient covered during the examination).</td>
</tr>
</tbody>
</table>
Declarations

The author has declared the conflicts of interest below.

This study was funded in part by the Scholarly Projects Program at Columbia University College of Physicians and Surgeons. The authors report no other declarations of interest.

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