EMRA

Resident as EDUCATOR

A guidebook written *by* residents *for* residents

Todd A. Guth, MD, Editor-in-Chief

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PREFACE

"To teach is to learn twice." — Joseph Joubert

Physicians at their very core are teachers. The word "doctor" comes from the Latin verb *docēre*, which means "to teach." The opportunity to care for our fellow human beings in times of need is a truly humbling and honorable experience that we physicians are afforded. Those physicians who seek to train *future* physicians have the additional responsibility to not only care for and to treat their patients, but also to nurture and to train their learners.

The *Resident as Educator* handbook was conceived and structured around the "Teaching Service" for third-year emergency medicine residents in the Denver Health Residency in Emergency Medicine program. This educational experience is designed to provide our blossoming senior residents the opportunity to serve as primary educators to third-year medical students at the University of Colorado School of Medicine who are rotating through a required clerkship in emergency medicine.

The experience equips our residents to be astute educators in the latter years of their residency training and in their future careers in emergency medicine. This educational opportunity provides our residents with the chance to practice their newly acquired skills in a protected environment with directed feedback from experienced clinician educators.

The *Resident as Educator* handbook provides the framework for our didactic "Teaching Service" curriculum, which we hope will provide you with similar structure and guidance on your path to becoming a better educator. Because the book has been written *by* residents *for* residents, it fills an important gap in the current resident-as-teachers materials. By publishing this work, EMRA has allowed emergency medicine residents to come full circle by creating a publication designed to help them understand what it means to be an educator in emergency medicine.

The energy for the continued success of the specialty relies on resident educators who have the knowledge, skills, and attitude to serve as exceptional role models, wise teachers, inspirational facilitators, and adept leaders for their junior learners.

Special thanks to my beautiful and aptly named wife, Joy; the EMRA staff; the EMRA Board of Directors; and the residents and educational core faculty of the Denver Health Residency in Emergency Medicine for making *Resident as Educator* a reality.

Sincerely,
Todd A. Guth, MD
Editor-in-Chief

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The Resident as Educator

Introduction

The white coat ceremony marks the end of one journey and the beginning of another for medical students across the country. Though this familiar rite of passage is mired in classic tradition – from the recitation of the Hippocratic Oath to the "cloaking" of new physicians – medical education has entered a new era. The physician-apprentice relationship is no longer the mainstay; today, physician educators draw from both science and bedside arenas, synthesizing information and showing learners how their medical knowledge translates to patient care.

In 1910, medical education reformer Abraham Flexner observed that knowledge gained from advances in laboratory and clinical science had led to an evolution in medical education – a shift from an emphasis on the master-apprentice relationship to a reliance on didactic sessions to relay information to students.[1] Some may argue that this advent of the lecture hall has resulted in a loss of individualized "human" instruction, in which students learn to recognize and treat disease through close personal interactions with their teachers. The modern era of medical education, however, has much to offer; emergency medicine provides more opportunities for meaningful hands-on learning than ever before – allowing learners to train at the bedside, where patients *become* the textbook.

Resident physicians have the unique and combined role of being both students of their specialties and educators to more junior learners (i.e., medical students and junior residents). As such, they are required to employ current learning theories and effective teaching methods while being engaging and enthusiastic, fostering positive relationships, and communicating clearly with learners.[2,3] In this chapter, we will illustrate the importance of residents as educators, and the benefits of this pivotal role in the emergency department (ED).

The Resident as Educator

In busy clinical settings, residents at academic institutions are poised as educators to more junior learners; the importance of this role for the students cannot be understated. Two-thirds of medical students feel residents play a significant teaching role during their clinical years, with one-third of their knowledge being gleaned from resident teaching.[4] Furthermore residents spend more time at the bedside than do attending physicians, providing an invaluable, accessible resource for learners, including a complementary set of skills and insight on practical patient management.[5,6] This direct availability has a measurable effect on medical student education, as noted through significant improvements in United States Medical Licensing Examination (USMLE) Step 2 scores.[7] Specifically in the ED, socioeconomic and political pressure to efficiently treat patients and make rapid dispositions may make attending physicians less available to clinical teaching, further highlighting the importance of residents as educators.[8]

The Accreditation Council for Graduate Medical Education (ACGME) recognizes the importance of the resident as an educator, marking teaching skill a core professional competency paramount to the success of emergency physicians.[9,10] The practice-based learning and improvement competency states that residents must be able to "participate in the education of patients, families, students, residents, and other health professionals;" hence, the need for residents first to see themselves as educators, and second to seek and receive focused educational training.

Benefits of Residents as Educators in the Emergency Department

A bustling emergency department offers a particularly beneficial setting for teaching, and more specifically, for *bedside* teaching. The ED provides a wide variety of surgical and medical pathologies for learning.[11,12] With a large volume of patients, there also is a spectrum of patient acuity – from the critically ill patient to the stable, uninjured patient. The diversity of complaints and patients in the ED is in stark contrast to the inpatient medicine ward, where the patients have been stabilized, and in most cases, the underlying diagnosis already has been identified.[11] This variety of situations within the emergency department provides a myriad of educational opportunities for residents to teach their learners, but this complexity also demands that residents have a breadth of flexible educational skills.

Residents are particularly influential as medical *educators*.[4] They typically have the advantage of being closer in age, training and professional development to their learners than attending physicians, making them more approachable, knowledgeable and capable of teaching in a more contextual and relevant manner.[8,11,13] Additionally, residents participate in real-time clinical decision-making with learners, role-modeling lessons of efficiency and time management that are invaluable to a learner's development.[6] Residents also provide an advantage to attending physicians when teaching procedural skills to junior learners by being more conscientious of individual steps.[13]

The benefits of residents serving as educators extend beyond the learner. Just as important, residents themselves learn more by teaching. They more effectively retain information on topics taught to their learners, improving both their clinical knowledge and their teaching skills through self-directed learning.[14] Finally, residents enjoy teaching and consider it important, potentially increasing job satisfaction and engagement in their own educational processes.[6]

It cannot be assumed, however, that residents are equipped to teach simply because they work with trainees in a clinical setting. Resident-as-educator training – through workshops, courses, readings or retreats – will improve resident self-confidence, teaching ability, and student evaluations of the residents as educators.[15] Ultimately, residents who seek and acquire the knowledge and skills to become resident educators will benefit the EDs they work in by improving both the education of learners and the care of their patients.

Contemporary Learning Theory

Introduction

Learning theory has evolved immensely over the past 100 years. Traditional learning is based on the direct, transparent transfer of knowledge, exemplified in primary education when one teacher bestows information to a group of children in clear, discrete modules. The teaching goals are concrete and the motivation to learn is provided by external rewards and punishments (i.e., grades, disciplinary actions, etc.).[1] However, as the study of learning has progressed, scholars have questioned the simplicity of this traditional approach, especially when teaching *adult* learners. The roles of experience, context, social interaction and relevance have been found to be critically important to learning theory. As a result, contemporary learning theories have evolved and are now widely accepted for all learners, but particularly adults.

Contemporary Learning Theories

Many true learning theories exist, all of which inform and shape the educational experiences conceived by educators. As an educator, residents should be familiar with the four well-established learning theories rooted in traditional psychology: behaviorist, cognitive, humanistic and social constructivist.[4]

The *behaviorist theory* is rooted in the works of American psychologist B.F. Skinner, Ph.D. With an emphasis on observable behaviors and using the external environment to affect change, the behaviorist focuses on repetition and reinforcement to inspire change in the learner. This is exemplified in medicine by patient-contact volume in clinical education, and the importance of seeing the same disease process and repeating the same procedures multiple times to achieve competence. Immersion in the field and observing the practices of more senior individuals is fundamental.

In contrast, the *cognitive theory* is rooted in traditional learning and is focused on the well-organized and structured transfer of knowledge. The development of skill sets and objective feedback are stressed. Exemplifying this, textbooks and structured simulation exercises provide the basis for further learning. The learner's knowledge can be described and understood as a "tree of knowledge" to which new pieces of information can be added.

The *humanistic theory* focuses on the relationship between teacher and learner. The teacher needs to be in touch with the background and goals of the learner, acting as a facilitator for self-directed study. Learners at the same level of medical education naturally are going to have very disparate skill sets and clinical knowledge. It is the teacher's responsibility to fill those gaps.

Finally, the *social constructive theory* highlights the situational orientation of the educational experience, and keys on the notion that people are inherently social beings. Individuals learn by observing and interacting with the environment. Modeling of behavior occurs whether or not it is desired, and special attention should be given to the situational context. For example, medical educators should not underestimate the importance of professionalism in daily interactions with patients and colleagues. Table 1 lists and summarizes the basic concepts of these four learning theories.

Table 1. Contemporary Learning Theories

Theory	Key Principles
Behaviorism	Reinforcement, repetition, variation, reinforcement, contiguity (strike while the iron is hot), extinction
Cognitivism	Organization and elaboration of prior knowledge Learners actively seek new knowledge, self-assess and are goal-directed.
Humanism	The relationship between teacher and learner is key. Teachers must understand goals and gaps in learners' knowledge to succeed.
Social Constructivism	Learning is a dynamic interaction with the environment; learning occurs through participation, observation, and role modeling.

While each of these theories has strengths, most educators recognize that optimal adult education borrows from *all* of them. As such, contemporary learning becomes a diverse and dynamic process that is relevant, contextual, social and experiential.

Andragogy

In the 1950's, education pioneer Malcolm Knowles, Ph.D., reintroduced into literature the term *andragogy*, a concept that centers on strategies to facilitate adult learning. Importantly, andragogy is not a true learning theory. Instead, it represents a range of strategies that borrow from the contemporary learning theories for adult learners described above, particularly the humanist and social constructive theories.

Andragogy distances itself from traditional learning strategies designed for children, which were coined *pedagogy*. Knowles, and others who ascribe to the premise of adult learning strategies, believe that the ways in which adults learn are inherently different than those of children. Andragogy is based on five tenets.[2] The first tenet is that adults have a higher need to know the purpose of learning. For example, an adult who is earning anatomy will be more likely to engage if the lesson is oriented towards the pathology of disease, surgical approaches or procedures.

The second tenet follows that adults possess a larger wealth of experience on which to draw. Rather than rely on the teacher as the sole deliverer of knowledge, adults of similar educational levels have much to be gained from each other in group settings. The third tenet explains that adults are more self-directed and, therefore, need autonomy. A mature learner can identify gaps in knowledge and should be encouraged to fill in gaps through self-study. In medicine, this is especially apparent in the advanced years, when students should be expected to explore the evidence behind clinical practice and engage in lifelong learning.

The last two tenets revolve around the motivations of the mature learner. Adults are highly motivated by changing social roles. For example, a senior medical student is inspired to master clinical medicine when he or she recognizes the dramatic increase in responsibility and knowledge of the intern. Early transitions (such as acting or sub-internships) and shadowing can facilitate more knowledge acquisition than a written test. The final tenet that Knowles introduced is the idea that adults are internally motivated, suggesting that educators should focus on self-assessment when making new goals for learning. External motivation, which commonly is seen in primary education (i.e., grades and discipline), should be downplayed.[3] Table 2 summarizes the five tenets of andragogy.

Table 2. The Five Tenets of Andragogy

Tenet	Learning and Teaching Strategies in Medical Education
Adult learning is goal-centered.	Introduce disease processes early. Simulation exercises
Adults have a wealth of experience from which to draw.	Group problem-based learning Flexibility of teacher to different techniques, based on learner expertise
Adults are self-directed.	Encourage self-study of core materials. Introduce and encourage evidence-based medicine.
Adults are motivated by changing societal roles.	Role modeling from more senior physicians or physicians-in-training Early transitions and exposure to increased responsibility
Adults are internally motivated.	Discussion of self-assessment techniques Introduce study goals based on the students' perceived weaknesses.

Contemporary Learning Theory in the Emergency Department

The emergency department of most hospitals boasts high patient-contact volume, high pathologic acuity, and a team-based social environment. These departmental elements perfectly complement many of the basic elements of the learning theories outlined above. As such, it is easy to see why the emergency department is an ideal arena for adopting these tenets into educational practice, through all years of medical school.

Early medical school years. Early in medical school the focus is primarily cognitive, as the learner develops a framework of knowledge on which to build. However, based on the principles of contemporary learning theories, early introduction to clinical settings is beneficial. Forming simulation exercises around the core learning blocks can assist with the development of goal-centered information-gathering, and also facilitate self-study. This is a safe environment for the teacher to begin modeling doctor-patient relationships and key concepts of professionalism prior to direct patient contact. Periods of clinical immersion with preceptors in the emergency department are high-yield, as the learner can see a large number of patient interactions that encompass multiple fields of medicine in a short time, again, stimulating self-study.

Clinical medical school years. In the clinical years, the learner must use the knowledge acquired in the early medical school years to apply to patient care. The emergency department offers many educational opportunities that reinforce contemporary learning theories in the clinical arena. The teacher can observe the learner in a wide variety of patient care scenarios, including the performance of procedures, and can cater a wide-range of learning goals and objectives to the learner. In addition, students and residents learn to appreciate the changing roles and responsibilities of clinical training during each year of medical school – forming a basis for modeling and goal-directed study.

Early resident years. Changing roles and responsibilities inherently motivate the learner in residency in all fields of study. Early transitions to the next role and increasing autonomy stimulate self-study and reflection. In the emergency department, the number of senior educators that a student or junior resident is exposed to allows the learner to model a large variety of clinical styles and approaches to medical problems. In addition, opportunities for self-reflection occur with every patient and colleague interaction.

Conclusion

The approach to medical education has changed significantly as the concepts of contemporary learning theory have evolved. Knowing how adults are motivated is key to effective teaching and learning. As a resident educator, your newfound understanding of these contemporary learning theories will help provide a framework to best guide your educational efforts.

Suggested Readings

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Kaufman, David. (2003). ABC of Learning and Teaching in Medicine; Applying Educational Theory in Practice. *BMJ,* 326: 213-216

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Large–Group Learning

Introduction

Despite recent innovations in technology and curriculum design, large-group learning remains a staple of medical education throughout all levels of training. The major advantage of large-group learning is the ability to teach pertinent, updated material in an efficient manner to a significant number of learners. However, this form of education – which typically is done in a lecture format – often is limited by the passive nature through which the material is delivered and received, making it difficult for the learner to participate actively in the process.[1] Given the potential pitfalls of lecturing to a large group and the limited attention span of learners, lecturers must engage their audiences by incorporating diverse styles of learning, rather than simply reciting subject matter. By focusing on both the content of the presentation and the development of an interactive environment, lecturers can maximize knowledge acquisition and improve information retention.

Preparation for Large-Group Presentations

The initial step of preparing a presentation for a large group is to gain an understanding of the learners (e.g., their experiences and levels of training), what the learners' current knowledge is of the subject being covered, and how the lecture material fits into the learners' larger curricula. Having a good understanding of the context of a lecture will allow the educator to prepare a presentation that is appropriate in content and design, building upon a previous fund of knowledge.

Very early on in the preparation of a lecture, the presenter also must define the explicit objectives of what the learners will achieve as a result of the instruction they receive.[2] By clearly identifying the learning objectives, the instructor will have a clear framework for the lecture and be better able to distinguish between essential core concepts and those learning points that are interesting, but not crucial.[3] A common pitfall encountered by lecturers is the tendency to cover too much material. By establishing clear learning points (usually three to five maximum for a one-hour presentation), the lecturer can avoid this pitfall and maintain a clearly established focus for the session without overwhelming the learner. Explicitly defined objectives also allow for better self-evaluation at the end of the lecture.

Introducing the Topic and Gaining Audience Attention

During the initial moments of the lecture, it is important that the learners are given a clear sense of the lecture objectives and how the session will progress. Thus, giving a brief summary of major objectives and a general outline for the session is a relatively easy and logical way to start the presentation. These core objectives can be restated and built upon throughout the lecture. To capture the audience's attention, it may be helpful to incorporate provocative statements or even an anecdote, which can help reinforce points you are trying to make. Additionally, lecturers may also pose specific questions or problems to elicit potential solutions or answers from the learners that the lecturer can then go on to explore and build upon through the body of the presentation.

Body of the Presentation

The goal throughout the body of the lecture should be to keep the learner engaged and to maintain a clear, simple structure. Given that the average learner's attention span is 10 to 20 minutes[4], it is key to change the pace of the lecture frequently so as to recapture audience interest. Learner attention and recall is best at the beginning and end of a lecture; however, recall can be improved by incorporating activities and exercises to break up the presentation. (See Figure 1) This can be achieved by asking learners to solve a problem, incorporating a different audiovisual aid, or by telling a new anecdote.

Figure 1. Student Recall Over Time
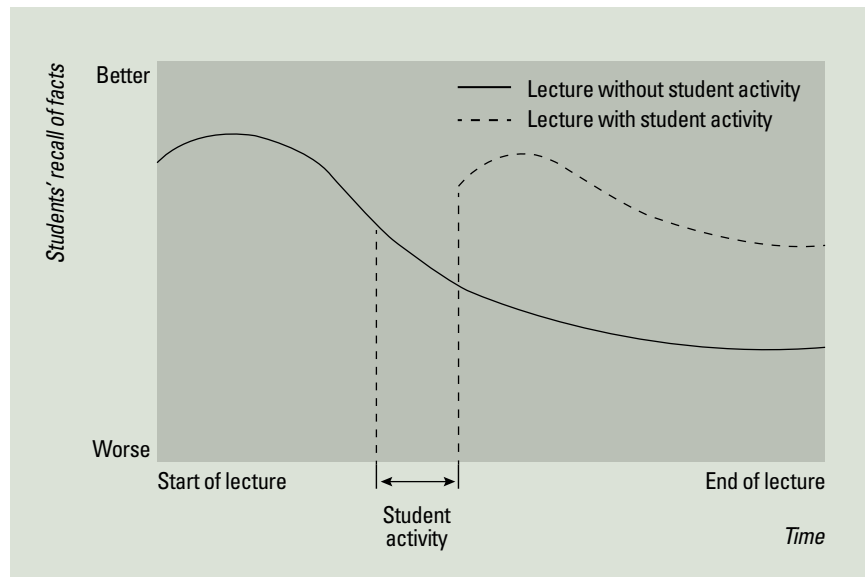
(Graph showing effect of students' interaction on their ability to recall what they have heard in a lecture. *Adapted from Bligh, 2000*)

Moreover, the lecturer can engage large groups by using case examples to conduct case-based discussions that exemplify the learning points throughout the lecture. Cases are particularly useful for problem-solving, especially in scenarios when there are a number of correct answers. Additionally, cases allow for the opportunity to demonstrate how experts would solve problems.[5] Table 1 lists techniques to engage learners during large-group presentations.

