THE PEDIATRICS MILESTONE PROJECT

A Joint Initiative of the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Pediatrics (ABP)

January 2012- (updated 11/25/14)
To the Medical Education Community:

The Pediatrics Milestone Working Group has written this letter to accompany the attached first iteration of our work. We are anxious to share our work with you, but at the same time feel compelled to point out that what you are about to read is a work in progress, a first iteration with many more to come. The Advisory Board* was invaluable in providing guidance, support and wisdom. We gratefully acknowledge the time and effort that they contributed to this effort. A special thank you goes to Lisa Johnson who helped us to get our work into an organized document. We also want to acknowledge Beth Fine, a medical editor at the American Board of Pediatrics for the long hours that she spent editing the grammar and style of this work to enhance its readability and clarity.

While the Pediatrics Milestone Working Group has spent countless hours searching the literature to inform our process of piecing together the developmental progression of knowledge, skills and attitudes for each sub-competency and then translating this background information into milestones, we recognized the need to further develop this work with the assistance of experts. We gratefully acknowledge the input of these experts (see below); their insights strengthened our work and enhanced its credibility. For the sake of our learners and our patients we are committed to “getting this right” in the hope that we will make assessment of and feedback to individual trainees more meaningful. In turn, we anticipate that more meaningful aggregate data about trainees will improve the ability to evaluate and improve our programs.

The Working Group is counting on the Pediatrics community to remain involved and invested in the work that is to come. We appreciate the thoughtful feedback that we have received from the membership of the Association of Pediatric Program Directors (APPD) along the way, specifically as it relates to making the sub-competencies of personal and professional development explicit. It is essential that we now review and critique this product, to learn what works and what doesn’t. The leadership of the APPD is poised to help set up collaborative networks, through APPD’s Longitudinal Educational Assessment Research Network (LEARN), to organize and institute rigorous processes to engage the community in studying these milestones. The Initiative for Innovation in Pediatric Education and APPD LEARN will work collaboratively to develop projects that will allow APPD members to participate in studying educational innovations, the Pediatric Milestones presenting rich opportunities for such an adventure! Ideally we will get all pediatric residency programs participating in at least one research collaborative. A formal and organized process will allow us to advance with efficiency and efficacy in our improvement efforts and ultimately achieve our goal of linking educational and patient care outcomes. Realizing that GME is one piece of the continuum, we look forward to partnering with our colleagues who focus on undergraduate medical education, fellowship training, and maintenance of certification to study milestones in these contexts.

We hope that those outside the specialty of pediatrics, who read this document, will find it helpful as you continue conversations about how to make competency-based education and assessment more meaningful in the context of your specialty. More specifically, we hope you will find applicability to your specialty in the core competencies of professionalism, interpersonal and communication skills, practice-based learning and improvement and systems-based practice. Should you choose to build on what we have developed, we will learn from your adaptations of this work as well as from your creative thinking about how to address milestones in your own specialty. This letter is intended to be the beginning of that ongoing dialogue.

Sincerely,

The Pediatrics Milestone Working Group**
We acknowledge and offer a special note of thanks to the ABP Foundation for supporting the printing and dissemination of this work.

**ORIGINAL VERSION WITH NEW FORMATTING RECOMMENDATIONS FROM ACGME**

1. PBLI #6 moved under MK #2 so that we have at least one series of reporting milestones under each domain
2. Original 5 elements of professionalism competency in the TOC combined into 4 to align with the 4 headings for milestones in the professionalism chapter
The Working Group wishes to acknowledge and thank the content experts who reviewed sections of this document for their willingness to share their time and expertise.

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*Added by the pediatrics community; underlined phrases also added by the pediatrics community
A. COMPETENCY: PATIENT CARE

1. **Gather essential and accurate information about the patient**

Primary Author: Daniel Schumacher, MD

**Background**

**Early Development of Information-Gathering Skills**

In the early stages of clinical reasoning, learners must rely upon their knowledge of basic pathophysiology and principles learned in their preclinical training when they gather information about patients. This knowledge allows them to use analytic reasoning to generate mental maps, which are representations of how things are related and linked to one another. In this situation, mental maps represent the way in which components of a patient’s history and physical examination are linked to one another as well as to the possible diagnoses. With limited clinical experience, these mental maps can be both overly extensive and inappropriately convoluted, including information of no or limited clinical relevance to the patient’s current presentation. At the same time, the lack of clinical experience may result in neglecting important features of the history and examination. The end result is often limited connections between the pieces of information gathered.

**Intermediate Development of Information-Gathering Skills**

As they gain exposure to clinical practice, learners begin to link signs and symptoms of their current patient to patterns of signs and symptoms they have seen in previous patients. With increasing clinical experience, learners use these prior clinical encounters to help them filter and group the information gathered into more specific diagnostic categories and then gradually advance to creating illness scripts. These scripts are based on recognizing patterns of signs and symptoms seen in previous clinical encounters and can be thought of as mental scaffolding representing the characteristic features of specific illnesses. Illness scripts are unique to each physician and become more robust with advancing clinical experience. As an example, the early development of an illness script for group A streptococcal pharyngitis may include fever, throat pain, and oropharyngeal erythema with exudates on examination. With further clinical experience, this illness script may advance to include the additional features of headache, abdominal pain, malaise, tender anterior cervical lymphadenopathy, and palatal petechiae. With still further experience, this illness script may advance to include features such as Pastia’s lines and circumoral pallor. As illustrated in this example, illness scripts become more robust and discriminating as they develop, allowing the physician to become more facile and exacting in gathering essential and accurate information about his patients.

**Advanced Development of Information-Gathering Skills**

As clinical expertise continues to develop, practitioners move from using prototypical illness scripts to creating more robust and elaborate scripts that incorporate specific characteristics of individual patients to form “instance” scripts. Recognition and use of these subtle variations in disease and patient characteristics help to discriminate features of similar illnesses and enhance the precision and accuracy with which clinical information is gathered, thereby avoiding premature closure in the development of a differential diagnosis. In the example of pharyngitis, this clinician would be open to the unexpected and may consider the possibility of diphtheria, even though many clinical characteristics overlap with group A streptococcal pharyngitis (throat pain, fever, headache, malaise, nausea, and cervical lymphadenopathy).

In the progression of information gathering, it is important not to misperceive pattern recognition as a higher order cognitive process than analytic reasoning. Rather, the increased use of pattern recognition with advancing clinical experience simply represents the natural progression of information-gathering skills.
However, even the master clinician engages in analytic reasoning when presented with rare cases not previously encountered in practice.

References


Developmental Milestones

- Either gathers too little information or exhaustively gathers information following a template regardless of the patient's chief complaint, with each piece of information gathered seeming as important as the next. Recalls clinical information in the order elicited, with the ability to gather, filter, prioritize, and connect pieces of information being limited by and dependent upon analytic reasoning through basic pathophysiology alone.
- Clinical experience allows linkage of signs and symptoms of a current patient to those encountered in previous patients. Still relies primarily on analytic reasoning through basic pathophysiology to gather information, but the ability to link current findings to prior clinical encounters allows information to be filtered, prioritized, and synthesized into pertinent positives and negatives as well as broad diagnostic categories.
- Advanced development of pattern recognition leads to the creation of illness scripts, which allow information to be gathered while it is simultaneously filtered, prioritized, and synthesized into specific diagnostic considerations. Data gathering is driven by real-time development of a differential diagnosis early in the information-gathering process.
- Well-developed illness scripts allow essential and accurate information to be gathered and precise diagnoses to be reached with ease and efficiency when presented with most pediatric problems, but still relies on analytic reasoning through basic pathophysiology to gather information when presented with complex or uncommon problems.
- Robust illness scripts and instance scripts (where the specific features of individual patients are remembered and used in future clinical reasoning) lead to unconscious gathering of essential and accurate information in a targeted and efficient manner when presented with all but the most complex or rare clinical problems. These illness and instance scripts are robust enough to enable discrimination among diagnoses with subtle distinguishing features.
2. **Organize and prioritize responsibilities to provide patient care that is safe, effective, and efficient**

Primary Author: Daniel Schumacher, MD

**Background**

In the 2001 report, *Crossing the Quality Chasm: A New Health System for the 21st Century*, the Institute of Medicine (IOM) describes "the prevailing model of health care delivery [as] complicated, comprising layers of processes and handoffs that patients and families find bewildering and clinicians view as wasteful...and fail[ing] to build on the strengths of all health professionals involved to ensure that care is timely, safe, and appropriate." The IOM described six aims for improvement: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equality in patient care. With this in mind, this milestone for organizing and prioritizing responsibilities to provide patient care that is *safe, effective, and efficient* finds important relationships with several other milestones in all competency domains. Given the broad and deep relationships to other milestones that address the provision of patient care that is safe, effective, and efficient (second half of the current milestone), this milestone will focus on the skills needed for *organization and prioritization* of this care (first half of the current milestone) from the perspective of how these skills can lead to care that is safe, effective, and efficient.

**Time Management**

When considering the organization and prioritization of responsibilities to provide patient care, time management is an important element of the foundation. Covey's Time Management Matrix Technique (TMMT) provides a useful construct for consideration. In the TMMT, all activities are placed into one of four quadrants based on their relative importance and urgency as follows:

- Quadrant I: Important and urgent
- Quadrant II: Important and not urgent
- Quadrant III: Not important and urgent
- Quadrant IV: Not important and not urgent

As Covey describes, the goal is to organize and prioritize responsibilities such that they fall within Quadrant II (important and not urgent), which focuses on planning ahead, being proactive, and optimizing productivity. In contrast, Quadrant I (important and urgent), which focuses on being reactive and responding to crises, should be avoided as much as possible. In clinical practice, it is sometimes not possible to avoid emergent situations, as patients can acutely decompensate without warning. In this situation, working in Quadrant I (important and urgent) is inevitable and unavoidable. However, even in clinical medicine, being proactive and astutely aware of the current situation can allow one to anticipate and avoid many crises, maximizing functioning in Quadrant II (important and not urgent) and minimizing transitions into Quadrant I (important and urgent). An example of this is the night rounds done by the junior and senior members of the health care team leading to the discovery of and intervention on behalf of a child with worsening respiratory distress, thereby preventing the child's eventual respiratory failure.

The activities of Quadrant III (not important and urgent) include interruptions as well as required unproductive work (e.g., attending a poorly run meeting in which nothing meaningful is accomplished). These activities are also sometimes unavoidable in clinical practice. However, they can also be anticipated and proactively avoided at times (remaining in Quadrant II [important and not urgent] and avoiding a transition to Quadrant III [not important and urgent]). An example of this is the physician who makes sure to address the questions and concerns of the multidisciplinary team and family on bedside rounds to prevent some pages, which serve as interruptions, as he continues his work for the day.

While the activities of Quadrant IV (not important and not urgent) are not important in terms of organizing and prioritizing responsibilities for patient care, they can serve as important outlets for maintaining work-life balance, reducing stress, and enhancing personal and career satisfaction (e.g., the physician who reads a good mystery novel for 20 minutes during lunch, when able, as an enjoyable escape from the workday).
**Multitasking and Minimizing Interruptions**

In addition to time management, important foundational elements of organizing and prioritizing patient care responsibilities include: 1) the optimization of multitasking and 2) the minimization and successful navigation of interruptions. The nature of work in the emergency department has led to several articles describing the frequent interruptions and multitasking,\(^6\) which can lead to lapses in information transfer that occur in that environment.\(^6\) Unfortunately, these activities can compromise the safe and effective care of patients, an important consideration when viewing this sub-competency in its entirety. The next two sections, therefore, describe the role of these elements in the safe and effective, as well as efficient, organization and prioritization of responsibilities.

**Optimization of Multitasking**

While multitasking can impair the safe and effective care of patients, it can also benefit the efficiency of that care. Among emergency medicine residents, work efficiency is enhanced not only by clinical experience but also by the ability to multitask well.\(^8\) Therefore, the optimization of multitasking is an important skill in achieving competence in this milestone. The work of Chisholm et al\(^9\) underscores the importance of this in pediatrics. The authors showed that while emergency medicine physicians have more interruptions and spend more time simultaneously managing more than one patient, office-based primary care physicians spend more time performing simultaneous tasks. Similarly, O’Leary and colleagues\(^5\) found that hospital-based internal medicine physicians spent 21% of their time multitasking.