Table 1. Techniques to Engage Learners During Large-Group Presentations

Ask questions	Check comprehension, promote discussion, and allow for initial silence.
Elicit questions from learners	Ask students to prepare questions in groups of two to three, then invite questions at random.
Brainstorming	Invite answers to a question and list answers on board/overhead.
Buzz groups	Two to five students work for a few minutes on a problem or exercise.
Mini-assessments	Students complete multiple-choice quiz or exercise to measure objectives.
Case-based learning	Case presentation is followed by discussion and problem-solving by learners.
Online discussion	Students exchange notes and provide instant feedback during lecture.
Large-group debates	Divide room into two to four groups, assigning positions to each; follow with debate.

Concluding the Lecture

At the conclusion of the session, it is important to summarize the learning objectives and restate the lecture's main points, which can be made more relevant by differentiating how they vary from conventional or established knowledge. Additionally, the conclusion of the session is an opportunity to direct learners toward further learning and provide examples of how they may use this new knowledge. Learners will be more likely to remember and further investigate a topic if provided with tasks or exercises that require them to look beyond slides or handouts for answers and ideas.[3] The conclusion of the lecture also is an opportune time for learners to ask questions and comment upon the presentation.

Presentation Skills

Well-polished presentation skills are a critical component to the delivery of a successful lecture and can greatly impact learners' engagement and interest levels during a presentation. Table 2 outlines some of the fundamental elements of effective public speaking. Lecturers should avoid lecturing from a script or from reading prepared text. Reading directly from slides or lecture notes prohibits eye contact and disengages the lecturer from the material and audience.[6] In general, thorough rehearsal of lecture material will help limit the use of distracting mannerisms and words such as "um" and "uh." Prior to delivering a presentation, the lecturer should become comfortable taking brief pauses – which can be used to gather his or her thoughts – and then continue to speak without distraction. Feelings of nervousness and anxiety are normal and can be used as a source of energy and enthusiasm to convey the importance of a topic.

Table 2. Tips for Effective Public Speaking

Verbal Elements	
Tone	Avoid monotone speaking; tone should be varied and enthusiastic.
Inflection	Natural, conversational; questions should sound like questions not statements.
Pitch	Nervous speakers often start out with a high pitch that gets progressively higher.
Volume	Don't trail off at the end of statements; look up at group and project voice out.
Rate/speed	Keep track of time; tendency is to speak too fast when there is too much material is prepared for allotted time.
Nonverbal Elements	
Posture	Stand erect; keep shoulders back; do not lean or slouch against podium.
Gestures	Modestly exaggerate hand, head, and body movement for large learning groups.
Eye contact	Pick targets in various sections to speak to; avoid constantly looking at notes or slides on monitor.
Fidgeting	Avoid finger-tapping, jingling keys or items on pockets, or tugging at clothing.

Slide-Based Presentations

Digital slide-based presentations (e.g., Microsoft PowerPoint, Apple Keynote) have become the modality of choice for large-group lectures due to the enhanced versatility and flexibility. These formats allow for animation and sound effects, and give lecturers the ability to incorporate text and images from various digital sources, including the Internet. Digital presentations allow for ease of transportability and transmission of slide files from flash-drives or Internet sources. These types of software programs have several pitfalls, however, that most often arise with the overuse of adjunctive features such as animation, sounds, or distracting backgrounds, all of which detract from lecture material. With varying versions of software, lecturers also may encounter issues related to software compatibility or other "technical difficulties." Tips for creating effective digital presentations are listed in Table 3.

Table 3. Tips for Creating Effective Digital Presentations

1.	Match design to purpose: Keep presentation consistent with learning objectives.
2.	Keep it simple: Two fonts maximum; no more than one graphic or chart per slide.
3.	666 Rule: Use no more than six words per bullet, six bullets per page, and six word slides in row.
4.	Use white, yellow, or other light, bright font colors on dark backgrounds.
5.	Do not use a red font color.
6.	Use a large type (font) size; 24-32 point is optimal.
7.	Plan to spend one to two minutes on each slide.
8.	Beware of the tendency to overuse animation and sound effects.
9.	Animation and graphics must enhance message, not distract from it.

Conclusion

Large-group learning remains an effective and efficient way to teach medical education. When preparing, it is critical that lecturers identify appropriate learning objectives and design their presentations to engage their audiences. Adequate rehearsal time, refinement of presentation skills, and careful editing of digital slide-based presentations will further ensure effective learning in large-group settings.

Suggested Readings

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CHAPTER 4
Small–Group Learning

Introduction

Small-group learning is widely used in higher education, especially in medical education.[1] Small groups are composed of approximately five to seven learners and a facilitator. The small-group learning experience allows for peer learning in a context where individuals are simultaneously pupils *and* peer-educators.

Small-group learning encourages participants to acquire and apply new knowledge for the purpose of finding solutions to specific problems. It requires the learner to be willing to prepare for discussions, to be open to the group process, to be willing to collaborate, to have the capacity for mutual respect, and to be dedicated to active learning. The nature of interactions in small-group learning is described in psychologist Bruce Tuckman's widely-cited work about the stages of group development, which he describes as forming, storming, norming, performing, and adjourning.[2,3] (See Table 1)

Table 1. Tuckman's Developmental Stages of a Group

Stage	Description
Forming	An orientation phase during which group and team members are testing boundaries and often behave independently. The facilitator must work to develop trust and bring the team together.
Storming	Group and team members gain confidence and feel more comfortable with conflict, confronting each other's perspectives. Emotions are expressed openly. The facilitators must guide or coach the group through this phase, while being tolerant of various team members' needs.
Norming	The group starts to form a uniform identity. Relationships and interactions become more accepting and natural. The group's effectiveness improves. The facilitator should allow the group to become more autonomous.
Performing	The group functions smoothly and as a tight unit. Conflict is appropriate. The facilitator should allow most decisions to be made by the group.
Adjourning	The group may lose a sense of purpose as tasks near completion, due to uncertainty about the future role of the group. The facilitator may choose to redirect the group or introduce a new focus.

Evidence suggests that small-group settings offer the following advantages to learners over traditional large group, lecture-based learning: improved motivation for learning; increased ability to comprehend, retain, and apply content knowledge; greater opportunity to teach and learn from peers; greater opportunity to develop problem-solving skills that can be applied in clinical settings; and improved teamwork and communication.[4,5,6]

Additionally, when objective academic outcomes are measured, small-group learning has been shown to be as good as, if not superior to, traditional classroom-based lectures.[7] There are challenges to small group learning, however, including: engaging learners to work in groups, finding effective facilitators, and overcoming learners' comfort with traditional lecture-based curricula.[8]

In emergency medicine training, small-group learning is an attractive model because it best simulates real-world situations in which group members must use their collective skills and knowledge to provide the best care to an individual patient. The use of small groups with defined and achievable tasks has been identified as a way to improve didactic learning among emergency medicine residents, and has been used as a strategy for reducing generational gaps in learning styles that often exist between educators and learners.[9,10]

Characteristics of the Facilitator

Small-group learning must be student-driven, yet the facilitator is "the seminal influence on the effectiveness of teaching."[8] A strong facilitator is a prerequisite for effective learning in the small group setting, with learner satisfaction being directly related to the effectiveness of the facilitator.[11,12] Thus, the facilitator must be an active part of the process, while at the same time remaining non-intrusive. An effective facilitator embodies several characteristics in three general domains: *motivator*; *mediator*; *model*. (See Figure 1)

Figure 1. Characteristics of an Effective Small-Group Facilitator

Role	Characteristics
Motivator	Provides scaffold for learner knowledge Sets and affirms ground rules and goals Encourages group focus
Mediator	Assists with conflict resolution Redirects disruptive learners Aids with transitions
Model	Is a learner Portrays mutual respect Is a content expert

As a *motivator*, the facilitator provides the framework within which the group process will proceed. Psychologist Willem de Grave, Ph.D., calls this framework a "scaffold" upon which learners build their knowledge.[13] This framework includes establishing "ground rules" for the educational sessions, as well as defining roles and expectations, outlining the learning goals and objectives, and determining and maintaining time limits for discussion items. At the start of the group process, the facilitator should clarify the goals of the learning activity, as well as the roles of individual group members.

The facilitator is responsible for introducing the outline of the topics and materials to be covered. Throughout the process, the facilitator establishes and affirms ground rules and serves as a guide, helping the learners to remain focused on the learning goals and objectives. The facilitator helps keep the group on task by periodically summarizing its progress and refocusing the learners when they stray too far off topic. In this way, the facilitator helps to define the *destination* of knowledge, but not necessarily the *journey*.

In the role of *mediator*, the facilitator assists the group with interpersonal conflicts, encourages reluctant group members to participate, and helps redirect disruptive learners. Poor group dynamics or disruptive participants are major obstacles to learning. The group should take ownership of conflicts and be permitted to identify solutions to interpersonal and other disagreements that arise among members. However, the facilitator should reiterate the ground rules of mutual respect among group members and assist by clarifying the problem and inviting learners to participate in its resolution.[11]

Additionally, the facilitator can assist the group in engaging an unmotivated, uninterested, or passive learner by eliciting input from that member or encouraging the group to do so. Finally, as mediator, the facilitator must help the group to anticipate and successfully navigate the transitions inherent to the process. Those transitions can be as complex as the stages of group development (forming; storming; norming; performing; adjourning) described in "Tuckman's Stages," or as simple as moving between content topics during a group session.

As the *model*, the facilitator provides an example of enthusiasm toward learning, teamwork, and mutual respect. The facilitator must be well-prepared if the process is to be beneficial for the learners. Researchers have identified the ability to promote critical thinking and self-directed learning among students as skills of a competent teacher.[14] The facilitator uses questions to stimulate the group to bring the material alive, to teach one another, and to remain oriented to the goals of learning. Although the facilitator needs some level of content knowledge, it is more important that the facilitator knows "when and how to use this expertise."[15] As the facilitator, it is important to clarify objectives and supplement gaps in knowledge with personal expertise on the subject being discussed.

It is critically important to integrate ongoing feedback into the learning process. The facilitator should encourage group members to check frequently for an accurate understanding of the material and to engage in questioning and discussion, when there is disagreement or a lack of understanding or progress. As part of this process, the facilitator must be open to respectful, dynamic feedback from the learners. This feedback only can occur when the facilitator "appreciates the need for an educational environment where mutual respect and civility govern every interaction" and models this behavior for the learner.[14]

Conclusion

Small-group learning provides an excellent environment for emergency medicine education. Learners must be engaged and open to the challenges and rewards of the process. The identification of an effective facilitator who can motivate these learners improves the chances of a positive learning experience for the group. Facilitating small groups is both challenging and rewarding; and by seeking to serve as a small group facilitator, a resident can become a more effective educator.

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Team-Based Learning

Introduction

The "potential to flexibly employ concepts in a range of contexts" defines current goals in medical education; the best method for attaining this goal has been hotly debated since the Flexner report in 1910.[1,2] Team-based learning (TBL) offers a clear method for achieving a more fluid and dynamic repertoire of knowledge – one that well-prepares learners to adapt to the diverse situations and team environments they will encounter.

TBL bears some similarities to other learning strategies, such as problem-based learning (PBL), in both its small group learner-centered environment and its focus on learning content through its application to clinical problems. Several aspects of TBL differentiate it from other methodologies, however, including: shifting the onus of learning content to the student, ensuring preparedness through in-class testing, allowing many teams to learn successfully with only one facilitator, and fostering deeper understanding of the material.

What is Team-Based Learning?

Created by organizational psychologist Larry Michaelsen, Ph.D., in the late 1970's, TBL represents a method of active learning that focuses on content application, thus transforming the learning experience. Four basic concepts comprise TBL: 1) well-formed teams, 2) readiness assurance, 3) frequent and timely feedback, and 4) effective application exercises. Each of these will be discussed in more detail below.[3,4] Figure 1 outlines the basic TBL model.[5]

Well-Formed Teams. To maximize outcomes, teams should be composed of five to seven learners who have diverse backgrounds and don't have preformed subgroups[3]. Groups should be divided such that individual member characteristics are evenly distributed; the process for this division should be transparent. For a group to function as an effective team, it will need to have a longitudinal relationship, enabling the group to grow to trust and value the input of its members.

Michaelsen emphasizes that teams differ from groups in that they "see their collective success as integrally tied to their own individual well-being"[3]. It can take approximately 40 hours for a team to achieve this level of inter-group cohesiveness.

Readiness Assurance. One of the key features of TBL is the *readiness assurance process*. Readiness assurance forces individuals to come to a session prepared. Carefully selected reading assignments must be completed prior to the session; on arrival to class, learners take an individual readiness assurance test (iRAT). The test consists of approximately 10-15 questions designed to assess learners' understanding of the material.

The group then takes the same test together (tRAT or team-readiness assurance test), generating debate among the members about the correct answers. This mimics the debate that frequently occurs after testing, wherein classmates gather outside of the classroom to discuss the answers. For a standard class, the testing occurs too late to be used to better define areas of learner misunderstanding. Through the tRAT process, facilitators are able to focus their teaching on areas where learners most need guidance.

Material that learners can easily acquire on their own is covered prior to class. This changes the function of the teacher from a *deliverer* of knowledge to a *facilitator* of the application of that knowledge. This paradigm shift has important implications for learning, which will be discussed below.

Frequent and Timely Feedback. Results of the tRAT are made immediately available, often by providing scratch-off cards that display the correct answer beneath. This allows the group members to consider a second choice if their first was wrong, and allows them to immediately attempt to explain why their answers may have been incorrect. Learners may then appeal their answers and outline their reasoning by using assigned readings to cite specific examples supporting their conclusions.

Effective Application Exercises. Exercises challenge learners to apply their knowledge to solve complex clinical problems and weigh multiple variables. Although much of early medical education still focuses on specific factual knowledge and recall, very rarely do patients present as "classic textbook" cases. Medical care requires students and residents to apply information to situations that may vary widely in context and presentation.

Michaelsen coined the "Four Ss" of effective group assignments[3], which guide facilitators to create problems that maximize learning. Problems should be the **s**ame for all learners, be **s**ignificant to the learners, require them to make a **s**pecific choice, and allow them to **s**imultaneously report their choices. Because they are required to make and verbalize their decisions, "members gain additional insight as they prepare to explain the reasons behind their selections to their peers".[3] A summary of the TBL Learning Framework appears in Figure 1.

Figure 1. Team-Based Learning Framework
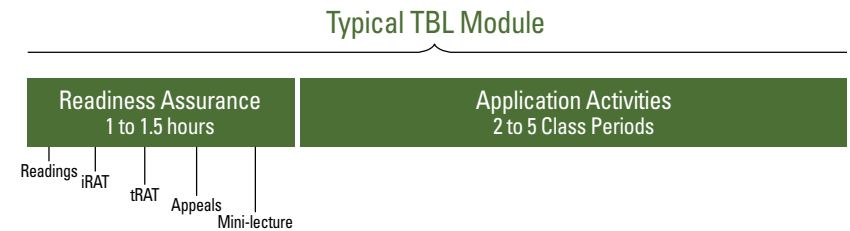
(Adapted from teambasedlearning.org)

Why is TBL so Effective?

TBL provides significant advantages in terms of translating short-term memorization into long-term memory gains. Management consultant Jean Atkinson describes that rehearsing an item while it is in short-term memory and connecting it to one's framework of other memories builds associations that facilitate its storage in long-term memory.[6] Learned information decays rapidly in short-term memory, and thus may never become stored in long-term memory, where it can be accessed. Similarly, psychologist Marilla Svinicki, Ph.D., describes in her analysis of learning and motivation that retention can be improved by focusing on a few key points and helping students build connections between new ideas.[7]

Figure 2: Pyramid of Bloom's Taxonomy of Learning Experiences
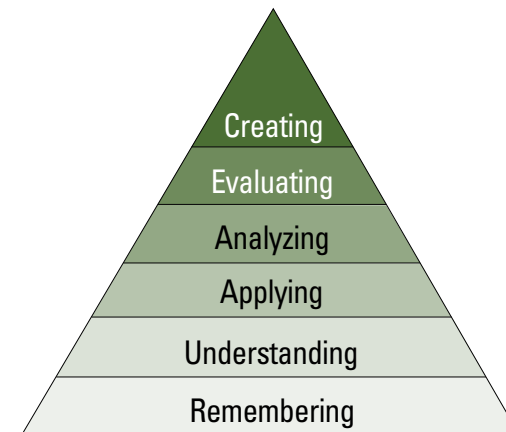
(Adapted from www.nwlink.com/~donclark/hrd/bloom.html)

Figure 2 illustrates *Bloom's Taxonomy*, a useful framework for resident educators, highlighting the hierarchical progression from less meaningful learning experiences (e.g., simple remembering) to more meaningful learning experiences (e.g., creating new meaning or structure).[8] The higher order domains or experiences require a high-order synthesis of content, thus suggesting more effective learning. Figure 3 depicts the educational goals of TBL in relation to *Bloom's Taxonomy*, emphasizing the shift in focus from remembering and understanding to applying, evaluating and creating.[5] These more advanced educational experiences contribute to the effectiveness of TBL.

Figure 3: **TBL Educational Experiences Superimposed Upon Bloom's Taxonomy**
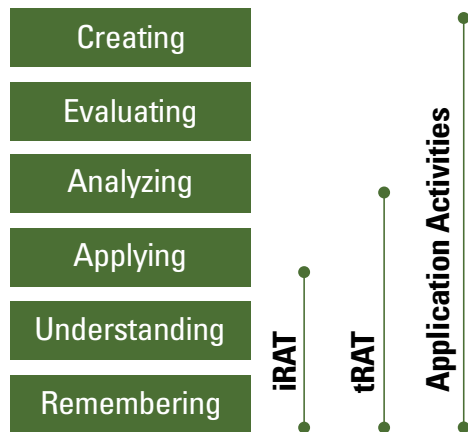
(Adapted from teambasedlearning.org)

Assessing Efficacy

Enthusiasts of TBL cite multiple examples of outcomes-based successes, including improved scores on standardized exams, increased learner satisfaction, improved student engagement and the facilitator's increased ability to recognize gaps in knowledge. Research into TBL outcomes is difficult, however. Most of the research that has been conducted to date has been based on comparison or descriptive studies; none were true randomized controlled trials. However, a 2011 systematic review of TBL research supports it as a highly effective method of instruction.[9] Conversely, other studies suggest that TBL appears to benefit weaker students to a greater extent.[10]

Prospective studies, in which students were randomized to TBL and non-TBL sections, would help to further establish the efficacy of team-based learning. In addition, non-TBL groups might also take an independent readiness assurance test (iRAT), because promoting reading prior to class could be a confounding variable leading to improved test scores in the TBL group.

Gauging TBL's effectiveness in preparing learners to work well in a diverse team of professionals – as in a hospital setting – also is difficult. Many learners, however, insist that TBL has helped them appreciate the value of teams for solving complex problems[4], a viewpoint that appears to differ notably from many prior opinions of group work. Experientially, "in the past 20 years, over 99.95% of the teams have outperformed their own best member by an average of nearly 14%".[4] Exposing learners to the positive aspects of team collaboration would logically seem to benefit their future teamwork abilities, although outcomes might be difficult to prove empirically.