**Minimization of and Response to Interruptions**

Multitasking and interruptions are closely related in many ways. Increasing interruptions often leads to the increased need for multitasking. Therefore, minimizing interruptions can benefit the optimization of multitasking. The minimization of interruptions was previously discussed briefly as it relates to time management. The response to interruptions will be addressed here.

The literature reports a variable response to interruptions. Brixey and colleagues\(^10\) noted that emergency medicine attendings most often responded to an interruption with a brief break in task followed by a return to the same preinterrupted task. However, they note that O’Conaill and Frohlich\(^11\) found that 41% of interruptions in the office workplace lead to a permanent break in task in which there is no return to the preinterrupted task. While there are urgent and emergent interruptions in clinical medicine that necessitate a prolonged or permanent break in task (e.g., a physician is examining a child in the emergency department with viral conjunctivitis when another child begins seizing and becomes apneic), most responses to interruptions in the clinical setting are likely related to the developmental level of the individual being interrupted. When early in clinical experience, interruptions are more likely to lead to a prolonged or permanent break in the present task to respond to the interrupting task. This can be true even when the interrupting task is less important. For these learners, permanent breaks in task are likely secondary to forgetting about the preinterrupted task altogether. As Brixey and colleagues\(^10\) demonstrate, individuals with more advanced clinical experience are more likely to respond to an interruption with a brief break in task, with return to the preinterrupted task after the interruption. They are also more likely to prioritize interruptions and address them in order of importance.

**References**


### Developmental Milestones

- **Struggles to organize** patient care responsibilities, leading to focusing care on individual patients rather than multiple patients; **responsibilities are prioritized** as a reaction to unanticipated needs that arise (those responsibilities presenting the most significant crisis at the time are given the highest priority); even **small interruptions in task** often lead to a prolonged or permanent break in that task to attend to the interruption, making return to initial task difficult or unlikely.

- **Organizes the simultaneous care of a few patients** with efficiency; **occasionally prioritizes** patient care responsibilities to anticipate future needs; each additional patient or interruption in work leads to notable decreases in efficiency and ability to effectively prioritize; permanent breaks in task with interruptions are less common, but **prolonged breaks in task are still common**.

- **Organizes the simultaneous care of many patients** with efficiency; **routinely prioritizes** patient care responsibilities to proactively anticipate future needs; additional care responsibilities lead to decreases in efficiency and ability to effectively prioritize only when patient volume is quite large or there is a perception of competing priorities; **interruptions in task** are prioritized and only lead to prolonged breaks in task when workload or cognitive load is high.

- **Organizes patient care responsibilities to optimize efficiency**; provides care to a large volume of patients with marked efficiency; patient care responsibilities are prioritized to proactively prevent those urgent and emergent issues in patient care that can be anticipated; interruptions in task lead to only **brief breaks in task in most situations**.

- **Serves as a role model of efficiency**; patient care responsibilities are prioritized to proactively prevent interruption by routine aspects of patient care that can be anticipated; unavoidable interruptions are prioritized to maximize safe and effective multitasking of responsibilities in essentially all situations.

### 3. Provide transfer of care that ensures seamless transitions

**Primary Author: Robert Englander, MD, MPH**

**Background**

With the advent of work duty hours and the Institute of Medicine reports on patient safety of the past decade, the skill of transferring care between providers and teams has become paramount. The literature on teaching and assessing “handoff” communication has proliferated in the realms of nursing,1,2 patient safety,3 medical education,4,5 and medical specialties.6,7 Handoffs occur in a variety of settings and contexts. For example, handoffs may occur within units, between units, between specialists and generalists, between subspecialists...
in different specialties, or between inpatient and outpatient settings. In addition, they may occur in person, by telephone, or by written document.

Emerging from the literature is a developmental progression in this skill, both at the individual and system levels. Novice systems and individuals have in common a lack of standardization in the process. There is variability in the content, efficiency, accuracy, and synthesis of information both within and between individuals handing off on different patients. In addition, Arora and Johnson\(^3\) observed significant variability in the process between teams, departments, units, and different hospitals or clinical settings within a system. The foundation of developmental progression in this skill is the development and use of standardized templates for information exchange. Many templates have been provided in the literature.\(^2\) To some extent, this stage of development requires support from the system in which the practitioner practices. The advanced beginner may use the template but has minimal ability to abstract pertinent information or add pertinent information beyond the script. As one becomes proficient, one can reliably and reproducibly transfer the pertinent information using and adapting the template. Assessment of this level of skill has been demonstrated through Observed Structured Clinical Examinations (OSCEs). The progression to competence includes becoming more succinct, avoiding errors of commission and omission, and improving one’s ability to anticipate events and responses for the practitioner accepting responsibility. In addition, the competent practitioner in this skill facilitates the opportunity for the receiving caregiver to read back, repeat back, or question any critical information.\(^2\) The competent receiving caregiver of handoff information also takes ownership for insuring understanding of the information and using deliberative inquiry to fill in any perceived gaps.

As one advances beyond the competent stage, one becomes increasingly agile in communicating the right information in a succinct manner in increasingly complex, demanding, and specialty-specific situations.\(^5\) The expert and master stages in handoff communication also involve superimposing a critical element of professionalism on this skill, that is, the transfer of professional responsibility.\(^3\) Even when separated in time or space, the master in handoff communication makes clear to patients, families, and members of the health care team when the professional responsibility for the patient has changed. On the part of the transferor, that professional responsibility includes transfer of all pertinent information for both active and anticipated issues during the ensuing time period. For the transeree, it includes the responsibility to obtain clarity and to assume responsibility once clarity around the patient’s issues has been provided, whether that responsibility is to last an hour, a shift, a week, or longer. For the individual assessing handoff communication, the master would never think nor utter the words, “I am just cross-covering.”

References
Developmental Milestones

- Demonstrates **variability in transfer of information (content, accuracy, efficiency, and synthesis)** from one patient to the next. Frequent errors of both omission and commission in the handoff.

- **Uses a standard template** for the information provided during the handoff. Unable to deviate from that template to adapt to more complex situations. **May have errors of omission or commission**, particularly when clinical information is not synthesized. Neither anticipates nor attends to the needs of the receiver of information.

- **Adapts and applies a standardized template, relevant to individual contexts, reliably and reproducibly**, with minimal errors of omission or commission. Allows ample opportunity for clarification and questions. **Beginning to anticipate potential issues for the transferee.**

- **Adapts and applies a standard template to increasingly complex situations** in a broad variety of settings and disciplines. Ensures open communication, whether in the receiver- or provider-of-information role through **deliberative inquiry**, including but not limited to read-backs, repeat-backs (provider), and clarifying questions (receivers).

- **Adapts and applies the template without error and regardless of setting or complexity.** Internalizes the professional responsibility aspect of handoff communication, as evidenced by formal and explicit sharing of the conditions of transfer (e.g., time and place) and communication of those conditions to patients, families, and other members of the health care team.

4. **Interview patients/families about the particulars of the medical condition for which they seek care, with specific attention to behavioral, psychosocial, environmental, and family-unit correlates of disease**

Primary Author: Daniel Schumacher, MD

Background

Models that shine light on the behavioral, psychosocial, environmental, and family-unit correlates of health and disease critical in the medical “interview” focus on the therapeutic relationship formed between the physician and the patient and family rather than on an act of information gathering driven by the physician. With this in mind, we will use the term medical encounter rather than interview.

Ideally, the medical encounter serves three functions: gathering biological and psychosocial information, responding to the emotions of patients and families, and educating patients and families to ensure optimal outcomes. The encounter can be divided into four functional components: building a relationship, data gathering, patient education and counseling, and activating and partnering. Building on this construct as well as on the work of Friere, Roter has conceptualized the developmental continuum of physicians’ skills in facilitating the involvement of patients in their care as beginning with patient participation and moving to patient activation and then empowerment facilitation. We also propose a developmental stage before this, in keeping with the work of Roter, which we have labeled “doctor participation” because this stage includes behaviors that do not engage the patient and/or family to participate. The components of these participatory communications skills are shown in Table 1.
As this construct illustrates, the recognition and sensitivity toward the verbal and non-verbal cues and statements from the patient and/or family are important in guiding the encounter as well as in forming a therapeutic relationship with the patient and family that will lead to empowering them with their own health care. For example, not interrupting, showing empathy, and expressing concern with a teen presenting for a health supervision visit can prompt further information gathering that leads to the diagnosis of pregnancy, with subsequent formation of a vital therapeutic partnership and counseling that facilitates empowering her to share in decision-making about care options.

In the developmental trajectory of physicians’ skills in facilitating the participation of patients in their care described above, it should also be noted that early in their development, physicians will tend to focus on gathering biomedical information, whereas later in development they will include elicitation and then joint decision-making and counseling around psychosocial issues as well. Additionally, as physicians continue to develop their communication skills with a deliberate focus on the behavioral, psychosocial, environmental, and family unit correlates of disease, more advanced skills are incorporated as well. These include using understanding of personality type and communication style of self and others to tailor and optimize communication as well as perceiving and responding appropriately to defense mechanisms (such as silence, denial, attacking back, blaming others, and changing the subject) in critical conversations.
Previous studies\textsuperscript{9-10} have shown declination in interpersonal communication skills with advancing medical education. This may not be surprising given that the emphasis on teaching medical interviewing skills is limited to early in the undergraduate medical education curriculum. Given that competence is a habit\textsuperscript{11} and that skill maintenance depends on “deliberate practice”\textsuperscript{12}, the continued focus on these foundational skills throughout the graduate medical education years is important.

References


Developmental Milestones

- Medical encounter focuses on doctor-centered information-gathering and biomedical aspects of the medical condition; patients’ and families’ emotional cues and expressions go unnoticed or are ignored.
- Begins to form a therapeutic relationship through patient and family participation in eliciting both biomedical and psychosocial information. Responds to patients’ and families’ emotional cues and expressions in a manner that shows respect and acknowledges their role in the encounter, but struggles to respond in a therapeutic manner that allows for shared decision-making and counseling.
- Responds to emotional cues and expressions and shares control of the medical encounter to create a therapeutic relationship with patients and families that aims to activate and empower them. Allows the medical encounter to go beyond information gathering to focus on joint problem-solving, shared decision-making, and counseling, being sensitive to the developmental level of the child and his/her role in this process.
- Tailors the encounter to optimize communication based on the personality type and communication style of self and others; advanced and dynamic perception of and response to emotions fosters a therapeutic relationship, even in difficult encounters (e.g., the delivery of bad news or counseling a defensive patient).
5. **Perform complete and accurate physical examinations**

**Primary Author: Daniel Schumacher, MD**

**Background**

The foundation of learning to perform complete and accurate physical examinations is found in the deliberate practice of performing examinations on many patients. Only through ongoing practice can one become adept in both performing examination maneuvers correctly as well as eliciting and recognizing normal and abnormal findings.¹ When considering the pediatric physical examination, flexibility to reorder the approach and agility in performing the maneuvers to maximize their efficacy and efficiency are also foundational to engaging children at their developmental level and accommodating their current behavioral states.

Trends over the past few decades toward reliance upon imaging modalities over physical examination skills² and also away from teaching and possessing superior and discriminating physical examination skills during training³⁴ have led Bordage to ask: “Where have the history and the physical examination gone?”⁵ In an editorial bearing a similar name, Bordage⁶ cites the work of Peterson and colleagues,⁷ who showed that while history is the major determinant leading to a final diagnosis among the physicians they studied, physical examinations were important in excluding and confirming diagnostic hypotheses. In short, performing complete and accurate physical examinations is an important next step after performing a complete and accurate history.

Demonstrating the importance of history to examination, Norman and colleagues have shown that approaching the physical examination with diagnostic hypotheses and their associated findings in mind leads to a greater likelihood of noticing these findings when they are present.⁸-¹¹ Conversely, approaching the physical examination without specific findings in mind makes someone more likely to miss those findings even when they are present. Furthermore, incorrect diagnostic hypotheses prior to the physical examination can lead to misinterpretation of physical findings (i.e. confirmation bias) and attribution of importance and meaning to irrelevant findings.⁹-¹⁰ Thus, it is not approaching the physical examination merely with a list of diagnostic hypotheses in mind but rather with a more accurate and select list of diagnostic hypotheses in mind that is most important in performing physical examinations that are complete and accurate and that lead to success in diagnostic reasoning. With this in mind, the material discussed in the milestones of 1) gathering essential and accurate information about the patient and 2) making informed diagnostic and therapeutic decisions, both under the Patient Care domain, provide a necessary foundation to this sub-competency of performing physical examinations.