Applications to Emergency Medical Education

As of 2006, 77 medicals schools in the U.S. and eight internationally have implemented TBL as part of their medical student curricula.[9,11,12] Researchers describe medical schools' experiences with TBL since its inception with overwhelmingly positive data.[13] A few emergency medicine residency programs have incorporated TBL into their curricula, with one implementing a curriculum called "Evidence Detectives," a TBL adaptation of the Evidence-Based Medicine curriculum.[14] Multiple applications exist for combining TBL with simulation or other small-group learning methods in order to enhance participation and knowledge retention.

Limitations in a Medical School/Residency Setting

Many aspects of team-based learning can be incorporated easily into medical school clerkships and residency curricula during didactic sessions. Groups would need to be somewhat fluid to accommodate scheduling demands, which could challenge group cohesiveness. Incorporating TBL into the clinical setting in a busy emergency department could be very difficult; however, the skills learned in TBL would likely prepare learners very well for the more complex decision-making faced in clinical practice.

Conclusion

Team-based learning allows learners to apply new content to clinical settings, facilitating a more complete understanding and a more direct translation of knowledge to clinical care. While some aspects of TBL may be difficult to implement in medical school or residency settings, a modified version of the method seems invaluable to resident and medical student learner education.

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CHAPTER 6
Providing Mentorship

Introduction

In Greek mythology, Mentor was one of Odysseus' most trusted friends. When Odysseus left for the Trojan War, he left is son, Telemachus, in the capable hands of Mentor; when Odysseus didn't return, Mentor guided Telemachus to his father. It was under Mentor's "mentorship" that Telemachus matured and developed. Odysseus' wife, Athena, even was said to sometimes disguise herself as Mentor when advising her husband and son. The etymology of the word "Mentor" demonstrates the profound effects and influences a mentor can have on a mentee.

Mentorship can be a challenging concept to define. According to the *American Heritage Dictionary*, a mentor is a "wise and trusted counselor or teacher." Yet mentorship can take on many forms, exist within many different contexts, and have a vast diversity of goals. At its core, mentorship is a developmental relationship between people through which an individual (the mentor) shares knowledge, skills, experiences, advice, and/or inspiration to foster the personal and professional development and growth of another (the mentee).[1]

As Gus Garmel, M.D., writes, "It is an insightful process in which the mentor's wisdom is acquired and modified as needed, as well as a process that is supportive and often protective. The successful mentor-mentee relationship therefore requires the active participation of both parties."[2] In these ways, mentorship is distinctly different from teaching, precepting, or supervising – all of which typically involve formal evaluation, are short in duration, and lack the intentional relationship.

Studies suggest that mentorship is the most important element of psychosocial and professional development.[3] While at times it may appear that the mentee is deriving the biggest personal or professional gain from the relationship, mentors benefit from the relationship, as well. Such benefits include a sense of accomplishment when the mentee is successful, professional advancement because of mentoring, reignited passion about emergency medicine, self-reflection, and others.[2]

Residents as Mentors

Residents straddle the gap between the medical student and the attending physician. Your role as an educator in a medical student's or junior resident's education is critical and well-established. The medical student-resident mentor and the junior resident-senior resident relationships are often undervalued; few

acknowledge the advantages of this mentor-mentee relationship. The power gap that complicates many mentoring relationships (causing undue pressure to perform, complete suggested research projects, participate in committees or other extracurricular activities, etc.) is often much narrower. Likewise, the generational gap is smaller, as residents and medical students often share generational values (i.e., technology, forms of communication, lifestyle, etc.), personal interests, and life stage.

For these reasons, it is often easier for medical students and junior residents to feel connected to a more senior resident mentor. Medical students often seek mentorship for advice on succeeding, planning the fourth year of medical school, completing residency applications, making program selections, and enduring the residency interview and match process. Junior residents seek advice about off-service rotations, expectations of nurses, staff, and attending physicians in the ED, the job search, and coping skills during residency. While faculty members, especially those involved in emergency medicine residencies, have great insight into each of these, residents have unique perspectives to offer because they have so recently dealt with the issues in question.

Forms of Mentorship

Mentorship can be informal and casual, or structured and formal; it can be delivered one-on-one or in group or team settings. It can last for a set amount of time (say, the duration of a research project), last many years, be continuous and ongoing, or be intermittent. A mentor may have multiple mentees, and a mentee may have multiple mentors. These days, a mentor-mentee relationship can even be virtual. In short, there is no single format that mentorship must adopt; the form, however, should reflect the context and goals of the relationship. Whichever structure a mentor-mentee relationship takes on, both parties ideally should be enriched personally and professionally.[1]

The resident-medical student or senior resident-junior resident mentoring relationship is typically less formal and occurs in person. Medical students and residents may come into contact during clinical rotations, emergency medicine interest group (EMIG) events, departmental events (grand rounds, journal club, etc.), or through formal mentorship programs. For example, the Emergency Medicine Residents' Association (EMRA) offers a formal mentorship program designed to link medical students to emergency medicine residents.

Common backgrounds, career goals, and personal interests often help propel and enhance the mentor-mentee relationship. Certainly, growing from the role of an "acquaintance" to a trusted mentor requires effort, insight, and a commitment of time, energy, and resources from both the resident and the medical student.

Qualities of a Good Mentor and Responsibilities of the Mentee

Mentorship is dynamic. It is a process, not an end result. As such, it is important to consider what qualities distinguish good mentors from mediocre mentors. It is challenging, particularly with limited time and numerous responsibilities, to embody all of these qualities. Working to improve as a mentor is a critical part of any resident's development; see the list in Figure 1, which can be used as a framework for gauging your own development as a mentor. A mentor-mentee relationship, like all relationships, is bidirectional. Mentees must put in effort, too. Figure 2 lists those responsibilities and expectations that are important for any mentee to adopt; these responsibilities can be discussed openly to set expectations for both the mentor and the mentee.

Figure 1. Qualities of a Good *Mentor*

1.	Dedicated to the mentoring process
2.	Actively listens to and engages the mentee
3.	Understands, values, and considers the mentee's personal and career interests
4.	Is respected by the mentee and by others
5.	Keeps in touch
6.	Withholds judgment
7.	Is professional and ethical
8.	Doesn't abuse their authority and is not overbearing
9.	Welcomes and introduces the mentee into the emergency medicine community
10.	Understands his/her own limitations

(Adapted from Garmel, 2006)

Figure 2. Expectations and Responsibilities of a *Mentee*

1.	Is responsive and follows up on advice
2.	Knows when to ask for help
3.	Knows when to express interest in topics
4.	Is willing to ask questions
5.	Continues progressing
6.	Maintains communication
7.	Understands their own limitations
8.	Is respectful and appreciative of your time

(Adapted from National Academy of Sciences, Adwor, Teacher Role Model, Friend: On Being a Mentor to Students, 1997)

Challenges in Mentoring

Numerous challenges may arise in any relationship, and a mentor-mentee relationship is not immune to insults. Occasionally, mentoring relationships do not develop successfully because the individuals fail to connect and bridge a critical divide. When a difference prevents a learning partnership from achieving its potential, the loss is multidimensional. Opportunities for the fostering of current and future talent on the part of the mentor are wasted, and chances for advancement on the part of the mentee are missed.

Insights into when such impasses are likely to occur may help both mentors and mentees address what feels "undiscussable."[4] Such challenges can arise because of differences in gender, race, ethnicity, language, or age; difficulty finding common ground; breach of trust; or lack of commitment to the mentoring process. If challenges arise, it is important to recognize them early and address them directly.[4] Focus on ways to alleviate the barrier, and do not dwell on the specifics of why the mentoring relationship is struggling. Ask the mentee what you can do to improve; provide the mentee with constructive feedback, not criticism; and consider other ways to build the relationship. As a last resort, one may consider a willing colleague as a replacement mentor, though this should be done only after other options have been exhausted and if you are certain that your colleague is capable and has a strong interest in mentoring the student.

Common Medical Student Questions and Issues

Medical students seek guidance and help from their mentors for a diverse set of issues, ranging from the personal to the professional and everything in between. It is outside the scope of this chapter to discuss all of the possible reasons medical students may seek mentorship. There are, however, common reasons medical students seek out *residents* for mentorship and advice.

Students often seek advice about impending transitions and upcoming stages in their educations. Consider anticipating students' questions and trepidations, and sharing your own experiences. Think about sharing tips and pearls that you picked up along the way to help them avoid pitfalls and to arm them with the confidence they need to be successful. Figure 3 lists some common questions that medical students at different stages of training may have.

Figure 3. Common Questions that Medical Students May Have for Resident Mentors

1. **How do I know if emergency medicine is right for me?**
   - Encourage the student to spend time in the emergency department.
   - Self-reflection is critical.
   - Discuss features of emergency medicine, the students' core values, what they envision their lives to be like, etc.

2. **What are some things I can do in my preclinical years to prepare for a residency and career in emergency medicine?**
   - Encourage students to pursue the things that interest them.
   - Join and consider becoming a leader in your school's emergency medicine interest group (EMIG), or start an EMIG if one does not already exist. Join an emergency medicine organization such as EMRA, ACEP, SAEM, or AAEM.
   - Shadow in the emergency department.
   - If interested, do emergency medicine-related research.
   - Study hard and prepare well for Step 1 of the USMLE.

3. **How can I best prepare for my third-year clerkships?**
   - Remind students that third-year clerkships are important for residency applications.
   - Be there early, be enthusiastic, know your patients, and work as a contributing team member.
   - Consider sharing personal experiences and pearls.

4. **How should I schedule my fourth-year electives?**
   - As one resident put it, "Nothing prepares you for residency except for residency."
   - Encourage students to fill educational gaps.
   - Suggest electives to emergency medicine-bound students, including anesthesia, MICU/SICU, radiology, sports medicine, toxicology, trauma, ultrasound, cardiology, dermatology, ophthalmology, and orthopedics.
   - Students should schedule two emergency medicine rotations.

5. **How do I prepare for the emergency medicine elective?**
   - Completing an emergency medicine rotation is critical for residency application.
   - Students are likely to be exposed to trauma assessment, ACLS, basic ED procedures, and developing symptom-based differential diagnoses.
   - Share personal experiences and pearls.

6. **Any tips for the application process and interview trail?**
   - Offer to review the student's personal statement or CV.
   - Offer to conduct practice interviews.
   - Give honest and constructive feedback.

7. **How do I know which program is right for me?**
   - Encourage self-reflection.
   - Encourage students to write notes for themselves during the interview process.
   - Aspects of programs for a student to consider may include: three- vs. four-year programs, interview day impressions, geographic preferences, significant other's preferences, personal academic interests, etc.
   - Students should consider spending time in the emergency department at a program of interest.

Conclusion

Mentors play a crucial role in the development of medical students and junior residents. A healthy mentor can augment a mentee's medical education, strengthen his or her commitment to medicine, inspire excellence, and provide wise guidance. The mentor-mentee relationship requires a commitment from both individuals to develop into a long-lasting, effective colleagueship. Moreover, residents can be powerful mentors in junior residents' and medical students' lives because many of the challenges that can exist with senior faculty members don't affect this less stratified mentoring relationship. Residents have a lot to gain from mentoring others. Feel inspired to engage your mentee, encourage self-reflection, and use this important connection for your own personal and professional growth.

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Content of this chapter was developed by James Luz, M.D., and Daniel Stein, M.D., M.P.H., in creating the EMRA Mentorship Guide for Emergency Medicine Residents. This chapter was created by taking excerpts from the EMRA Mentorship Guide.

Section II

Clinical Teaching Skills
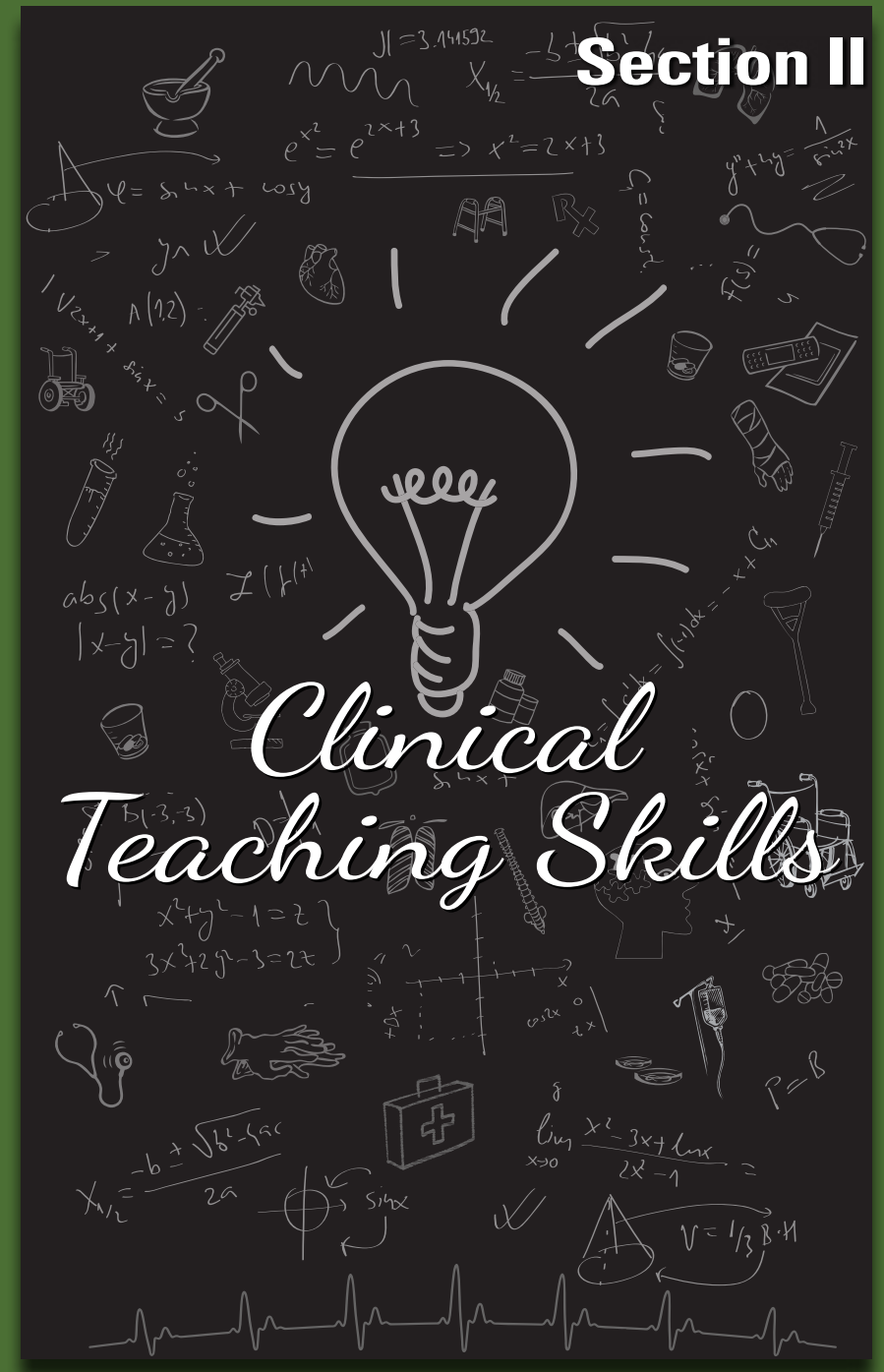
Teaching to the Gap

Introduction

Effective and engaging education varies widely, depending on the setting and audience. If the goal of education not only is to increase the learner's knowledge, but also to inspire and motivate, then the educator's task becomes much more daunting – yet perhaps more fulfilling. A kindergarten teacher, for example, might bring a live frog to the classroom as a starting point for a lesson on the amphibian life cycle. It is safe to assume that five-year-olds do not know what an "amphibian" is, but it is equally safe to assume that most students will be motivated to learn about the frog. Adult educators can be equally as awe-inspiring, but the process may be more complicated.

A few key concepts are fundamental to adult education and highlight some of these unique challenges. First, adults need to know *why* learning a particular thing is important. Second, adult learning is problem- and life-centered, not subject-centered. Finally, adults have a variety of life experiences, a fact that can be both a challenge and an advantage. While there are other components that will be discussed further, these aspects are key to creating a framework for adult education.

Medical education, in general, has recently begun to embrace this adult learning concept and has started to focus on learner-centered instruction. This adult learning style strives to educate and motivate physicians-in-training as a way to bring the "live frog" into clinical teaching.

Concepts in Learner-Centered Education

While learner-centered education (LCE) is a recent concept in medical education, it was described as early as 1905 by education scholar F.H. Hayward, Ph.D., and subsequently expressed by many others throughout the twentieth century. In the late part of the century, psychologist Carl Rogers, Ph.D., and educator Malcolm Knowles, Ph.D., further described the concept of LCE and incorporated it into general educational theory.[1] Knowles, in particular, popularized learner-centered adult education through his work in *andragogy*, often defined as "the art and science of helping adults learn."[2] Medical education began to explore the concept around the same time; since then, many LCE-based practices in both undergraduate and graduate medical education have been developed, utilized and studied.[3,4,5]

Teaching that is focused on the learner encompasses several key tenets; specific applications of LCE emphasize different components of the theory. A key aim of medical education is to create active learners. With LCE, content is centered on the needs of the learner, and the educator serves as a facilitator to help identify areas in which the learner can grow as a physician by improving his or her knowledge, attitude, or skill.

In short, the needs and motivation of the learner control the direction of education. To further clarify, LCE can be contrasted with the traditional role of an expert lecturer.[1] In the latter, the educator chooses a topic – often one on which he or she has expertise – and presents this information to a group, regardless of what individuals in the group may already know on the subject. While the lecturer may involve the learner through questions, the *active* role is played primarily by the teacher. Additionally, the lecturer may design the presentation based on presumed knowledge deficits, rather than actual needs. In LCE, the learner is actively involved in identifying the topic or "gap" that needs to be filled. The educator can either provide this knowledge, skill or attitude, or provide the learner with the tools needed to fill the gap.

Creating active learners requires individual responsibility that, in turn, can increase motivation. Knowles asserts that this motivation is a result of internal stimuli; the learner *discovers* what he doesn't know and is more motivated to fill the deficit than if he were simply *told* what he should know.[2] Others have questioned the validity of this assertion, and propose that both internal and external motivations are always present and that distinguishing between the two is difficult.[6]

LCE creates increased autonomy for the student, where learners often identify the subject matter that will be taught.[7] Additionally, the learner may need to do some self-directed reflection and inquiry on the subject, apart from the teacher. This autonomy requires responsibility on the student's part, as well as intellectual integrity to acknowledge educational deficiencies. The educator helps the student recognize the gap, but the learner must acknowledge it. By making the learner an active part in this process, LCE increases internal motivation, which in turn can strengthen external motivation, such as the desire to succeed.[8]

For example, "Mike" is a medical student with an interest in orthopedics. He's already memorized the types of eponymous fractures out of a desire to impress the orthopedic surgeons on his next rotation. A patient presents in the ED with a Colles' fracture and you, as an educator, proceed to give a quick talk at the radiology station on Colles', Smith's, Monteggia, and Galeazzi fractures. Already confident in his knowledge, Mike begins to daydream about drilling bones.