The findings of LeBlanc, Brooks and Norman and colleagues⁹-¹¹ have led others to advocate for a hypothesis-driven physical examination (HDPE), in which learners make diagnostic hypotheses prior to examining a patient, over the standard head-to-toe examination, in which learners perform a complete examination with minimal or no regard given to the presenting complaint or history (a method of learning physical examination skills that is common in medical school training).¹²-¹³ Through employing the HDPE, the relevance and efficiency of a learner’s physical examination maneuvers are enhanced as they mindfully attend to specific maneuvers that confirm as well as discriminate between the diagnostic hypotheses being entertained.

While it is important to use diagnostic hypotheses to drive the physical examination, it is also important to perform a more complete physical examination survey when examining patients. Making a habit of routinely performing a survey examination helps to develop a range of normal findings, gain fluency in executing the maneuvers, and avoid premature closure around a diagnosis by surveying for findings that may otherwise be missed but would contribute meaningful information to clinical reasoning, diagnosis, and/or treatment. Consider as an example the 12 year-old child without a history of asthma who presents with bilateral knee pain and whose physician suspects Osgood-Schlatter disease but also discovers wheezing on lung examination, which he performs as part of his survey physical examination. Without a careful and deliberate lung examination, this finding would have gone unnoticed. Here again, however, the mindfulness with which this survey examination is performed is paramount. As the work of LeBlanc et al⁹-¹¹ suggests, if this physician
were going through the rote steps of a survey examination without anticipating potential findings during each part of the examination and being mindful of what he is seeing and hearing, he could still miss the lung finding.

The increasing rarity of being taught and possessing superior examination skills during training\(^3\)-\(^6\) underscores the importance of “making the direct observation of students and residents, while they take histories and conduct physical examinations, a major responsibility and activity of the faculty. Faculty members could thus give the students and residents constructive feedback on the appropriateness and accuracy of their history-taking and physical-examination techniques and of their interpretation of the findings.”\(^7\)

References


Developmental Milestones

**Milestones for the Psychomotor Performance of the Physical Examination**

<table>
<thead>
<tr>
<th>Performs and elicits most physical examination maneuvers <strong>incorrectly</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Performs basic physical examination maneuvers correctly (e.g., auscultation of the lung fields) but does not regularly elicit, recognize, or interpret abnormal findings (ex: recognition of wheezing and crackles).</td>
</tr>
<tr>
<td>Performs basic physical examination maneuvers correctly and recognizes and correctly interprets abnormal findings.</td>
</tr>
<tr>
<td>Performs, elicits, recognizes, and interprets the findings of most physical examination maneuvers correctly.</td>
</tr>
<tr>
<td>Performs, elicits, recognizes, and interprets the findings of even special testing physical examination maneuvers correctly most of the time (e.g., stork test for spondylolysis).</td>
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</table>
Milestones for the Approach to the Pediatric Physical Examination

- Does not alter the head-to-toe approach to the physical examination to meet a child’s developmental level or behavioral needs.
- Sometimes uses a developmentally appropriate approach to the physical examination, achieving variable success.
- Consistently and successfully uses a developmentally appropriate approach when examining children.
- Is fluid and agile in performing the physical examination in a way that maximizes cooperation of the child and thus accuracy of findings; experience facilitates the engagement of the child as well as the caregiver in the physical examination.

Milestones for the Approach to the Focused Physical Examination

- Performs essentially the same rote head-to-toe physical examination of the patient regardless of presenting complaint; does not use diagnostic hypotheses from the history to anticipate or look for specific positive or negative findings on physical examination.
- With a broad list of diagnostic hypotheses after the history, uses a head-to-toe approach to the physical examination to anticipate and look for a myriad of potential positive and negative physical examination findings for multiple diagnostic considerations. This approach can lead to failure to identify pertinent and important physical findings that are present, misinterpretation of physical findings, and attribution of importance and meaning to irrelevant findings.
- Uses a narrow list of diagnostic hypotheses generated through the history to anticipate and look for specific positive or negative physical examination findings of only the most relevant diagnostic considerations; open to new diagnostic possibilities in the process of performing a survey physical examination to elicit unexpected abnormalities but may dismiss these as unimportant when it is difficult to integrate these findings into the working differential diagnosis.
- Uses a narrow list of diagnostic hypotheses generated through the history as well as through extensive clinical experience to anticipate and look for key specific physical examination findings that will discriminate between competing similar diagnoses; uses surprises that result from a survey physical examination to rethink and retest diagnostic hypotheses; actively looks for physical exam findings that disconfirm the working diagnosis or rule in or out rare but high-risk alternative diagnoses.

6. Make informed diagnostic and therapeutic decisions that result in optimal clinical judgment

Primary Author: Daniel Schumacher, MD

Background

When considering the developmental progression of making informed diagnostic and therapeutic decisions that result in optimal clinical judgment, the role of previous clinical experience cannot be emphasized enough. With increasing clinical experience, learners do not simply gain new knowledge in an additive manner. Rather, they reorganize existing knowledge in an elaborated way that allows them to become more efficient and effective in diagnosing and treating new patients who possess features similar to those of previous patients. This highly learner-specific knowledge is best gained through individual clinical experience, which is a necessary but not sufficient prerequisite for developmental advancement in making informed diagnostic and therapeutic decisions that result in optimal clinical judgment. As Kolb suggests in his Experiential Learning Theory, this knowledge is strengthened through reflective observation, active experimentation (e.g., in a simulation environment), and abstract conceptualization. In fact, the mental energy that is saved as one becomes more efficient and effective in diagnosing and treating new patients must be reinvested in reflection and new learning if one is ultimately to become an expert clinician and not just an experienced nonexpert.
Early Clinical Reasoning: Analytic Reasoning through Basic Pathophysiology
Development of expert diagnostic and therapeutic reasoning follows a predictable progression. In the preclinical and early clinical stages, learners rely on knowledge of the pathophysioLOGIC causes and consequences of disease and analytic reasoning to formulate diagnostic considerations. As a result, knowledge is organized as a causal network. At this stage, the learner arrives at the diagnosis of hemolytic uremic syndrome through matching the patient’s clinical picture to his illness script for this disease, which may include elements of renal failure (anuria, elevated creatinine, edema), hemolytic anemia (low hemoglobin, high LDH, pallor, tachycardia), thrombocytopenia, and other features (e.g., bloody diarrhea, a history of eating a hamburger at the state fair, ill appearance, decreased energy and playfulness, irritability, and a myriad of other clinician-specific components). These illness scripts can be used to compare and contrast diagnostic possibilities by comparing clinical patterns of disease presentations. Clinicians continue to refine and remodel these scripts as they encounter new patients. Over time, they become robust representations of diseases, each one riddled with nuances and discriminating features of illnesses that even become context dependent. Episodic memories of individual patients seen in the past add specific situational information to these scripts, transforming illness scripts into “instance scripts” unique to individual patients (e.g., the 1-year-old with diabetes insipidus who dunked his head under the bath water and gulped water as quickly as possible).