Taking a learner-centered approach, you ask Mike if he knows what type of fracture the patient has; he answers correctly, and also goes on to explain the three other types of fractures he's studied. You ask if there is anything more that he would like to learn, and he comments that he hasn't had the opportunity to touch plaster since he began medical school two years ago. You roll out the cast cart, help him reduce and splint the patient, explain the different types of splints, and share a few pearls on the art of treating a fracture.

You explain that different types of fractures need different types of splints, and encourage him to read more about them on his own time. Mike goes home covered in plaster and ready to do more research. He also leaves his rotation that day with the realization that he would have the opportunity to reduce bones and joints right there in the ED – a epiphany that prompts him to pursue a career in emergency medicine.

In addition to creating autonomy, responsibility, active learning and motivation, LCE is efficient for both the student and educator.[3] The student does not benefit from a reintroduction to knowledge that he or she already possesses, and LCE avoids this type of over-teaching. Learner-centered teaching is problem-based, rather than subject-based.[4] By addressing a specific problem, instead of a broad topic, this method provides focus and avoids over-preparation on the educator's part.

Finally, LCE creates an interdependent relationship between the educator and learner.[9] The teacher needs the student in order to identify what and how to teach; the learner needs the educator to realize educational gaps, provide knowledge, skills, or attitudes, and facilitate the process of self-directed learning. This interdependent relationship requires mutual respect and helps create an environment in which the learner feels safe to express uncertainty, another key component of LCE.[4]

Effectiveness of Learner-Centered Education

LCE has not been rigorously validated by evidence-based medicine standards, but certain applications of teaching focused on the learner have been studied with demonstrated benefits. Motivation and responsibility, as demonstrated by learner-initiated self-study, increased in a LCE-scripted model, compared to "usual and customary teaching" in clinical settings.[5] Learners were also more actively involved, asking more questions and acknowledging more educational gaps in the LCE group. Additionally, a comparison of student survey data collected before and after the implementation of a LCE course demonstrated increased internal motivation, and interestingly, also increased external motivation.[8] In a European study, students exposed to learner-centered education displayed better study skills and increased understanding, when compared to those taught using traditional methods.[10]

Conclusion

Classroom curricula based on LCE is well-established in medical education, but established clinical applications are less formalized. While several scripted methods exist for applying learner-centered education, LCE has the potential to inspire growth and further development. Educators must remember its key tenets, however, as summarized in Table 1. Learner-centered education is ideally an act of *discovery* — the learner goes through a self-motivated process of understanding that is inspired by the teacher.

Table 1. Key Tenets of Learner-Centered Education

1.	Create a safe environment, involving mutual respect that allows learners to acknowledge gaps and feedback.
2.	Promote active learners and active facilitators by focusing on specific problems identified by both learner and teacher.
3.	Value individual responsibility and internal motivation.
4.	Promote reflection and understanding.

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CHAPTER 8

Learner–Centered Clinical Teaching Scripts

Introduction

The "script" theory is a concept from cognitive psychology that explains the routine and commonly reflexive way human beings compile and compare events of daily life.[1] Also known as "schemas", scripts arise from day to day encounters, which occur so frequently that the sequence becomes predictable and expected. Applied to medicine, illness scripts similarly compile information into a stereotypical model of disease through common patient presentations.[2] For example, a male with anorexia, nausea, vomiting, and sharp right lower-quadrant pain may describe a script for appendicitis.

Teaching these scripts to learners synthesizes their general medical knowledge with a real patient scenario, focusing relevant information to make a correct diagnosis.[3] Described another way, clinical scripts incorporate specific disease or illness scripts with particular patient characteristics and situation scripts; and, in so doing, effectively convey knowledge on pathophysiology, patient-physician communication, and the larger context of care for the learner.[4]

Setting the Stage: Building a Relationship with Learners

In recent decades, medical education has seen a cultural shift from teacher-centered learning to the learner-centered teaching model that was emphasized in the previous chapter.[5] Building on the principles of adult learning, clinical education engages the learner in action and reflection via real-life patient encounters, making knowledge relevant, participatory, problem-focused, and immediately applicable.[5] This is no more true than in the emergency department, where the "see one, do one, teach one" model of medical education – despite accurately reflecting the need to gain practical learning, acquire skills, and convey knowledge – is no longer sufficient for the learner.[3]

An ideal clinical instructor embodies a compassionate and astute physician, an interested and available teacher, a responsible supervisor, and a friendly and positive supporter – one who is fully aware of a learner's inherent abilities that

need further fostering, as well as what deficiencies need guided instruction.[3] To be well-rounded and pertinent, a teacher also must understand the sociocultural context in which medicine is practiced, with attention paid to educational curricula, health care policy, ethics, and organizational standards.[3] The learning vector theory describes how learners move from dependent learners to collaborators and ultimately to independent, self-guided practitioners.[6] With this trajectory in mind, and borrowing on the concepts of adult learning, teachers must treat learners as valued colleagues with individual educational needs.[7]

To build a relationship with learners – or "set the stage," as it were – the teacher must create a positive learning climate in which to ask questions and provide feedback.[7] A positive learning climate is fostered by investing in personal relationships and considering the context of the interaction. Asking questions requires the readiness to listen attentively, read nonverbal cues, and adjust to the knowledge base of the learner with regard to his or her comprehension, application, analysis, synthesis, and evaluation of information, as it pertains to a patient case.[8] Feedback must be timely, specific, and behavior-centered in order to be maximally effective.[9]

Writing the Script: Diagnosing the Learner

Diagnosing the learner is a crucial step to improving clinical development. Medical students have been described as progressing through four stages: reporter, interpreter, manager, and educator.[10] Organizational categories for diagnostic reasoning were stratified by medical educator Georges Bordage, M.D., PhD., as: *reduced* (lacking knowledge to make connections between presentation and disease), *dispersed* (abundant knowledge without context), *elaborated* (using "semantic axes" such as acute vs. chronic or unilateral vs. bilateral to weigh diagnoses into those most likely and least likely), and *compiled* (recognizing patterns and synthesizing into cohesive terms), with the latter two representing more advanced approaches for the learner.[11]

With this in mind, many common errors in the learner's clinical thinking, such as not generating plausible hypotheses, gathering too much information, interpreting cues incorrectly, overemphasizing positive findings, committing to premature closure, and ordering excessive tests, may simply stem from inexperience on the part of the junior clinician.[12]

Building the Scaffold: Frameworks for Active Instruction

A thematic review in the mid-1990s found that clinical instruction is "variable, unpredictable, immediate and lacks continuity."[13] The traditional model of case presentation was guided by the teacher as expert consultant, with the majority of inquiry directed at clarifying patient information.[14] The one-minute preceptor model shifted the focus to the learner, and has been proven to be more efficient and effective than the traditional method.[14] Since this model's inception, other formats have been developed to further focus the emphasis of education on the learner, such as the SNAPPS mnemonic and L-CARE in clinical teaching model, as described below.

The One-Minute Preceptor

In 1992 medical educator Jon Neher, M.D., published a five-step model for clinical teaching in the outpatient family medicine setting, which is now known and independently validated as the "one-minute preceptor."[16] Practiced across specialties and settings, it engages the learner to reflect on a patient case by: 1) getting a commitment, 2) probing for evidence, 3) teaching general rules 4) reinforcing what was done right, and 5) correcting mistakes.[15]

Table 1. The Five Microskills of the One-Minute Preceptor

1.	Get a commitment.
2.	Probe for evidence.
3.	Teach general rules.
4.	Reinforce what was done right.
5.	Correct mistakes.

(Adapted from Neher, 1992)

An example of this may be highlighted via the typical case of a patient with chest pain in the emergency department. After the learner's case presentation, the teacher may ask "Now, what do you think is going on?" After eliciting this response, the second step may be to ask, "What did you consider in your differential diagnosis, and what evidence do you have to support the most likely one?"

By engaging the learner in thinking and verbalizing this knowledge, the teacher may identify the "mind map" of the learner.[16] This will then become the stage for teaching, either through a short clinical "pearl" or a mini-lecture, as appropriate to the patient's case, the environment, and the learner's level of understanding of a particular topic. The pearls need to be short and to the point to remain relevant in the emergency department. Finally, feedback is given in a case-specific, timely, behavior-focused manner by reinforcing correct thinking and identifying problem

areas.[9] Educators have rated the one-minute preceptor as more effective and more efficient than the traditional model.[14]

The SNAPPS Model

Formulated to place the emphasis on the active role of the learner in clinical education and to shift the focus from instructor as *expert* to instructor as *facilitator*, the SNAPPS mnemonic developed by education researcher Terry Wolpaw, M.D., reminds the learner to: **S**ummarize briefly the history and physical examination, **N**arrow the differential diagnosis to several possibilities, **A**nalyze the differential by comparing and contrasting options, **P**robe for ambiguities, challenges, and different approaches, **P**lan patient management, and **S**elect a case-specific topic for further self-directed learning.[17] This builds on the one-minute preceptor, and further adds a level of self-guided study for the learner.

Table 2. SNAPPS Mnemonic for Learner-Centered Teaching in the Outpatient Setting

1.	**S**ummarize briefly the history and findings.
2.	**N**arrow the differential to two or three relevant possibilities.
3.	**A**nalyze by comparing and contrasting the possibilities.
4.	**P**robe the teacher by asking questions about uncertainties, difficulties, and alternative approaches.
5.	**P**lan management for the patient's medical issues.
6.	**S**elect a care-related issue for self-directed learning.

(Adapted from Wolpaw, 2003)

Although led by the learner, the participation of the teacher in a paired collaborative conversation is essential to ensure that each component is adequately addressed. Experimental validation revealed students using the SNAPPS format improved, when compared to non-SNAPPS peers in categories that measure expression of clinical diagnostic reasoning and learning issues.[18]

The L-CARE Model

The recently developed Learner-Centered Approach to Raise Efficiency (L-CARE) in clinical teaching involves: 1) addressing the learner's *feelings* toward patient care and studying issues, 2) establishing *expectations* from the learning encounter, 3) sharing *ideas* that maximize efficiency and energy on the part of the teacher, and 4) mutual self-assessment and constructive feedback or *impact*.[19] This transforms SNAPPS into an efficient model for both learner and teacher. Special additional consideration is also given to the many contextual variables that affect education, and this model can assist with defining obstacles for difficult learners.

Figure 1. L-CARE in Clinical Teaching
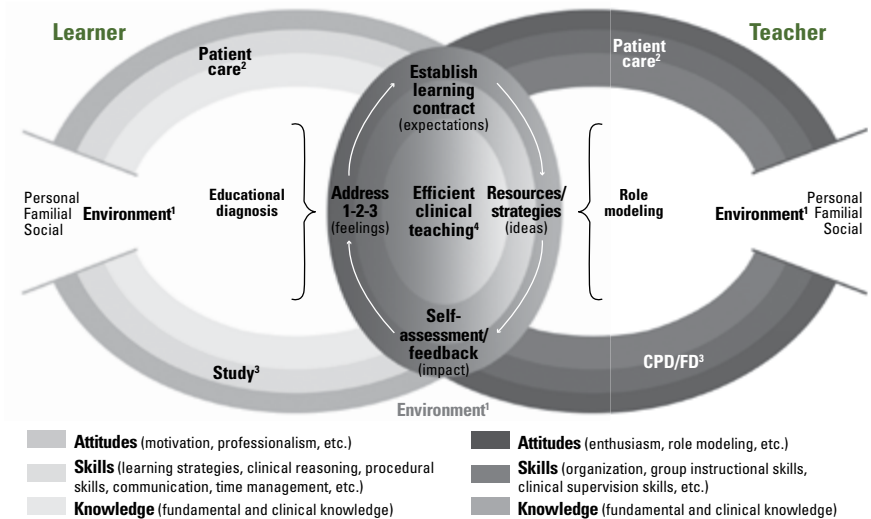
(Adapted from Lacasse M., et al., 2009)

Conclusion

Today's theater of medical education is primed by a collaborative relational approach based on adult learning and centered on the individual goals of the learner. This is assisted by frameworks, such as the one-minute preceptor model, which incorporates feedback in an easy-to-learn algorithm; SNAPPS, which guides the learner through the educational encounter and encourages independent study; and L-CARE in clinical teaching, which further focuses on context and efficiency.

The development of teaching scripts reminds the teacher to slow down and reflect; to practice whenever possible, using different formats and for different levels; and to keep a list of favorite scripts, until they become committed to memory.[7] By considering personal motivations for teaching, instructors may further develop personal philosophies to guide their careers as empathic providers and effective role models.

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CHAPTER 9

Direct Observation of Learners

Introduction

Direct observation of learners is a tool that has been utilized in medicine for centuries: in fact, the expression "see one, do one, teach one" comes from the idea that clinical skills are best learned through direct observation. Direct observation is defined as observing and giving feedback on clinical skills in the natural practice environment.[1] This practice – when performed timely, constructively and comprehensively – can lead to formative, practice-changing feedback as well as improved patient care by the learner.

Simply by observing everyday resident-patient and resident-staff interactions the facilitator can gain insights regarding the learner's medical knowledge, patient care abilities, communication skills, professionalism, and practice-based learning and systems-based practice. In 2010, the Accreditation Council for Graduate Medical Education (ACGME) went a step further, recommending the use of direct observation to evaluate interpersonal and communication skills.

Interestingly, direct observation is commonly used in undergraduate education, but its use often decreases in postgraduate education, likely due to a perceived lack of time. In fact, researchers have found that only 3.6% of interaction time between residents and faculty is spent using direct observation.[2]

Why Do We Use Direct Observation?

Direct observation has many advantages for both the learner and the facilitator. First, it occurs in the clinical setting and allows not only for real-time observation with immediate feedback, but also for observation in a naturalistic environment. All aspects of interpersonal communication can be evaluated, and facilitators can also note how distractions affect the learner's interaction with the patient.[3] Similarly, while standardized testing commonly assesses medical knowledge, professionalism and communication skills can be better evaluated by observing real-life encounters.[4]

Direct observation has several positive effects. Bedside teaching, a tool that allows experienced clinicians to reinforce the textbook understanding of disease processes, employs direct observation to assess the history and physical examination skills of learners.[5] Improved patient education is another benefit. In one study, patients felt that they had a better understanding of their diseases after bedside

discussion.[6] Furthermore, a recent study demonstrated that direct observation sessions resulted in increased global clinical rating scores, National Board of Medical Examiners examination scores, and improved clinical skills examination performances for medical students.[7] Finally, learners appear to appreciate direct observation, noting that sessions were valuable to their educations and that areas needing improvement were correctly identified. Importantly, and contrary to some perceptions, learners did not find the experience intimidating.[8]

Direct Observation Tools

Direct observation can be performed informally by a facilitator simply observing a learner's encounter with a patient, or in a more structured way with specific observation tools. It also can be performed using simulated or standardized patients, either in person or through recorded encounters. In its simplest and most common form, direct observation employs a facilitator to observe a learner's interaction with a patient. After the period of observation, feedback can be given verbally or with detailed written comments. Such interactions often lead to valuable and specific feedback for the learner that is timely, constructive, and actionable.

A number of tools have been formulated to help facilitate direct observation of learners. They range from using standardized patients to assess history-taking and communication skills (e.g., informing a patient of the death of a loved one) to using real-time checklists to assess learner competency in performing a physical examination. Nevertheless, of 55 tools identified by researchers in a recent systematic review of 85 articles, few have been tested for validity. The most frequently measured outcomes were the trainee or observer attitudes about the tool, whereas self-assessed or objectively measured changes in knowledge or clinical skills were infrequently reported.[9]

One tool, the Mini-CEX (Clinical Evaluation Exercise) has been used for medical students, residents, and fellows in internal medicine, but has adaptations for cardiology, palliative care, and other specialties. It is composed of a 10-20 minute observation of an interaction, and utilizes a nine-point rating scale.[15] In the tool, learners are judged on their history-taking abilities, physical examination skills, clinical reasoning, and overall clinical competence. A recent survey of internal medicine residency programs notes 90% of residency programs use the Mini-CEX to evaluate patient care.[10]

Another tool proposed for direct observation is specific to the field of emergency medicine. The Standardized Direct Observation Assessment Tool (S-DOT) was developed by the Council of Emergency Medicine Residency Directors (CORD-EM) in 2002 to assess emergency medicine resident outcomes in the six core competencies. The S-DOT begins with 26 behaviors expected in an encounter and assigns them to one of the six competencies.[14] The learners are then rated as "needs improvement," "meets expectations," "above expected," and "not assessed" for each metric. A recent study shows the S-DOT has good inter-rater reliability, although the authors note more studies regarding both S-DOT's reliability and validity are needed.[11]

Challenges

Although direct observation employs many simple tools, there also are several barriers to its successful implementation. First, many authors have noted the *Hawthorne Effect* can hinder evaluation through direct observation. Described in 1955 by Henry Landsberger, this theory postulates that subjects of an experiment change their behavior simply because they are being studied. Another limitation may be faculty reluctance to give learners low scores for performance. Nick Jouriles, M.D., medical educator and former ACEP president, noted this may be the result of generous grading systems or reluctance to give a bad grade, since feedback typically is given face-to-face.[12]

Lack of time and proper training also can present challenges to implementing direct observation in the clinical arena. Although several studies demonstrate that direct observation does not increase preceptor time, lack of training for the facilitators remains valid concern.[4] Researchers noted faculty preceptors failed to identify 68% of errors committed by residents after watching a video of a complete CEX setup designed to depict a "marginal" performance. In fact, 69% of the faculty preceptors rated these performances as satisfactory or superior.[13] To this end, faculty workshops in which effective observation and feedback skills are taught may be useful.

Incorporate into Clinical Practice

Creating an accepting culture is the most important step toward integrating direct observation into daily practice. Learners, facilitators, inter-professional team members, and patients all should have an understanding of the observation and perceive it as routine and non-threatening. Facilitators should have departmental support for time spent with learners. In addition, the observation sessions should be frequent and short, and should be focused on a specific skill or behavior, such as patient communication or performance of a neurologic exam. Finally, direct observation should be followed by immediate and directed feedback.[4] Additionally, as described in Table 1, facilitators should keep several simple tips in mind in order to keep the sessions productive.[1]

Table 1. Facilitator Tips for Successful Direct Observation Sessions

Focus and concentrate	Set aside protected time without distractions, emails, etc.
Teach within a framework	Organize observation and feedback in a pre-determined manner to keep it manageable.
Be learner-centered	Ask learners what they would like to focus on before each session, and teach to their needs.
Teach process before content	Focus on the interaction and not the medicine. Refrain from critiquing differential diagnoses or plans.
Facilitate mutual trust	Make it a judgment-free interaction, and attempt a long-term facilitator-learner partnership.

(Adapted from Russell, 2009)

Conclusion

With medicine's shifting focus toward a competency- and outcomes-based evaluation system, direct observation is essential. Multiple tools are available to evaluate learners in the clinical setting, with both learners and facilitators reporting increased satisfaction with educational interactions. Direct observation continues to be a positive and effective tool for learners in the clinical environment.

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CHAPTER 10
Bedside Teaching

Introduction

Bedside teaching is any teaching that takes place in the presence of the patient, often at the patient's bedside. William Osler, M.D., the first physician to bring students to the bedside for clinical training, noted that there should be "no teaching without a patient for a text, and the best is that taught by the patient himself."[1] This method of teaching has comprised a large part of medical education for centuries.

Bedside teaching integrates the patient into the education process, demonstrates physical exam findings, and models professionalism. Unfortunately, we have moved learning away from our patients to the hallways, conference rooms, lecture halls, and the Internet. Bedside teaching comprised 75% of clinical teaching 50 years ago, but it comprises less than 20% of clinical teaching today.[2,3] This trend is due to a variety of perceived barriers to bedside teaching, some of which are more apparent in the emergency department.

Benefits of Bedside Teaching

Teaching at the bedside offers multiple advantages that cannot be reproduced in a lecture hall or textbook (Table 1). Having a patient present allows physical exam skills and important exam findings to be easily demonstrated. In addition, subtle exam findings can be appreciated and their correlation to the clinical presentation and relevant pathophysiology can be reviewed.[4] All senses can be employed by residents and students at the bedside to appreciate the clinical manifestations of disease. For example, a joint effusion can be described in a textbook, but the clinical signs – such as warmth, fullness, and ballottement – cannot be truly appreciated without a patient present.

Table 1. Benefits of Teaching at the Bedside

Bedside Teaching Opportunities	
1.	Demonstrate professionalism and model the doctor/patient relationship.
2.	Teach how to efficiently take a history.
3.	Teach physical exam skills and demonstrate abnormal findings.
4.	Use direct observation of learners to provide helpful feedback.
5.	Teach procedures.

Learners can gain insight into the sanctity of the doctor-patient relationship by watching residents and attendings interview and examine patients. Professionalism, humanism, efficiency in obtaining a history, and establishing rapport with the patient can be experienced firsthand at the bedside.[5] Alternatively, learners can take histories and perform physical exams under the direct observation of residents and attending physicians and receive timely and relevant feedback. This direct observation also can be used to evaluate learners.

Studies suggest that patients themselves prefer bedside rounds to rounds that occur outside of their rooms. In a study in the *New England Journal of Medicine*, patients were randomly assigned physician teams that rounded at the bedside, or teams that rounded in a conference room. The patients with bedside rounds were more satisfied with their overall medical care and felt their physicians spent more time with them. Physicians rounding at the bedside did, in fact, spend almost twice as much time with their patients – spending 10 minutes on average at the bedside, compared to six minutes for teams that rounded elsewhere.[6]

The emergency department is an ideal setting for bedside teaching. There are numerous opportunities in an environment that holds a high volume of undifferentiated patients of various ages with a variety of disease processes. Many patients in the emergency department present in the acute phase of a disease with physical exam findings that are often more pronounced than would be seen in clinics or on wards.[4] This provides a unique opportunity to discuss and appreciate the course of a disease.

Critically ill patients also present to the emergency department with regularity. Learners are able to see and participate in the resuscitation of these patients, as well as appreciate exam findings and diagnostic studies that yield a quick diagnosis in the critically ill. Patients with acute psychosis, ingestions, and alcohol intoxication also are common in the ED. When teaching is conducted at the bedside, learners gain experience in how to best deal with these difficult patients. Finally, the wide variety of procedures commonly performed in the emergency department create even more opportunities for teaching.

Perceived Barriers to Bedside Teaching

Residents and attendings may avoid bedside teaching, doubting their own levels of experience or ability to teach in this setting. Many clinicians wrongly feel they must attain a level of perfection in their fund of knowledge and clinical skills before instructing learners at the bedside. The emergency department is an unpredictable environment, and – unlike in the classroom – teaching points are not easily scripted.[7]

Rather than trying to achieve a level of perfection in a certain area, residents should find teaching points that are familiar to them and situations that are common in the emergency department. Appreciating signs of respiratory distress, assessing volume status, and interpreting capnography are just a few examples of teaching points that are familiar to emergency medicine residents. Residents can use these areas to gain experience and comfort in bedside teaching.

As academic medicine has evolved, less importance has been placed on educators. Academic centers hold fewer expert educators and conduct only a minority of education at the bedside. Surveyed residents and attending physicians cite this under-appreciation of educators as one of the largest barriers to bedside teaching.[8] An increasing number of teaching awards are being established at many institutions in order to address this obstacle. In addition, many residencies have integrated clinical education training into their formal curricula. By recognizing and rewarding effective clinical teachers, and by equipping residents with the tools and skills to be successful educators, this barrier can be overcome.

Time constraints provide another obstacle to bedside teaching; clinicians are now faced with more patients who need to be seen in shorter amounts of time. This is especially true in the emergency department, where residents and attendings often care for a number of critically ill patients simultaneously. These patients often require immediate care and stabilization, a stark contrast from the controlled inpatient setting, where bedside teaching first began.[4] Despite the pressures of a busy emergency department, bedside teaching can be conducted in concert with patient care, with teaching points being effectively communicated in a matter of minutes.

Short patient stays, interruptions as new patients arrive, and a focus on efficient patient flow are other barriers to bedside teaching in the ED. Despite these challenges, bedside teaching models can be tailored to accommodate this unique environment.

Characteristics of Effective Bedside Teachers

Specific attributes and teaching styles make some physicians more effective educators than others (see Table 2). A survey of family medicine residents across seven residency programs cited enthusiasm, clinical competence, and clarity as the most important characteristics for clinical educators to possess. An ability to respect the resident's autonomy also was a highly ranked skill; conversely, residents felt scholarly activity and serving as a role model worth emulating were *least* important.[9]

Table 2. Characteristics of Effective Bedside Teachers

Important Qualities for Bedside Teachers	
1.	Enthusiastic about the subject at hand
2.	Clinically competent and well-read on the topic being discussed
3.	Clear and articulate
4.	Respectful of the learner's autonomy
5.	Encouraging of the learner

A study utilizing an online survey of residents and faculty in Canada and North America found that ideal clinical teachers were "stimulating, encouraging, competent, and well-read." These characteristics were consistently chosen as the most important, regardless of specialty or level of training.[10] While the emergency department has not been surveyed for important teaching attributes, these results can be extrapolated. Residents must be clear and articulate, informed on the subject at hand, enthusiastic, and encouraging of students in order to be effective teachers at the bedside.

Effective Bedside Teaching Habits

Effective bedside teachers not only possess many of the aforementioned characteristics, they also demonstrate certain key habits. Exceptional teaching tailors the instruction to the individual; decisions should be made about what skills to emphasize and how best to challenge the learner. This concept is captured by the idea of teaching to a learner's knowledge "gap." By tailoring instruction to the situation and actively seeking opportunities to educate, the teacher can make adjustments according to his or her department workload, the receptiveness of the learner, the time of day, duration of a shift, etc.

Active involvement puts the learner in a position of responsibility and challenges them to make decisions about how to approach and manage patients. Learners also should be part of their own assessments by reviewing in detail – and agreeing to – the tasks and responsibilities they are expected to complete. Learners should expect to receive regular feedback from their teachers; at the same time, teachers should solicit feedback on their own performances as educators and clinicians.

Teachers also can make use of additional resources, such as personal files of ECG's, x-ray's, and web-based or evidence-based medicine resources, if they are prepared in advance. Finally, effective bedside teachers should look to create a supportive environment for teaching and role model these teaching behaviors for learners. By creating this environment and role modeling effective teaching strategies, effective habits can be demonstrated to learners and education can be seen as a regular part of the working environment. Many of these concepts are explored further in other chapters in this handbook.

Table 3. Habits of Effective Bedside Teachers

Effective Bedside Teaching	
1.	Tailor teaching to the learner and situation.
2.	Optimize teacher-learner interactions.
3.	Actively involve the learner.
4.	Actively seek opportunities to teach.
5.	Agree on expectations.
6.	Make use of additional resources.
7.	Be a role model.
8.	Provide and encourage feedback.
9.	Improve the learning environment.

Conclusion

While numerous barriers in modern health care explain the decline in bedside teaching, it remains one of the most effective forms of teaching in medical education. With the patient at hand, students can learn physical exam skills, explore the intricacies of obtaining a history in a professional manner, and receive feedback based on their performances. While the emergency department may seem like a challenging place to regularly conduct bedside instruction, it is an ideal environment, given the patient volume, pathology, and variety of diseases encountered.

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Teaching Emergency Medicine Procedures

Introduction

Invasive medical procedures are a critical and daily part of an emergency physician's scope of practice and range from tasks as simple as IV insertion to those as complex as resuscitative thoracotomies. Training and competence in the performance of these procedures are vital to the medical education of residents and students in the emergency department.

Residents frequently educate both medical students and fellow residents to help them develop procedural skills. Residents also supervise learners attempting invasive and potentially dangerous procedures for the first time. This role is fraught with challenges, and the manner in which trainees learn continues to evolve. Complicating matters further, patients frequently prefer more experienced clinicians to trainees; and opportunities for some specific procedures may be limited to when impact on outcomes is greatest and risk for complications is highest.[1] A summary of the possible approach to teaching procedures discussed in this text is located in Table 1.

Table 1. Tips For Teaching Procedures

1.	Obtain Consent.
	Make patients aware of the skill levels of all involved.
	Have a conversation about the procedure with the patient.
2.	Assess Your Learner.
	Have they had training in this procedure?
	Do they know the steps?
	Have they done it before?
	Do they have the technical skills?
	Should they try different methods to broaden their skill sets?
3.	Directly Observe.
	Discuss procedural actions aloud as they occur.
	Maintain open lines of communication with the patient.
	Intervene, if necessary.
	Report any errors.
4.	Provide Feedback.
	Allow for self-reflection.
	Provide specific and directed areas for improvement.

History of Teaching Procedures

The frequently used apprenticeship model of "see one, do one, teach one" has historically dominated the way in which physicians have learned to perform procedures. More recently, much has been made in medicine of the concept that 10,000 hours of dedicated practice are required to develop expertise in *any* field.[2] While the ideal level of training and experience required to perform procedures safely and effectively likely lies between these two extremes, resident educators should be aware of worthwhile educational techniques and the appropriate training levels needed to prepare junior learners to properly perform emergency medicine procedures.

Modern attempts to augment procedural education, while preserving interests in patient safety, include the use of medical simulation labs, cadaver labs, and the performance of procedures on the newly deceased. Each of these has drawbacks; the most rapidly growing field appears to be medical simulation. Research has shown improvement in a wide variety of measures, such as overall patient care, knowledge-retention, decreased error rates, reduced training time, and adherence to safety protocols.[3]

An entire chapter of this handbook has been dedicated to medical simulation and standardized patients. There is, however, very limited standardization of curricula across medical schools and graduate medical education. This leads to scattered and varied experience levels among trainees, who are faced with performing these procedures on actual patients. Ideally, those who are learning a procedure for the first time progress using a stepwise approach, which incorporates both instruction and assessment of the procedure.

The framework for systematic training and assessment of technical skills (STATS) is an example of this stepwise approach, which builds from knowledge, to simulated experience, to real patients, with assessments at each stage.[4] *See Figure 1 for the STATS flow diagram.* With this technique, procedural indications and contraindications are reviewed, and the procedure is broken down into individual tasks and steps. Once a learner has achieved an understanding of these, they are able to gain mastery in a simulated scenario before being allowed to perform the procedure on an actual patient. In the emergency department, this often can be done immediately prior to the procedure, if the task is not too dangerous or complex (for example, the splinting of a fracture). Learners then can be guided through the individual steps of the procedure on a patient, under the watchful eye of a facilitator.

Figure 1. STATS Framework for Procedures and Technical Skills

Knowledge-Based Learning
Task Deconstruction of the Procedure
Training in the Laboratory Environment
Transfer of Skills to the Real Environment
Granting Privileges for Independent Practice

The ACGME sets guidelines for the minimum number of procedures that a residency program must perform – either on real patients or in simulation – to maintain its accreditation. Meeting these minimums, however, by no means ensures resident competence, confidence in procedure basics, or the ability to train or supervise others at the time of graduation.[5] It is crucial that those learning to perform these procedures have a sufficient quantity – and *quality* – of experiences. The resident serving as teacher is uniquely positioned to help guide the trainee through this process and help optimize these opportunities.

Informed Consent

Implicit in performing invasive procedures is the informed consent of the patient. Informed consent is a necessary and important step completed prior to any procedure that poses real or potential harm to the patient. It is, in essence, a conversation between patient and physician that explains the risks and benefits of the procedure, and any alternatives that may be available. Medico-legally informed consent frequently involves a signed consent form; but, at its core, informed consent is a dialogue between patient and physician about the planned procedure. The consent process provides an opportunity for the patient to ask questions, and for the physician to disclose his or her experience level and complication rates with the proposed procedure.

When a student or resident with limited experience is performing the procedure, the supervising physician and learning provider should obtain informed consent together, and be completely forthright about the experience levels of those involved. Residents and medical students, however, often are very poor at discussing their experience levels with patients. A 2005 patient survey showed fewer than half of patients were aware they could be the first patient on whom a medical student might perform a procedure, while the majority thought they should be told if this were the case.[6]

There is some debate as to the opinion of patients about consenting to first-time procedures. An earlier survey of patients found 8% would not consent to sutures, 27% would not consent to intubation, and 52% would not consent to lumbar puncture if they knew it were the resident's first attempt.[7] Interestingly, this did not bear out when the question of consent was posed prospectively in the researcher's later survey.

Ninety percent of patients consented when medical students asked them directly, acknowledging it would be their first attempt at the procedure, but stating that they would be supervised.[6] Others have postulated that there is pressure on patients to consent when speaking directly with the trainee. A study in *Academic Emergency Medicine* states, "When allowed to answer anonymously and not having to confront an authority figure to do so, a majority of participants in this study would not allow a medical student to perform a first procedure."[8] Clearly more research is required in this area; nevertheless, it is ethically imperative for the consent process to inform patients of the experience levels of their medical care providers prior to any invasive procedure, as well as any associated risks, benefits, and potential alternatives to the planned procedure.

Assessment of Learner

The most important step in supervising and teaching a procedure to a trainee lies in assessing his or her competence prior to actual performance. There is wide variance in resident and medical student experience, and many learners feel inadequately trained to safely perform procedures without supervision. Researchers have found that the vast majority of mistakes made by residents when performing procedures are due to insufficient knowledge and experience.[9]

It is important to discuss with the trainee, in an open and honest manner, the level of his or her prior training (with medical simulation, cadaver labs, etc.) and the number of procedures previously performed. The goal should be an assessment of competencies in both critical and technical skill performance and operator confidence. This dialogue also potentially allows the supervisor to broaden the learner's base by offering different techniques or styles for those procedures without rigid protocol.

Knowledge of the basic steps of a procedure, and proficiency in the technical and manual skills required, are vital to successful procedure performance. Assessment of these is important in determining the level of overall learner competence. Reviewing the procedure prior to entering the room in a detailed, stepwise manner allows the teacher to fill any knowledge gaps and facilitates a possible discussion of variations in style. One also can ask a trainee to set up the necessary supplies and to prepare the patient, in an effort to provide a glimpse into his or her understanding of the steps required. Without prior experience with the trainee in a similar situation, only direct observation allows for assessment of technical skill and demonstration of any areas of concern.

Direct Observation and Feedback

Directly observing a trainee perform a procedure facilitates both learning and patient safety. Medical students and residents frequently are uncomfortable with procedures, particularly when they feel supervision is inadequate.[10] When errors occur under these circumstances, they can result in life-threatening complications with high morbidity and mortality.[11] More troublesome is research in which 45% of internal medicine house officers admitted to making mistakes, some of which were fatal; but only 50% of errors were ever reported to an attending physician, and only 25% to patients or family.[12] Real-time supervision allows for the supervisor to be aware of such mistakes immediately, and removes the disincentive of learners reporting an error to those responsible for evaluating their skills.

Direct observation also allows the trainee to talk through the procedure with the supervisor – step by step and as it is performed – to ensure no critical steps are omitted or done incorrectly. The supervisor may intervene, as necessary, to ensure patient safety. Open communication with the patient is crucial, as well, particularly when patient anxiety is high. A supervisor is well-suited for preparing the patient and guiding the patient-provider interaction, as it allows the trainee to focus on performance alone.

Overconfidence on the part of the trainee can be every bit as dangerous as insufficient knowledge or experience. The famed surgeon William Stewart Halsted, M.D., stated as far back as 1904:

> *"The intern suffers not only from inexperience, but also from over-experience. He has in his short term of service responsibilities which are too great for him; he becomes accustomed to act without preparation and he acquires a confidence in himself and a self-complacency which may be useful in times of emergency, but which tends to blind him to his inadequacy and to warp his career."*

This situation may go unrecognized if confidence is mistaken for competence and the procedure is inadequately supervised. Direct observation helps ensure *high-quality* learning experiences over a higher *quantity* of experiences, which carry greater potential for the development of poor habits.

Providing robust feedback and debriefing after procedures is an integral part of supervising procedures. Reviewing the events and providing areas for improvement are of extraordinary value to the trainee. Techniques for providing feedback are discussed elsewhere in this book, but it is important to be direct, specific, and nonjudgmental.

Conclusion

Residents serve a vital role in developing the technical skills of medical students and their junior residents. Great strides are being made in medical education, particularly in the world of medical simulation, in an effort to reduce risk to patients and augment the learner's experience. The future of procedural teaching likely lies in the movement away from performing a set number of procedures throughout training to a formalization of procedural competence. In the meantime, the onus of determining this level of competence of trainees lies with the supervising residents and attending physicians.

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Clinical Reasoning in the Emergency Department

Introduction

At their very core, emergency medicine physicians are problem-solvers. Patients present to emergency departments everywhere in need of solutions to their problems. Emergency physicians must work through the patient's presentation and synthesize often incomplete information to formulate a working differential of diagnostic possibilities and initiate diagnostic and treatment management plans for those under their care. Clinical reasoning is a set of problem-solving skills used by all physicians to generate a meaningful differential diagnosis based upon a patient's presenting features. Physicians also must use this process to work through diagnostic possibilities with additional testing to create appropriate treatment strategies for their patients.

Medical academician Jerome Kassirer, M.D., describes clinical reasoning, also known as clinical cognition, as the "range of strategies that clinicians use to generate, test, and verify diagnoses, to assess the benefits and risks of tests and treatments, and to judge the prognostic significance of the outcomes of these cognitive achievements."[1] Clinical reasoning, which also has been termed "clinical decision-making" and "medical problem-solving," is the process by which physicians make clinical decisions. Meta-cognition, a term also found in the clinical reasoning literature, is the process of *thinking about* the way in which clinicians *think*.