Intermediate Clinical Reasoning: The Emergence of Illness Scripts
With even further clinical experience, learners organize knowledge as illness scripts or narrative scripts in which the characteristic features of specific illnesses form clinical patterns in memory. At this stage, the learner arrives at the diagnosis of hemolytic uremic syndrome through matching the patient’s clinical picture to his illness script for this disease, which may include elements of renal failure (anuria, elevated creatinine, edema), hemolytic anemia (low hemoglobin, high LDH, pallor, tachycardia), thrombocytopenia, and other features (e.g., bloody diarrhea, a history of eating a hamburger at the state fair, ill appearance, decreased energy and playfulness, irritability, and a myriad of other clinician-specific components). These illness scripts can be used to compare and contrast diagnostic possibilities by comparing clinical patterns of disease presentations. Clinicians continue to refine and remodel these scripts as they encounter new patients. Over time, they become robust representations of diseases, each one riddled with nuances and discriminating features of illnesses that even become context dependent. Episodic memories of individual patients seen in the past add specific situational information to these scripts, transforming illness scripts into “instance scripts” unique to individual patients (e.g., the 1-year-old with diabetes insipidus who dunked his head under the bath water and gulped water as quickly as possible).

Advanced Clinical Reasoning: Avoiding Premature Closure
With advanced clinical experience, the knowledge structures formed previously in the development of clinical reasoning “do not decay; neither do they become inert, nor inaccessible. They sediment into multiple ‘layers’ which are accessed” in future clinical presentations where illness scripts or instance scripts stored in memory cannot be readily matched to a new patient who presents a diagnostic and/or therapeutic dilemma. With this in mind, it is important to note that advanced clinicians are not just using pattern recognition from previous cases they have seen. They are also engaging in analytic reasoning and using their understanding of the underlying causal mechanisms of diseases and their pathophysiological consequences to compare and contrast the discriminating features of the diagnoses they are entertaining. This mental activity avoids premature closure or settling on an incorrect diagnosis based on cases in the past that looked similar on the surface but were different upon deeper probing—a problem that would persist if the clinician were using pure pattern recognition.

Problem Representation and Semantic Qualifiers
In this developmental progression, the sophistication with which medical knowledge in memory is organized and made available for use in diagnostic and therapeutic reasoning is ever-improving, a key determinant to the increasing success of clinical judgment. Storage of knowledge and the retrieval of that knowledge,
rather than the amount of knowledge, is related to diagnostic reasoning performance.\textsuperscript{17} For example, possessing a high level of knowledge that is poorly organized is associated with inadequate accessibility of diagnostic considerations and suboptimal diagnostic reasoning. It is here, again, that the role of experience is important. With increased clinical experience, learners begin to reorganize clinical information that is gathered from the patient into abstract terms in their minds that they can then use to categorize and understand clinical presentations, “facilitat[ing] the retrieval of pertinent information from memory”\textsuperscript{4} and making it available for diagnostic reasoning. This process is known as “problem representation.”\textsuperscript{4,7} As part of this process, learners begin to use semantic qualifiers in their abstraction and description of cases.\textsuperscript{4,6}

Semantic qualifiers are qualitative modifiers that give deeper meaning to clinical information in the learner’s mind and subsequently help learners discriminate clinical features and diagnostic hypotheses with more precision and accuracy. They are most often described as paired opposites that are used to describe clinical information (e.g., acute and chronic; focal and diffuse; proximal and distal). However, they also include pathognomonic findings (e.g., opsinclonus-myoclonus in neuroblastoma), criterion that are essential to make a diagnosis (e.g., the triad of hemolytic anemia, thrombocytopenia, and acute renal injury in the diagnosis of hemolytic uremic syndrome or the presence of 4 of 5 clinical features in addition to high fever to confirm the diagnosis of typical Kawasaki disease), and absolute criteria for exclusion of a diagnosis (e.g., focal seizure excluding the diagnosis of simple febrile seizures). As use of semantic qualifiers allows enhanced discrimination between diagnoses, increasing use of semantic qualifiers is associated with increasing success in diagnostic reasoning.\textsuperscript{6} As learners begin to use problem representation and semantic qualifiers, the 2-year-old with “a temperature to 103°F and really bad ear pain on the left and right that began last night” becomes the “febrile (opposite of afebrile) toddler with acute (opposite of chronic) onset of severe (opposite of minor) bilateral (opposite of unilateral) ear pain.” Through this abstraction and reorganization, this clinical knowledge is reframed in the learner’s mind in a manner that facilitates the ready access to connect to and build upon previous knowledge for use in diagnostic and therapeutic reasoning.

\section*{Evolution of Creating a Working Differential and Subsequent Decision-Making}
In the developmental progression of diagnostic and therapeutic reasoning, it is also helpful to consider the evolution of creating a working differential diagnosis and subsequent therapeutic decision-making.\textsuperscript{4} Novice learners, who do not possess knowledge specific to pediatrics, struggle to create diagnostic hypotheses for pediatric diseases. As a result, their early diagnostic hypotheses tend not to change as more clinical information is gathered (because this new information is not helpful in diagnostic and therapeutic reasoning). Intermediate learners tend to change their diagnostic hypotheses frequently as more information becomes available, often changing their diagnostic schema after the history, after the physical examination, after initial testing, and after initial therapy and management. Their resultant therapies tend to treat the features of a diagnosis rather than a unified diagnosis. Interestingly, the changing of diagnostic hypotheses for novice and perhaps for intermediate learners may depend on the type of additional clinical information provided. The work of Codere and colleagues\textsuperscript{18} demonstrates that first-year medical students are much less likely to retain their initial diagnostic hypothesis when additional information is discordant with initial information; whereas, they are much more likely to retain their initial diagnostic hypothesis when subsequent information is concordant. Advanced learners tend to develop quite advanced and narrowed diagnostic hypotheses early in a case and use subsequent history, physical examination, and tests to confirm this initial schema. As a result, their therapies tend to be focused and specific, based on a unifying diagnosis for the patient.