The Importance of Clinical Reasoning

Presently, much of medical education consists of learning information and memorizing facts – the basic knowledge that is necessary to become a specialty-trained physician. A certain amount of knowledge is essential to be an effective physician, but no one can "know" everything within a certain field of medicine. In the age of the "cloud," massive amounts of information will be available to us through our handheld devices and within our electronic medical records. *How* we find, access, and use this information – and *how* we think about our patients – will soon be much more important than *what* we actually know. This is where clinical reasoning comes in.

Clinical reasoning typically is not taught in a formal fashion in medical training. Historically, junior physicians learned how to "think like a doctor" by observing and modeling the behaviors of a senior expert physician in action at the bedside. This method of teaching can be an excellent and useful way for residents to demonstrate their clinical reasoning skills to junior residents and students, but additional educational methods are needed. The emergence of problem-based, small-group learning – commonly used early in medical training – is one attempt to introduce clinical reasoning skills to junior clinicians. Formal instruction that highlights exceptional clinical reasoning skills (and warns against the pitfalls that arise when the reasoning is flawed) also is needed.

As patient safety, quality improvement, and medical error-reduction increasingly command the focus and attention of politicians, administrators, and the public, the importance of teaching clinical reasoning skills can be seen. Although, in one study, system-related errors comprised a large portion (65%) of medical mistakes, cognitive errors – or errors in how clinicians think about their patients – (74%) are equally important.[2] Research indicates that health care providers in cognitive specialties, such as emergency medicine, have diagnostic error rates around 10-15%.[3] If improvements are to be made, an emphasis in teaching physicians clinical reasoning skills needs to occur.

The Dual-Process Theory of Clinical Reasoning

Dual-process theory creates a clinical reasoning method in which two approaches—one intuitive and the other analytical—frame the way that most physicians use clinical reasoning.[4] The intuitive approach relies heavily on experience, and is most often used by expert clinicians who easily recognize patterns or illness scripts in forming their diagnostic impressions about patients. The analytical approach, which uses an algorithmic or a systematic approach to make sound decisions about patient presentations, is more useful for novice diagnosticians or those with less clinical experience. Clinical reasoning often involves a balance of these two cognitive processes, as determined by the particular patient presentation and situation. Let's look at each approach independently.

The *analytical approach* is a deliberate, conscious, and rational process that follows rules, is structured, and is based on probabilities.[5] Many examples of analytical approaches to clinical reasoning exist, including the ABC's in trauma, the *organ systems approach* in intensive care units, and the *exhaustive method* (asking an exhaustive number of questions and performing all possible physical examination maneuvers) used by first- and second-year medical students.

The *hypothetical-deductive model* takes a stepwise approach through hypothesis generation, evaluation, refinement, and verification.[6] Probabilities can be infused into one's clinical reasoning through use of a Bayesian approach. Analytical approaches can be time-consuming, potentially inefficient, and often can accumulate superfluous data; however, they provide a framework for novice clinicians to understand clinical reasoning. Analytical methods are most suitable for junior diagnosticians or in situations that are confusing, complex, non-routine, ambiguous and high stakes.

The *intuitive approach* is a holistic, reflexive, and often subconscious process that relies heavily on visual clues, experience, and recognition of patterns of illness.[5] The intuitive approach to clinical reasoning is the hallmark of the astute, expert clinician who walks into the room and "knows" what is going on with the patient. Experience and an ability to recognize patterns of illness, known as illness scripts, allow clinicians to know "intuitively" what the diagnosis is and how to manage the patient. An illness script is the way we expect a patient with a particular disease to look, act or behave. It includes the patient's presenting symptoms and complaints, demographic features, overall appearance, physical exam, and initial diagnostic test results. A classic illness script for acute appendicitis is a young male patient presenting with right lower quadrant pain and tenderness, fever, anorexia, vomiting, and guarding.

When using intuitive clinical reasoning, clinicians compare the patient's presentation to known illness scripts, looking for the best fit, while understanding that atypical presentations of both common and unusual illnesses can occur. Intuitive approaches have the pitfall of allowing for biases to enter into clinical reasoning, causing potential errors. The real benefit of intuitive clinical reasoning, especially for emergency medicine physicians, is *speed*. Intuitive methods are most suitable for routine and well-defined problems with less severe consequences from mistakes, instances of limited ability to gather information, and in time-critical situations. Junior diagnosticians can use intuitive methods for clinical reasoning, but they should recognize the importance of defaulting to the analytical approach, should the situation become confusing or complex.

Teaching Clinical Reasoning

The bedside is the ideal venue to demonstrate and teach clinical reasoning. The clinical cases of actual patients have the complexity, inconsistencies, and false leads that – when examined in real-time – provide the meaningful substrate for teaching. Variations of teaching techniques, including direct observation of learner's history-taking skills; learner-centered teaching scripts; and the modeling of clinical reasoning out loud, or through priming exercises, all can be used to teach clinical reasoning at the bedside. Examples of few of these techniques are described in Table 1.

Table 1. Bedside Techniques for Teaching Clinical Reasoning

Technique	Type of Technique	Description of Technique
Differential Diagnosis-Based Questioning	**Direct Observation** Directly observing a learner perform a history provides tremendous insight into his or her clinical reasoning skills.	Before going to see a patient with a junior learner, emphasize that you will be watching the trainee perform the history of present illness (HPI). Ask the learner to generate a differential diagnosis of possible conditions in his or her mind, while talking with the patient. The learner should explore each possible diagnosis with the patient in the HPI before moving onto other possibilities. The observer should be able to discern the learner's differential based on the questioning. Discuss the differential afterwards.
Worst-First Differential Diagnosis	**Learner-Centered Teaching Scripts** An initial analytical approach to teaching clinical reasoning in the emergency department is to prioritize the serious or life-threatening conditions in the differential diagnosis.	As a variation of the one-minute preceptor or SNAPPS oral presentation styles, ask your learners to include the worst diagnoses that they are considering **first** in a discussion of their differential diagnoses. Ask the learner to commit to providing at least three serious or life-threatening conditions when discussing any patient's differential diagnosis. This technique teaches learners to think like an emergency physician by considering the worst diagnoses first in their oral presentations.
Priming the Pump	**Reducing Diagnostic Confusion for Junior Learners** Focus a learner's history-taking and physical examination by priming the pump before the patient is seen. This is very useful for complex cases.	Before the trainee sees the patient, but after he or she knows the patient's vitals and chief complaint, ask the learner to state the differential diagnosis. Once a working differential is established, ask the learner what key questions and physical examination maneuvers will help clarify the diagnosis. By priming the pump, you help get trainees focused and thinking about the diagnosis *before* seeing the patient.
Thinking Out Loud	**Demonstration of Clinical Reasoning in Action** The learner or supervisor can actively speak out loud during the course of a presentation and state those diagnostic possibilities they would consider in the differential.	"Thinking out loud" was used as an experimental tool to assess what expert diagnosticians were thinking about during the course of a patient's workup. As an educational exercise, supervisors and learners can demonstrate the same technique at the bedside. This can be particularly elucidating in the context of a critical resuscitation, as clinicians **think out loud** and inform the other members of the resuscitation team what is happening inside their brains. A less obtrusive means of thinking out loud uses a marker-board, where trainees can jot down thoughts that arise during a case presentation, which can be reported back to the group after the presentation is complete.

The use of case conferences focused on both exemplary and problematic clinical examples also is an effective way to teach clinical reasoning. The key advantage of cases conferences, beyond the value of bedside teaching, is the ability to select cases that demonstrate complex elements of clinical reasoning not available in the random distribution of patients in the emergency department.

Case conferences focused on clinical reasoning are different than "typical" case conferences (which present information in summarized, digested capsules), in that they primarily highlight the judgmental aspects of the cases by allowing the presentation to unfold more slowly. The cases should include those that demonstrate excellent clinical reasoning, as well as those that show how cognitive errors arise and near-misses occur.[1]

Table 2. Tips for Running a Clinical Reasoning-Focused Case Conference

1.	Present and analyze the clinical information in chronological order.
2.	Provide data in small portions to mimic the actual accumulation of data over time.
3.	Use unmodified, genuine patient cases whenever possible.
4.	Select cases carefully to demonstrate key diagnostic clinical problem-solving and clinical reasoning concepts, as well as treatment decisions.
5.	Provide a coach or senior facilitator who also is unaware of the final diagnosis and can facilitate and monitor the group's discussions.

(Adapted from Kassirer J. K., 1991; Eva, 2004)

Conclusion

A final point about pitfalls in clinical reasoning skills must be made. Despite many strides made in the understanding of clinical reasoning, cognitive or diagnostic errors – both analytical and intuitive – continue to be made. Premature closure or anchoring bias, representativeness, and availability bias are a few of the culprit cognitive biases attributed to diagnostic error. Research has shown that these cognitive biases are the most common sources of cognitive error, outpacing errors due to faulty information-gathering or faulty knowledge.[2] While many advocate for additional training related to the recognition and correction of these cognitive errors, no convincing evidence exists that simply teaching about cognitive errors improves clinical outcomes.[5,6]

The teaching of clinical reasoning at all phases of medical training is likely to become more prevalent. Physicians will be trained less on "what to know" and more on "how to think," as the wealth of medical knowledge grows and the importance of problem-solving and clinical reasoning solidifies.

Suggested Readings

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Section III

Assessment and Evaluation of Learners
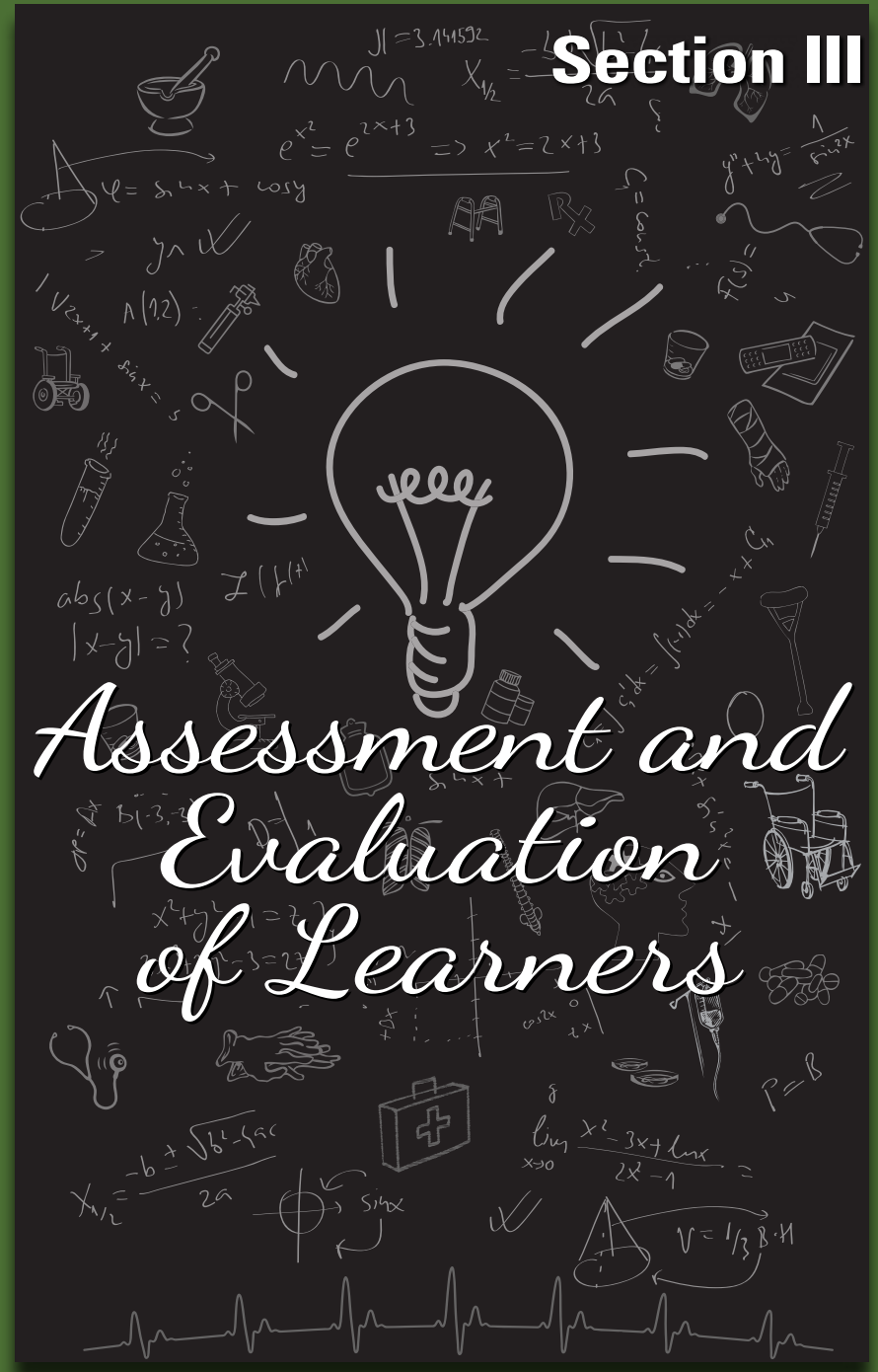
The Difference Between Feedback and Assessment

Introduction

Medical education relies on an apprenticeship model, in which learners gain experience through clinical encounters under the supervision of more senior staff.[1] The role of senior clinician and educator frequently requires residents to evaluate the competence of learners, including medical students, junior residents and other health professionals. This evaluation generally takes one of two forms: *formative assessment* or *summative assessment*. Understanding the role of each is essential to proper mentorship and evaluation.

Competence

Since 2001, the American College of Graduate Medical Education (ACGME) has required residencies to provide competency-based education and evaluation in six key areas: patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and system-based practice.[2] Researchers have defined professional competence as "the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individual and community being served."[3]

Competency is multifaceted and dynamic. It requires the integration of medical knowledge, reference materials, communication, procedural skills, moral judgment, teamwork, emotional intelligence, self-reflection and more.[4] Competence is an evolving status to be sought and maintained throughout one's career. Because of its breadth, learners require frequent evaluation of their performances to ensure they are continually improving; and, because development in such a variety of interrelated domains is required, multiple forms of evaluation must be employed.[5]

The Role of Assessment

According to researcher Ronald Epstein, M.D., assessment of medical professionals has three main goals:[4]

1. Provide direction and motivation for future learning – including medical knowledge, skills, and professionalism.

2. Protect the public by upholding high professional standards and screening out incompetent trainees and physicians.

3. Differentiate among candidates for advanced training.

Formative assessment, often described as feedback, is *nonjudgmental* and designed to guide *future* learning, generally focusing on the first goal of assessment. Summative assessment is *judgmental* and evaluates *past* performance, tending to focus on the second goal of assessment. These are not strict distinctions. Certainly learners will study what they expect to be tested on; hence, a summative assessment can guide future learning. And judgmental formative assessments may discourage a learner who is seeking guidance rather than evaluation, but these goals provide a basis for understanding the role of assessment.

Formative Assessment

Formative assessment is a critical element of clinical medical education. In his seminal 1983 paper, Jack Ende, M.D., describes feedback as "an informed, non-evaluative, objective appraisal of performance intended to improve clinical skills."[6] He highlights several key features of feedback that separate it from more traditional summative assessment.

First, feedback is objective appraisal; it is not judgment. Telling a learner, "Your treatment plan is wrong," only fosters uncertainty. Instead, more appropriate feedback might be, "That antibiotic regimen fails to cover gram-negative bacteria." This is an objective statement that makes no judgment of the learner, and instead encourages further investigation. Conversely, praise like, "You had a great shift tonight," is vague and does not encourage improvement; better would be, "You took a thorough history and developed a comprehensive differential diagnosis on that last patient." Feedback prompts self-reflection, reinforcing effective behaviors and correcting less-effective ones.[1]

Clinical competence is a complex, multifaceted achievement; learners need direction to stay on track. Frequent, non-evaluative appraisals — formative assessment or feedback — help the learner judge his own progress and encourage continual improvement. Multiple chronologic observations across multiple domains also give a more complete picture of a learner's development toward competence.

Another advantage of this form of assessment is that any element of clinical practice is a potential opportunity for providing feedback: patient presentations, physical exams, written notes, procedural skills, etc. Learners can be assessed over a wide variety of clinical scenarios. This makes feedback suitable for gauging clinical competency in areas not amenable to other forms of assessment.[5]

Summative Assessment

Summative assessments have long been a cornerstone of education. This form of assessment is used to measure whether a certain level of competence has been achieved at a given point in time.[5] Summative assessments are designed to evaluate the summation of a learner's knowledge, skills and attitudes; they make a judgment about a learner's competence or qualification for advancement.[4] The most well-known forms of summative assessment in medical education include multiple-choice exams, oral board exams, and objective structured clinical examinations (OSCE).

As an objective evaluation, methods of summative assessment strive for a high degree of reproducibility and validity. They are the basis for high-stakes examinations, such as licensing and certification exams, fulfilling an important role in self-regulation and societal protection.[4] Multiple-choice exams in particular are exceptionally reliable in assessing factual knowledge, problem-solving skills and some aspects of clinical reasoning.[3]

Conclusion

If current trends continue, further emphasis will be placed on competency-based education in the medical profession. Understanding the various elements of competency and the different modes of assessment is crucial to our success as residents and our role as resident educators. Assessment does more than set minimum standards for the practice of medicine; it can set the *values* for a program. Well-designed summative assessments will influence curricular content, and an emphasis on feedback will encourage a culture of self-reflection, continual improvement, and connection between senior and junior staff.[3]

Suggested Readings

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CHAPTER 14
Providing Feedback

Introduction

Feedback initially was defined by rocket engineers in the 1940's as "the control of a system by reinserting into the system the results of its performance." Child prodigy Norbert Weiner, Ph.D., "father of cybernetics," expanded this concept and applied it to the humanities. His notion of feedback as a vehicle for learning and improvement is widely utilized in the fields of business, education, and psychology, but is relatively new to clinical medicine.[1]

As it applies to clinical medical education, feedback occurs when the teacher observes the learner perform a certain activity and then provides a description of the performance in order to guide and improve future execution. Importantly, feedback – or formative assessment, as was described in the previous chapter – is distinct from summative assessment. As a resident educator, it must be clear to you that evaluation is *summative*, providing judgment against a standard; while feedback is *formative*, non-judgmental, and intended to provide trainees with information that will help them improve.[2]

The Importance of Feedback

Feedback is essential to the development of clinical skills. As Ende pointed out, "Without feedback, mistakes go uncorrected, good performance is not reinforced, and clinical competence is achieved empirically or not at all."[1] Furthermore, in the absence of feedback from their teachers, learners will inevitably create their own feedback by attaching often inappropriate importance to internal or external clues. Something as simple as a raised eyebrow can quickly be interpreted as negative feedback when, in fact, it had no such connotation. This type of self-appraisal can be a slippery slope, leading the student even further adrift in the already unfamiliar setting of clinical medicine.[1]

Providing Effective Feedback

Feedback fails when the student feels embarrassed, angry, defensive or not invested.[3] A set of guidelines can help avoid these problems and provides a rubric for effective feedback in clinical medicine. (See Table 1)

Table 1. Guidelines for Effective Feedback

Feedback should be:	
1.	Undertaken with the teacher and trainee working as allies
2.	Expected
3.	Well-timed
4.	Based on direct observation
5.	Limited in quantity
6.	Specific
7.	Limited to behaviors that are modifiable; offer subjective data that is labeled as such
8.	Descriptive and non-judgmental; based on decisions and actions rather than on assumed intentions or interpretations

Feedback should pair teacher and trainee as allies. It is important for the teacher and trainee to be allies with a shared goal of improving and expanding the student's knowledge and skill.[1] Due to the nature of shift work and the fluctuating level of patient acuity in the emergency department, it is often difficult for trainees to develop a significant relationship with their teachers. Even in this setting, however, the teacher can set a precedent (at the beginning of the shift or at the beginning of the rotation) describing this shared goal and the plan for achieving it.