\section*{References}
\begin{enumerate}
  \item Schmidt HG, Boshuizen HPA. On acquiring expertise in medicine. \textit{Educational Psychology Review}. 1993;5:205-221.
  \item Bordage G. Elaborated knowledge: a key to successful diagnostic thinking. \textit{Academic Medicine}. 1994;69:883-885.
  \item Schmidt HG, Rikers RMJP. How expertise develops in medicine: knowledge encapsulation and illness script formation. \textit{Medical Education}. 2007;41:1133-1139.
\end{enumerate}


### Developmental Milestones

- Recalls and presents clinical facts in the history and physical in the order they were elicited without filtering, reorganization, or synthesis. **Analytic reasoning** through basic pathophysiology results in a list of all diagnoses considered rather than the development of working diagnostic considerations, making it difficult to develop a therapeutic plan.

- Focuses on features of the clinical presentation, making a unifying diagnosis elusive and leading to a continual search for new diagnostic possibilities. Largely using analytic reasoning through basic pathophysiology in diagnostic and therapeutic reasoning; often reorganizes clinical facts in the history and physical examination to help decide on clarifying tests to order rather than to develop and prioritize a differential diagnosis. This often results in a myriad of tests and therapies and unclear management plans, since there is no unifying diagnosis.

- Abstracts and reorganizes elicited clinical findings in memory, using semantic qualifiers (such as paired opposites that are used to describe clinical information [e.g., acute and chronic]) to compare and contrast the diagnoses being considered when presenting or discussing a case. The emergence of pattern recognition in diagnostic and therapeutic reasoning often results in a well-synthesized and organized assessment of the focused differential diagnosis and management plan.

- Reorganized and stored clinical information (illness and instance scripts) leads to early directed diagnostic hypothesis testing with subsequent history, physical examination, and tests used to confirm this initial schema. Well-established pattern recognition leads to the ability to identify discriminating features between similar patients and to avoid premature closure. Therapies are focused and based on a unifying diagnosis, resulting in an effective and efficient diagnostic work-up and management plan tailored to address the individual patient.

### 7. Develop and carry out management plans

Primary Author: Robert Englander, MD, MPH
Background

This sub-competency is intimately enmeshed with other competencies and sub-competencies described in this document. It is perhaps most intimately linked to the sub-competency “Make informed diagnostic and therapeutic decisions that result in optimal clinical judgment.” Much of the literature refers to “making informed diagnostic and therapeutic decisions” and “developing management plans” with one voice,\(^1\)-\(^3\) often under the rubric of clinical judgment. The literature on illness scripts is particularly pertinent and has been covered in the “Make informed diagnostic and therapeutic decisions…” sub-competency.

Nilsson and Pilhammar\(^4\) provide an additional framework for understanding the developmental progression in clinical judgment through a qualitative analysis of junior and senior physicians using a critical incident technique. They found that junior and senior physicians demonstrated differences in clinical judgment in a number of different areas, including those outlined below:

- **Use of theoretical knowledge versus use of previous experience and knowledge of the course of events:** Junior physicians tend to base their clinical judgments and management plans predominantly on their theoretical knowledge. As one matures, one has increasing superimposition of experience to place the theoretical knowledge in context towards an understanding of issues such as risk and prognosis. The most seasoned clinician can build upon theoretical knowledge with experience in ever more complicated and difficult situations.

- **Ethical approach to management decisions:** Junior physicians tend to exercise clinical judgment founded on their own personal assumptions of how one should behave in general and in consideration of health care resources. The senior practitioner is increasingly able to understand individual patients in the context of their lives to make decisions that maximize well-being, minimize harm, and avoid over-treating.

- **Meeting and communicating with patients:** Junior physicians tend towards one-way communication of information to patients. Senior physicians become increasingly engaged in two-way discussions around management. The most experienced clinicians are also aware of how their own biases, needs, and behavior play into the communication with patients around clinical judgment.

- **Focusing on available information:** The most inexperienced clinician will be unable to sift through the information available to come to the key elements. As a result, clinical judgment is often based on a relatively arbitrary and poorly prioritized sampling of the information and is limited by the time available. With increasing experience, one is able to focus on key elements of information early and then augment from the remaining sources of information as necessary. An example might be a patient with multiple medical problems who comes for a health supervision visit to the outpatient setting. The inexperienced clinician will be unable to navigate the long medical record in a meaningful way in the time allotted, resulting in less than optimal use of the time to plan patient management. The experienced clinician, conversely, will zero in on the key information from the medical record in the time allotted, prior to entering the examination room, allowing optimal use of the time to plan care.

- **Being directed by the organization:** Junior physicians cite that they often develop management plans due to perceived or real health care organization directives (e.g., “The Joint Commission makes me do this.”) without an understanding of the rationale or importance to the patient. Of note, senior clinicians do not cite this as an issue for them in clinical judgment, even though they follow the organizational guidelines. For them, directives become a matter of habit and form the basis, rather than the entirety, for the discussion around management.

These differences inform the milestones outlined below and aid in creating a picture of the continuum of competency in developing and carrying out management plans.

References


**Developmental Milestones**

- Develops and carries out management plans **based on directives from others**, either from the health care organization or the supervising physician. **Unable to adjust plans** based on individual patient differences or preferences. **Communication about the plan is unidirectional** from the practitioner to the patient and family.