Feedback should be expected. The learner's orientation to the emergency department should include a framework that explains the importance of feedback in clinical medical education. Trainees should be advised to expect feedback from their teachers, with the caveat that feedback comes in a variety of forms and at a variety of times. These forms include *brief feedback*, which takes little time and can occur throughout a clinical shift; *formal feedback*, which may occur at the end of a shift in a more formal setting; and *major feedback*, which is likely to occur at the end of a clinical rotation.[2]

When feedback is expected, the student is less likely to be caught off-guard and more likely to internalize the process and actively participate.[4] It is often helpful to precede feedback with a statement that defines it as such. This allows the learner to mentally prepare and eliminates the chance that he or she could misunderstand the statement as something other than feedback.

Feedback should be well-timed. It is important to consider where and when feedback is given. Feedback should be private and occur as close to the observation period as possible. Students are much more likely to recall the specifics of their physical exam techniques and incorporate feedback into future practice when it is given immediately after a patient encounter.[5] When delivering formal feedback at the end of a shift, consider finding a relatively quiet location, such as an empty patient room, where the student and teacher feel comfortable and removed from the chaos of a busy department. This removed setting eliminates the possibility of embarrassment in front of colleagues when discussing areas for improvement.[6]

Feedback should be based on direct observation. Direct observation is an integral part of the feedback process. Importantly, the observation need not be lengthy or time-consuming to be valuable. Even simple interactions, such as delivery of discharge instructions or updates on lab results, can provide the teacher with an opportunity to observe the student's clinical practices. Since emergency medical care has so many facets, elements of efficiency, communication, documentation, and patient satisfaction all are possible topics for feedback.[6]

Feedback should be limited in quantity. It is important to limit the amount of feedback given. When the learner is overwhelmed with a barrage of feedback, it is rarely internalized and incorporated into future practice. The fast pace and high volume of the emergency department lends itself to brief, digestible, and frequent advice on topics ranging from procedural techniques to interviewing skills.

Feedback should be specific and limited to behaviors that are modifiable. It is important to focus feedback on behaviors that can be changed. Personality traits are not modifiable in the setting of clinical medicine and should be avoided as an area of focus. In these situations, it is especially important to anchor feedback in specific descriptions of witnessed behavior. For example, if a learner comes across as terse or rude with a patient, the teacher should provide specific observations and recommendations that can be acted upon, such as improving eye contact, decreasing the rate of speech, and making introductions a priority.

Often, clarifying a behavior before giving feedback is necessary to assess a learner's level of knowledge and skill. Let's say, for example, that a student performs an exhaustive neurologic exam on a patient complaining of a mild cough. Rather than accusing the trainee of being "obsessive-compulsive," it may be more helpful to say, "I noticed that you were very thorough in your neurologic exam of this patient; tell me more about what you were hoping to identify." This statement is more likely to facilitate a conversation in which the learner self-identifies behaviors that can be changed in order to better tailor the exam to the patient's complaint.

Subjective opinions should be labeled as such. Effective feedback can include subjective observations, but it is important that they are identified as such.[1] This can be accomplished with a preparatory phrase, such as an "I" statement. For example, it is appropriate to say "I felt like you were uncomfortable during the interview." This allows the student to recognize that these were the teacher's personal feelings and leaves room for the student to explain the interaction from his or her perspective. The teacher should keep in mind that it may be more helpful to describe the specific actions or gestures that implied the student was uncomfortable.

Feedback should be descriptive and non-judgmental. As emphasized previously, feedback is not evaluation. The teacher avoids the impression of judgment by focusing specifically on what was *seen* and *felt*. Superficial accolades like, "Good job with that lumbar puncture," are not nearly as helpful as more descriptive observations, such as, "You were very thorough in palpating all of your landmarks and positioning the patient properly. I also like the way that you prepared the patient for what was going to happen during the procedure." To avoid the perception of judgment, it is important to base your descriptions on decisions and actions, rather than on assumed intentions or interpretations.

Delivering Feedback

Even with knowledge of what the content of feedback should be, it is often difficult for the teacher, as well as the learner, to participate actively in feedback. This can be particularly true when the feedback is negative. Education literature, as well as practical experience, provides us with a number of tools for the successful delivery of feedback.

Resident educators should elicit self-assessment. Many teachers and learners find that self-assessment is a relatively stress-free way to initiate a feedback dialogue. The teacher can start with an open-ended question such as "How do you think things went today?" This allows the learner to bring up areas for self-improvement, including some that the teacher may not have identified. When learners identify these areas, they are more likely to be invested in taking steps towards their improvement. Self-assessment also helps to ensure that the teacher and learner have shared goals, an integral step in effective feedback. The teacher should be aware, however, that many learners are unable to self-assess accurately, and the teacher must be prepared to provide constructive feedback, when this is the case.[7]

Resident educators should focus on the positive. Positive reinforcement that is descriptive of specific behaviors is a cornerstone of effective feedback. Some feedback however, inevitably will be perceived as negative. As Ende mentions, "There is simply no way that you can inform a student that a differential diagnosis did not include the most likely disease without causing some disappointment or embarrassment."[1]

One method that may help alleviate some of the anxiety associated with negative feedback is the "feedback sandwich," where negative feedback is given between more positive comments. Although negative feedback can be difficult for teachers, as well, they should not shy away from this task, keeping in mind that appropriate delivery of negative feedback mitigates much of the anxiety associated with it. Furthermore, teachers must keep in mind that students desire feedback in general, and associate it with excellent clinical teaching.[8]

Resident educators should help create a plan for improvement. When feedback is most effective, the teacher and student succeed in identifying areas of strength and weakness.[3] At the conclusion of such a discussion, the teacher should recap the important points and help the learner identify a plan for self-improvement and assessment. This can take many forms, but the teacher should be prepared to offer suggested readings, practice cases, or even take the time after a shift to review procedural equipment, EKGs or radiographs. At the conclusion of such a session, the student should feel confident about how progress on the selected clinical skill will be monitored in the future.

Conclusion

Resident educators should incorporate feedback into clinical practice. There are numerous strategies to assist in the consistent delivery of effective feedback. Feedback cards, which have been advocated by some as a useful tool, can be filled out by the preceptor on a daily or weekly basis. A common tool used for overall assessment, the SDOT, has been used effectively at multiple institutions to appropriately evaluate residents' clinical skills.[9] Other methods include faculty and resident development exercises, where effective feedback is taught and practiced. Teaching the students about feedback at the beginning of their clinical rotations achieves several goals: it allows them to identify and actively seek feedback, and prepares them to receive it. It also provides them with a foundation for their up-in-coming roles as *providers* of feedback.

Suggested Readings

Bernard, A.W. Kman, N.E. Khandelwal, S. (2011). Feedback in the Emergency Medicine Clerkship. *WJEM*, 12 (4), 537-542.

Ende, J. (1983). Feedback in Clinical Medical Education. *J Amer Med Assoc*, 250 (6), 777-781.

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Assessment Frameworks

Introduction

Assessment is defined as "any method used to better understand the current knowledge that a learner possesses."[1] In medical education, assessment is a measure of skill-acquisition and learning for a student or resident. This method of evaluation is frequently used to grade learners on their progression from basic medical knowledge (i.e., beginning of medical school) to action (i.e., end of residency).[2] In assessment, the evaluator forms an overall composite judgment of a student over a period of time.

Assessment is distinguished from feedback in that assessment is a judgment made at the *end* of a certain period of time about how a learner has performed; whereas, feedback consists of *ongoing* suggestions for improvement over that time period. For example, an assessment on an individual learner often occurs at the end of a rotation or a block; in contrast, feedback may have occurred at the end of each day's clinical work. Ideally, the evaluator who is assessing the learner is actively playing a role in setting goals and evaluating growth over this defined period of time. Said another way, assessment is a *summative judgment* of the learner; feedback is a *formative suggestion* to modify behavior. (See previous chapter for additional clarification on the differences between feedback and assessment.)

Since assessment is an overall composite evaluation, the judgment may be a combination of different tools and methods to determine what a learner *understands* (knowledge), what a learner *does* (skills), or what a learner *portrays* (attitude). For clinical evaluations, this includes a spectrum of assessments of bedside manner, patient care, medical knowledge, interactions between the learner and patients and staff, and utilization of health care resources. In medical education, assessments are most commonly performed by a faculty member who is directly supervising the learner throughout a rotation. There are four categories in medical education to which almost all students are exposed. These include written tests; performance tests; clinical observational methods; and a miscellaneous category, which consists of assessments such as oral exams, learner portfolios and case presentations.

Written Tests. Students respond to written questions in one of two ways. Constructed-response tests usually present with a question for which students create a response, such as an essay or short answer. Selected-response tests, also known as multiple-choice tests, present a question with a number of answer choices.

Observation of Clinical Performance. Informal or formal observation of students in clinical settings with real patients, in which the supervisor fills out an assessment form on learner performance.

Performance Tests. Formal testing based upon an observation of clinical performance, in which students are tested on what they would do in patient situations. The most well-known example of this is the Objected Structured Clinical Exam (OSCE) test.

Other Assessments. These can include tests such as oral boards, case assessments, and portfolios of student experience.[2]

Table 1. The ACGME Core Competencies

Patient Care (compassionate, appropriate, effective)
Residents must be able to triage patients into critical, emergent, or low acuity; perform a primary assessment to stabilize patients; communicate effectively with patients to perform a focused history and physical exam; identify the emergent process that needs work up, and manage health problems for all patient populations.
Medical Knowledge (biomedical, clinical, cognate sciences, and their application)
Manifested through annual emergency medicine examination scores, direct observation, direct questioning during clinical care and teaching experiences, journal club, patient presentations, and scores on home study course self-tests.
Practice-Based Learning and Improvement (investigation and evaluation, appraisal and assimilation of evidence)
Evaluated through a progressive, graded improvement in clinical care; the use of evidence-based medicine during clinical practice; continually assessing the evidence in real time to help guide medical decisions; and appraising decisions by attending morbidity and mortality reports that discuss potential new investigation into management of certain disease processes.
Interpersonal and Communication Skills (effective information exchange, teaming with patients and families)
Manifested through direct observation of communications with other residents, attending physicians, physicians from other services, non-physician clinical staff, non-physician non-clinical staff, and patients and their families.
Professionalism (carrying out professional responsibilities, ethics, sensitivity)
Demonstrated through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
Systems-Based Practice (awareness and responsiveness to larger context and system of health care, use of system resources)
Exhibited by the use of the entire health care system in patient care; utilization of appropriate hospital resources and community resources for patient follow-up; understanding how to manage acute disasters.

(Adapted from www.acgme.org)

How are Residents Assessed?

In 2001 Michael G. Stewart, M.D., created a framework for assessing resident progress. Adopted by the ACGME and based on core competencies, the framework is the standard assessment tool in resident education in the United States.[3] The ACGME has chosen six core areas in which proficiency is required to successfully complete residency training (See Table 1 on page 82).

In the early 1990's Canada developed a similar competency-based assessment program, the CanMEDS *Physician Competency Framework,* which has been adopted as the official "barometer" for graduate medical education by the Royal College of Physicians and Surgeons of Canada.[5] (See Figure 1.) This framework, which outlines seven core competency roles, has been used as a model for many health professions. Both the ACGME core competencies and the CanMEDS roles address similar domains within medical education that have been deemed to be crucial attributes for all physicians-in-training, and serve as a gauge by which educators assess their learners.

Figure 1. CanMEDS Roles
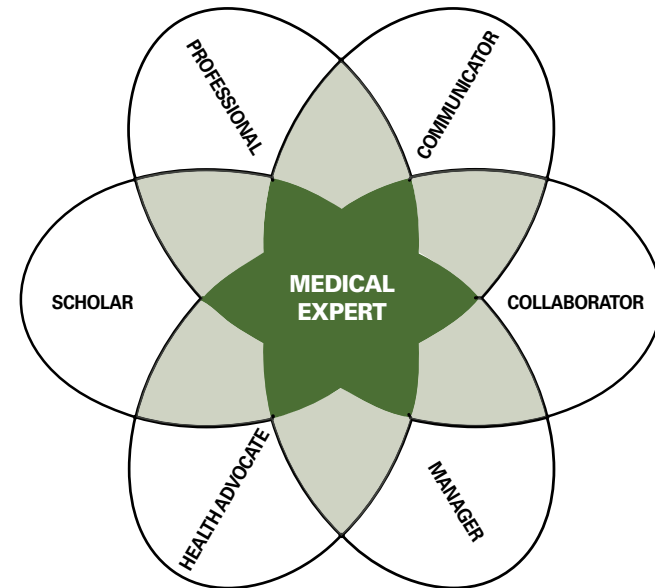
(Adapted from www.royalcollege.ca/portal/page/portal/rc/canmeds)

As a resident educator you will be assessing junior residents, so you must be intimately familiar with the ACGME's core competencies. As some medical schools apply the criteria directly to the assessment of medical students, understanding of this framework is essential.

The Council of Emergency Medicine Residency Directors (CORD) examined the tools currently being used in medical education to assess the six core competencies as they specifically relate to emergency medicine resident education. Table 2 summarizes these tools.[4]

Table 2. Resident Assessment Tools

Direct Observation	Real-time observation and feedback of the resident while on shift performing patient care.
Simulation and Models	Tools to simulate disease processes or patient care situations (mannequins, models, animal labs, computer labs), in which residents can practice procedures, and interactions with patients. Immediate feedback can be given to the resident.
Standardized Patients	Healthy actors who are trained to imitate a specific disease process. The resident must communicate and treat the patient effectively. Feedback to the resident can focus specifically on communication, interpersonal skills, and professionalism.
Objective Structured Clinical Exam (OSCE)	Clinical stations for residents with certain tasks to complete, ranging from clinical interaction to procedure stations.
Standardized Oral Exams	Standardized cases for residents to participate in with an oral board examiner, testing important core concepts and basic knowledge in emergency medicine.
Portfolios	Compilation of written documents meant to reflect on a resident's time during training. These documents may include lectures, patient follow ups, quality improvement projects, procedure logs, etc.
Record Review	A review of a resident's patient interactions, which charts documentation, billing, resource utilization, number of patients seen per hour, etc.
Procedure Logs	A record of all resuscitations, core procedures in emergency medicine, and a requirement of the ACGME.
360 Global Evaluation	A composite evaluation, which compiles assessments from all staff members who interacted with the resident throughout his or her entire residency training, and makes a global statement on the resident's performance.

(Adapted from www.acgme.org)

Medical Student Assessment Frameworks

While the core competencies have become the standard tool for the assessment of residents, they are not always the *preferred* tool. While many medical schools have adopted the core competencies into their rotational evaluations, there are other assessment frameworks that are more specific to the educational development of medical students.

The RIME model was developed at the Uniformed University School of Health Sciences to assess student performance during clerkships. The framework corresponds to the stages that medical students should undergo in the development of clinical expertise; **R**eporter, **I**nterpreter, **M**anager, **E**ducator.[6,7] The benefit of this method is that it allows the teacher to describe what he or she sees, lending a more honest evaluation. Table 3 lists the four stages described by Louis Pangaro, M.D., who created the RIME framework.

Table 3. Descriptions of the Levels of the RIME Framework

Reporter	Reliably gathers, organizes, and communicates clinical information with good interpersonal skills
Interpreter	Prioritizes and analyzes patient problems, successfully takes ownership of the creation and justification of differential diagnoses
Manager	Proposes reasonable diagnostic and therapeutic options while successfully taking responsibility for all aspects of patient care
Educator	Demonstrates self-directed learning and consistently educate others

The benchmark for graduating U.S. medical students should be the mastery of the "reporting" stage and being well-versed at interpreting common medical problems. Advantages that have been reported from the RIME method include identifying students with difficulties, enabling the assessment of professionalism, and providing real-time feedback.[8]

When using the RIME framework in assessing medical students, it is thought that early learners in the second and third years of medical school should be held to the standard of being solid reporters. Students at this stage should be able to gather information correctly and communicate the "story" to upper-level trainees. The "interpreter" stage prepares the student to analyze patients' complaints and create thorough differential diagnoses – critical skills that trainees will be expected to demonstrate later in their medical school careers.

The "manager" and "educator" stages are reserved for advanced third- and fourth-year medical students, who are expected to suggest therapeutic treatments and facilitate all aspects of patient care. In addition, these advanced students make the transition into the self-directed learning and teaching of other students. Medical students at all levels, however, can perform as interpreters, managers, and educators in straightforward, less complex situations, or those in which they have special expertise.

The Milestones Outcomes-Based Accreditation Project

Developed by the ACGME and its Residency Review Committees, the new *milestones* initiative adds another level of complexity to the national skill-assessment framework. The milestones create benchmarks of assessment that occur throughout residency training; learners are expected to reach these milestones in each of the ACGME's six core competency areas. Many specialties throughout graduate medical education already have created their own milestones, and will eventually create assessment tools that focus on specialty-specific components essential in a resident's education.

As described in the 2008 ACGME bulletin, "At the completion of training, the milestones are the articulation of the level of performance expected at entry into the unsupervised practice in each specialty, and are the levels of clinical competence required to gain eligibility for ABMS (American Board of Medical Specialties) certification."[9] At earlier levels, they constitute developmental milestones to offer programs and the ACGME's assurance that residents and fellows attain appropriate educational goals.

An important feature of this initiative is the development of an entry-level assessment for the intern. Goals include creating an Individual Educational Plan (IEP), which will highlight the trajectory of each resident as he or she progresses through residency education.[9] Entry-level assessment is important, as it identifies areas of weakness and learning strategies that are preventative for remediation and help to organize learner goals. Ideally, the milestones will produce higher-quality outcomes for the resident learner.[9,10]

Another advantage of the milestone project is that it allows residents to be directly compared to their counterparts in a specific specialty. A milestone could be evaluated for a particular learner, and that learner could be measured against the national percentage of residents who have exceeded the milestone.[10]

At the end of 2011, the Emergency Medicine Milestones Working Group published the first set of milestones for emergency medicine training, focusing on the six ACGME core competencies.[12] This document describes the specific milestones needed to be achieved at different levels of training within each competency. For example, in the patient care core competency, the working group identified 14 subsets specific to emergency medicine training. These include emergency stabilization, focused history and physical exam, diagnostic studies, diagnosis, pharmacotherapy, observation and reassessment, disposition, multi-tasking, procedures, airway management, anesthesia, ultrasound, wound care management, and vascular access.