- Develops and carries out management plans based on one’s **theoretical knowledge and/or directives** from others. Can **adapt plans to the individual patient**, but only within the framework of one’s own theoretical knowledge. Unable to focus on key information, so conclusions are often from arbitrary, poorly prioritized, and time-limited information gathering. **Management plans based on the framework of one’s own assumptions and values.**

- Develops and carries out management plans **based on both theoretical knowledge and some experience**, especially in managing common problems. Follows health care institution directives as a matter of habit and good practice rather than as an externally imposed sanction. Able to more effectively and efficiently **focus on key information**, but still may be limited by time and convenience. **Plans begin to incorporate patients’ assumptions and values through more bidirectional communication.**

- Develops and carries out management plans **based most often on experience**. Effectively and efficiently **focuses on key information** to arrive at a plan. **Incorporates patients’ assumptions and values through bidirectional communication** with little interference from personal biases.

- Develops and carries out management plans, even for complicated or rare situations, based primarily on **experience that puts theoretical knowledge into context**. Rapidly **focuses on key information** to arrive at the plan and augments that with available information or seeks new information as needed. Has **insight into one’s own assumptions and values** that allow one to filter them out and focus on the patient/family values in a bidirectional conversation about the management plan.

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8. **Prescribe and perform all medical procedures**

Primary Author: Patricia Hicks, MD

**Background**

All of the competencies are involved in prescribing and performing medical procedures. In an integrated fashion, development of elements of competence in the performance of procedures takes place along a continuum, with ongoing deliberate practice required to achieve and sustain competence.

Prescribing medical procedures is a process that includes the ability to weigh many factors to achieve the optimal outcome for an individual patient. Prescribing medical procedures requires careful consideration of the indications, contraindications, benefits, risks, anticipated undesirable outcomes, and complications, all within the specific anatomic and physiologic state of a specific patient's condition. Consideration of these many factors and their complex interplay results in determining the best short- and long-term therapeutic outcome. Awareness and appreciation of unintended, but known, consequences or risks is part of the decision-making process, as well as the post-procedure management process. The prescribing process as part of procedural competency involves other milestones, such as diagnostic reasoning, clinical decision-making, and communication; informed consent is a related but separate area of competence embedded within the achievement of performance of medical procedures. The prescribing process may be undertaken
for the purpose of achieving an immediate, desirable, therapeutic outcome as the primary goal (e.g., bladder catheterization for a neurogenic bladder or suturing of a laceration), or the procedure might be prescribed as a beneficial means to an end (e.g., obtaining evidence in the form of laboratory data or providing access to administer medications into a vein). Thus, developing competence in prescribing and performing procedures involves cognitive and communication skills as well as psychomotor skills.

The problem of assessing competence in the performance of procedures has been reported for over 2 decades. In 1989, Wigton et al. surveyed 2500 general internists and reported that newer graduates were performing more and more procedures. However, a survey of internal medicine training program directors conducted at the same time reported that while 53% had developed a list of procedural skills that all their residents must master, only 21% had developed specific criteria for competence in procedural skills. Fifty-six percent of the 389 program directors surveyed stated that they planned to develop criteria for competence in procedural skills. Eighty-two percent stated that a “uniform system to be used by all programs to document procedures would be helpful.” Today, there is still not a uniform system for demonstrating graduate competence in procedural skills.

In 1992, responders to a survey of internal medicine graduates reported that they had not mastered the procedures that their program directors thought they should master. Their program directors had approved privileges for these procedures on credentialing applications, allowing those graduates to perform those procedures without supervision. Many of the survey’s responding graduates reported learning procedures without supervision, often after they entered practice.

Confidence, or operator comfort with performance of procedures has not been shown to be a useful proxy in providing evidence of competence of performance of procedures. The popularity of evaluating curriculum at Kirkpatrick’s lowest stage, which is learner satisfaction, has been addressed by Kirkpatrick in the following judgment: "Evaluating reaction is the same thing as measuring customer satisfaction." Enjoying simulation training sessions and leaving those sessions with a great confidence, comfort, or satisfaction may not necessarily equate to competence in performing those procedures. Just as the physician’s ability to self-assess his cognitive skills is often flawed, so is self-assessment of procedural competence. Some examples follow:

- Carbine et al. videotaped individuals providing neonatal resuscitation, to compare the resuscitation methods applied against the standards set forth by the Neonatal Resuscitation Program (NRP). Their group found a “significant number of deviations from the NRP guidelines demonstrated on video recordings; 30% of NRP steps were not performed or were performed incorrectly despite having completed NRP training.
- Adams et al. reported that despite going through NRP training, residents were less successful at intubation on the first attempt than respiratory therapists on a transport team.
- Eighty-seven percent of pediatric residents in training in a study by Falck et al. reported confidence in their ability to intubate neonates. Yet, 35% of the intubation attempts were never successful by the pediatric house officers in that study. These individuals were surveyed post graduation, and 71% of the group’s respondents stated that they were practicing general pediatrics and 36% were attending deliveries.

There is abundant evidence that counting procedures alone is not adequate evidence of competence. Colliver et al. conducted a study comparing the number of procedures performed to performance of those procedures using a gold-standard competency assessment model of simulation and animal models. His work demonstrated that the number of procedures needed to demonstrate competence far exceeded the number recommended by most residency programs.

Lastly, the particular group of procedures a pediatrician wishes to perform without direct supervision depends largely on their individual career goals. Jones and McGuinness have described an educational approach that considers this differentiation. For the majority of procedures in pediatrics, the pediatrician may prescribe and manage the patient, but may not directly perform many procedures. A relatively short select list of procedures has been deemed by the American Board of Internal Medicine (ABIM) as appropriate for generalists to perform without direct supervision. It is anticipated that a finite group of procedures will be
recommended for a categorical pediatric resident who anticipates hospital privileges as a general pediatrician; deliberate training for this subset of procedures is anticipated. Thus, the categorical general pediatric graduate would seek to be competent in the cognitive and psychomotor components of a select group of procedures, have awareness of these components for another group of procedures, and the ability to assist in yet another group of procedures.

With competence, performing any procedure without ongoing deliberate practice results in extinction or attenuation of skills. Likewise, deliberate practice is required to achieve more highly reliable functioning associated with proficiency and mastery. There are no data to address the intervals recommended for reassessment or retraining in procedural competence, but there is evidence that current intervals may be inadequate. Therefore, ongoing re-assessment will need to be part of continuing professional development such as maintenance of certification, maintenance of licensure, or the granting of hospital privileges, and relate directly to the type of practice (and therefore the type of procedures encountered or performed).