Within each of these milestones is a list of expectations for each level of learning – from novice to expert, ranging from Level 1 to Level 5. Each milestone outlines specific goals for each level, as well as suggested evaluation methods for assessing skill and competency. As part of the transition to the New ACGME Accreditation System (NAS), residency programs soon will be expected to evaluate residents bi-annually on these competencies.

Suggested Readings

Pangaro, L. (1999). A new vocabulary and other innovations for improving descriptive in-training evaluations. *Acad Med*, 74 (11):1203–7.

Nasca, T.J. (2008). ACGME Bulletin. "The CEO's First Column — The Next Step in the Outcomes-Based Accreditation Project." May. Accessed from www.acgme.org.

Promes, S., et al. (2012). Emergency Medicine Milestones. www.saem.org/emergency-medicine-milestones, Accessed on July 25, 2012.

Supplemental Materials

Descriptions of the new ACGME Milestones can be found on the EMRA website at: www.emra.org.

Simulation as an Assessment Tool

Introduction

Simulation is a teaching method that augments or replaces clinical experiences with the use of artificially generated techniques. Simulation technology encompasses several levels of varying fidelity, from the use of pigs' feet to teach suturing techniques to the use of standardized patient encounters (now a required part of the Objective Structured Clinical Examination (OSCE) or United States Medical Licensing Examination's STEP 2 Clinical Skills Exam), and even to virtual reality applications. The various types of simulation are detailed in Table 1.

Table 1. Types of Simulation

Type	Description
Low-Tech Simulation	Models used to practice basic physical procedures or maneuvers: pig's foot (suturing techniques), chicken leg (intraosseous line), orange (subcutaneous injections)
Screen-based Simulation	Computer programs that allow learners to manage a case remotely to assess knowledge base and decision-making: USMLE Step 3, Part 2
Task Trainers	Focused experience that teaches both steps and kinesthetics for a given procedure: laparoscopic surgery trainer, lumbar-puncture trainer, ultrasound-guided central line placement trainer, vaginal delivery trainer
Standardized Patients	Actors who portray a patient; may have true examination findings (heart murmur), may be used to teach examination techniques (pelvic or breast examination), or to get feedback on an interpersonal encounter
Mannequin-Based "High-Fidelity" Simulation	Computer-driven mannequins that speak, breathe, have physical examination findings, and exhibit physiologic changes to stimuli: METIman®, Laerdal SimMan®
Virtual Reality	Simulated environment, providing complete immersion: CAVE

(Adapted from Ziv, 2003; McLaughlin, 2008)

Simulation Fundamentals

Medical education traditionally has been based upon the *Halstedian model*, most commonly known as "see one, do one, teach one." However, in the presence of an increasing demand for patient safety, the medical community and patients are less willing to accept this approach. Patients were noted in one study to be more willing to have students perform basic procedures on them if the learner had undergone simulation training.[1] Simulation provides an environment where learners can actively provide patient care without risk to real patients, and allows the paradigm to instead shift to "see one, simulate and practice several times until mastery, do one competently, teach many."[2]

An additional benefit of simulation is that it can be tailored to the learner, such that scenarios are adjusted to be increasingly complex and fit the learner's knowledge base. In essence, simulation accelerates the expertise curve, avoiding the need to wait until a patient with each disease condition happens to present. Ultimately, it allows for specificity in education, ensuring that learners have demonstrated a certain competency standard before progressing forward in their training.

Information is best anchored when it is practiced, as demonstrated in one study, where learners could recall 90% of what they *did,* compared to only 10% of what they had *read*.[3] The ability to learn from errors is a strong tool that simulation is able to employ because it allows learners to experience what happens when errors propagate, in contrast to an actual clinical setting where more experienced clinicians may intervene once an error is recognized.[4]

Additionally, information linked to emotional experiences has been shown to be even more readily stored by learners; simulation provides a unique environment where learners are emotionally engaged in the scenario and a sense of personal responsibility develops.[5] These emotional triggers perhaps are what make simulation such an effective tool and give it its appeal and inherent strength; emotions harness the unique power that comes from learning while in a highly activated state, known as experiential learning.[6]

The immediate directed feedback, termed debriefing, that occurs following a simulation experience is as important for learners as the period of active participation. Debriefing allows dedicated time for reflection and review, something that can be difficult to make time for during a busy clinical workday. Research has shown that debriefing is so critical, in fact, that simulation efforts *without* this important step lead to a lack of improvement in nontechnical skills.[7]

Simulation Use with Medical Students

The traditional Flexner model of medical education is based on the tenet that students who are not fully educated in basic principles of medicine cannot safely practice medicine. This model established the traditional preclinical-clinical sequence used by medical schools nationwide.[5] In addition to earlier clinical exposure, simulation fits well within the evolving framework of medical education, which increasingly emphasizes problem-based learning (PBL) methods. It allows a level of consistency among learners, such that all trainees are exposed to a set series of cases that includes rare diseases, near misses, and critical incidents; this eliminates the dependence on *chance* for learning opportunities.[8,4] In light of the duty-hour restrictions placed on residents, strengthening clinical education is critical for broadening the training experience.

Evidence of Simulation Effectiveness

Research regarding the value of simulation has evolved from initial work showing strong learner satisfaction and confidence after participating in simulation endeavors to a now sizable literature base from which meta-analyses have shown great improvement in knowledge retention, skill performance, and clinical behaviors.[9] One large systematic review evaluated existing literature and concluded that high-fidelity simulation was an effective educational tool. In addition, this review identified the features of high-fidelity simulation that led to effective learning; these traits are listed in Table 2.[10]

Table 2. Features and Uses of High-Fidelity Simulators that Lead to Effective Learning

1.	Feedback provided during the learning experience
2.	Repetitive practice
3.	Simulator integrated into overall curriculum
4.	Learners practice with increasing levels of difficulty
5.	Adaptable to multiple learning strategies
6.	Variation in clinical conditions simulated
7.	Controlled environment where learners can make, detect, and correct errors without adverse consequences
8.	Individualized active learning
9.	Defined outcomes with tangible outcome measures
10.	Validity of simulation as an approximation of clinical practice

(Adapted from Issenberg, 2005)

Simulation Design

Simulation scenario development begins with an ending – and, in turn – is designed to meet that end. The educator must first define a set of learning objectives that are to be met.[8] The basic steps of simulation scenario design are listed in Table 3.[8] Educators must match the experience of the learner to the objectives and simulation method chosen. Once these are established, the educator can select the best simulation modality and appropriate level of fidelity. One of the frequently cited limitations of simulation efforts is that it is resource-intensive; however, educators must recognize the strengths and weaknesses of each method and adapt the teaching tool to the learning objectives. High-fidelity mannequin simulators are not ideal for all simulation-based learning efforts, and recognizing the advantages of other less resource-intensive simulation methods is important.[8]

Table 3. The Eight Steps of Scenario Design

1.	OBJECTIVES: Create learning and assessment objectives.
2.	LEARNERS: Incorporate background and needs of learners.
3.	PATIENT: Create a patient vignette to meet objectives that also must elicit the performance you want to observe.
4.	FLOW: Develop flow of simulation scenario including initial parameters, planned events and transitions, and response to anticipated interventions.
5.	ENVIRONMENT: Design room, props, script and determine simulator requirements.
6.	ASSESSMENT: Develop assessment tools and methods.
7.	DEBRIEFING: Determine debriefing issues and missed learning opportunities.
8.	DEBUGGING: Test the scenario, equipment, learner responses, timing, assessment tools, and methods through extensive pilot testing.

(Adapted from S.A. McLaughlin, 2008)

Once objectives and modalities are defined, a narrative with various branch points and anticipated actions and events can be designed with associated critical actions. The necessary equipment, props, and potential confederates (actors) will then become clear as the scenario unfolds. A template for creating simulation cases is available online through the SAEM Simulation Interest Group website. In addition, there are several case banks of existing simulation scenarios that can be tailored to an educator's particular needs. The SAEM Simulation Case Library and AAMC MedEdPortal are two excellent resources (see *Suggested Readings* for links).

It is important to recognize that educators often must formally be taught how to conduct simulation encounters and the debriefing sessions that follow, and both lectures at national emergency medicine conferences and dedicated training courses are available to this end. Certain tenets, such as minimizing interventions to allow students to make errors (not correcting or preventing them from "behind the scenes") and avoiding the death of simulated patients (cutting a case prematurely, if needed), often are stressed.[5]

Conclusion

Simulation is an increasingly popular method, which – via experiential learning – allows trainees earlier and more consistent exposure to clinical scenarios in a safe environment tailored to their abilities, where feedback is highly valued. Using simulation, trainees learn from their near-misses and errors; and knowledge gaps can be identified, which can be used to direct their future learning. Novel uses for simulation continue to be explored, as new methods and technologies evolve. As simulation finds its place within medical and continuing education initiatives, it should be recognized for what it is and is not – an adjunct to, and not a replacement for, bedside patient care.

Suggested Readings

Issenberg, S.B. (2005). Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. *Med Teach, 27(1), 10-28.*

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Okuda, Y. (2009). The Utility of Simulation in Medical Education: What Is the Evidence? *Mount Sinai J Med, 76, 330-343.*

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The Difficult Learner

Introduction

The challenging pace and urgency of the ED can isolate learners who do not fit the mold of a typical emergency medicine team member. Pressure to evaluate patients quickly and to communicate clearly, concisely, and confidently can catch the unprepared learner off-guard and can set the stage for a dysfunctional experience. When confronted with a learner perceived as "difficult," it is important to clarify the possible causes of the deficiency, as there can be divergent opinions as to what constitutes a difficult learner. There are, therefore, important differences in how the educator or supervising instructor can address the issues and provide the struggling learner with a more functional and rewarding experience in the emergency department.

Three primary factors contribute to learners being labeled as "difficult" during their emergency medicine rotations: issues with the individual learner, issues with the administration or system structuring the rotation, and the perceptions and practices of the educator.[1] This chapter primarily will focus on issues with the students themselves; however, understanding what makes a learner struggle also requires an awareness of problems that can sometimes arise elsewhere in the learning chain.

The Learner

For the student or resident who is part of an emergency team, it is practical to divide the label of "difficult" learner into two groups – those with difficulties originating from cognitive issues, often related to deficits in their knowledge base or to learning disabilities; and those with difficulties originating from non-cognitive or behavioral issues, often falling into the realm of professionalism. To complicate matters, there can be significant overlap between these two categories, as cognitive deficits (such as learning disabilities) may precipitate mood disorders or behavioral issues. Learners in this last group are particularly susceptible to falling into downward spirals, where these issues can affect their levels of confidence as team members and further compromise their performances.

Cognitive issues, which are often related to poor preparation, knowledge deficiencies, or immature critical thinking skills, are typically easiest to identify and correct. A steady diet of reading and studying usually fixes these issues. Providing students with reading assignments, evaluating them in the simulation lab, or directly observing them as they practice medicine can be helpful. Additionally, given the high-caliber students that the medical profession attracts,[5] learning disabilities, such as attention-deficit disorder and dyslexia, and psychiatric disorders, such as anxiety and depression, can remain dormant until learners are exposed to the fast pace, new responsibilities and accountability on their emergency medicine rotations.

The emergency department, with its high volume of sick patients and constant interruptions can bring these issues to the surface for struggling learners. Small group sessions, mentorship, and remediation are covered in more detail in other chapters in this book and are particularly useful strategies for helping struggling learners.

Depression, in particular, is a prevalent mood disorder in residents and is estimated to be nearly double that of the population at large.[3] Depression often is first recognized when a resident displays difficulties in concentration, thinking and learning. A labile mood, inappropriate outbursts, and falling behind peers with respect to clinical knowledge and judgment can be dysfunctional symptoms that point to a mood disorder. Recognition of depression in learners can be difficult, however, as a typical resident's lifestyle is already wrought with signs that – in an average person – would indicate a serious mood disorder, including lack of sleep and less time for self-care, exercise, socializing and proper diet.

As detailed in an online article from the American College of Physicians, early recognition of mood disorders is paramount.[4] Seeking proper treatment, often with a mental health clinician outside of the resident's home institution, maintaining sleep hygiene, eating an adequate diet, and engaging in exercise can help circumvent mental illness. These interventions also may prevent serious consequences of mood disorder-related impairment, including harm to patients and unprofessional behaviors that may lead to disciplinary action. It has been shown that with proper, professional treatment, more than 80% of people with depression can make a meaningful recovery.[5]

The Administration

The system facilitating emergency medicine experiences also can contribute to a challenging environment for struggling learners. Many students and residents who participate in emergency medicine rotations are not planning to pursue a career in the specialty and sometimes appear unenthusiastic, even apathetic, during their time in the ED.[2,4] Also, students enter the rotation with disparate backgrounds in terms of the autonomy, structure or schedule they are familiar with, and working in the emergency department for the first time can be a difficult and sometimes reluctant adjustment.

Organizers of the rotation for non-emergency medicine learners should set clear goals that describe the learner's specific role on the ED team and instruct students on how to think like an emergency medicine physician. Clerkship directors should explain how learners will be evaluated; at what level they are expected to perform; and the key differences between emergency medicine and other specialties, when collecting and presenting patient data. Explaining how emergency medicine physicians prioritize patients and their complaints, and then providing early and frequent feedback about a trainee's performance, will provide the learner with a clearer path to success on the rotation.

The Educator

Sometimes an educator's misperceptions, inexperience with teaching, or inappropriate expectations can precipitate or worsen a difficult learner's deficiencies. There is a wide range of experience that supervising physician educators and residents possess – from the veteran, award-winning faculty attending to those without any formal training in education. Furthermore, teaching and evaluating learners efficiently and effectively takes more time than often is allowed during a busy ED shift and requires educators to know their trainees in order to accommodate different learning styles, levels of experience, and personalities.[6]

Tailoring teaching moments to specific learning styles, such as drawing diagrams for procedures, showing pathologic imaging, and teaching at the bedside are important for students who depend on visual learning. In the fast-paced emergency department environment, where chaos necessitates verbal communication, making an effort to teach through other modes of communication can improve the experience for struggling learners.

Conclusion

For learners labeled as "difficult," diagnosing the problem and intervening early are important. Learners may struggle with cognitive deficiencies or mental illness, both of which can worsen in the challenging emergency department environment. Properly resourcing these struggling learners and providing a safe, supportive environment can help result in a successful remediation.

Suggested Readings

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Coates, W., Gill, A. (2001). The emergency medicine subinternship – a standard experience for medical students? *Acad Emerg Med, 8* (3), 253-8.

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CHAPTER **18**

The Resident Role in Remediation

Introduction

Albert Einstein was called a "weak student" and failed his college entrance exam; Michael Jordan was cut from his sophomore basketball team; yet, no one would dispute that these two men remain among the best in their respective fields. Through hard work, perseverance, and – most likely – remediation, they were able to overcome initial hurdles to achieve great things.

Remediation, the formal process of correcting deficiencies in competency, is common in emergency medicine, but is not frequently discussed. Although the American College of Emergency Physicians (ACEP) and the Society of Academic Emergency Medicine (SAEM) have not published formal numbers on the percentage of emergency medicine residents needing remediation, the American Board of Internal Medicine (ABIM) estimates that 8-15% of residents have significant learning deficiencies. This number has remained fairly constant, according to ABIM.[3] Learner deficits have been broadly categorized within competencies.

The Formation of Structured Remediation

Historically, learning through "trial and error" was an accepted method used to train physicians. Training programs subsequently used a general gestalt of knowledge, skills, and attitudes to evaluate resident performance. Through the years, however, medical practice standards and expectations have continued to evolve. These changes have led to clearer definitions and guidelines on physician competency and changes in resident evaluation systems.

Over the past 10 years, the focus has changed to incorporate accountability, patient safety and quality of care. As a result of these changes, the ACGME and the American Board of Medical Specialties (ABMS) have worked to incorporate these other areas of focus into training. In 2001, the ACGME and ABMS defined six core competencies in which residents-in-training would need to demonstrate proficiency prior to graduation. The six competencies are: patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.[1]

The core competencies provide a formal framework for resident evaluation and assessment. Within the competencies, some of the most common deficits seen are: insufficient medical knowledge, poor clinical judgment, inefficient use of time, inappropriate interactions with colleagues or staff, provision of poor or inadequate care of patients, unsatisfactory clinical skills, unsatisfactory humanistic behaviors, tardiness or absences, and unethical behavior.[8] The most common issue is insufficient medical knowledge, and the least common is unethical behaviors. Additionally, deficiencies can be a consequence of mental health or substance abuse problems.[3]

Once these standards for competence were implemented in 2001, this gave residency-training programs, licensing boards and society a framework to evaluate the training and practice of resident doctors. Ultimately, the goal is to train excellent physicians who provide high-quality medical care. Other frameworks exist, but since the core competencies are the nationally accepted assessment framework for graduate medical education in the United States, we will focus on it as it relates to remediation. Other assessment frameworks are discussed in a separate chapter in this handbook.

Challenges to Remediation

Remediation is a complex and extremely difficult task. There are barriers to identifying those learners in need, establishing a formal remediation program for these individuals, identifying other confounding variables, and ensuring a successful process.[4] Finally, since res idency is an apprenticeship of sorts, there are many other regulations to which programs and their residents must adhere, including national and hospital-specific policies.

Many different sources can pinpoint struggling residents, including chief residents, faculty, program directors, other residents, and nurses. Nevertheless, it often takes direct observation or a "critical incident" for a resident to be identified as one in need of formal remediation.[8] They often are identified late, due to the inadequacy of assessments; the reasons for this are multifactorial. As an example, written global evaluations have been historically inaccurate. Schwind noted that of 30 surgical residents that needed remediation, 23-55% had excellent ratings in areas later identified as deficient on their written evaluations.[4] Additionally, program directors often have a hard time discussing shortcomings with residents because of prior, positive written evaluations by other faculty members.[3]

Evaluators often struggle to remediate residents. In addition, a supervisor may question his or her own ability to completely evaluate a resident, pointing to lack of exposure to the trainee, a concern for repercussions, or overall inexperience with the evaluation process. Finally, many faculty members are reluctant to record negative evaluations.[2] These factors contribute to a delayed identification of residents' deficiencies and, therefore, delay the implementation of the remediation process.

The development of the remediation plan requires a number of resources that also can present a challenge. Required resources include: mentoring by faculty; additional supervision; development of a personal learning plan; and, often, a neuropsychological evaluation. It can be difficult for both faculty members and residents to find the time and resources to execute the remediation plan.[8] Additionally, there is a paucity of validated tools for pinpointing deficiencies, potentially making it more difficult to develop plans targeted at the appropriate competency needing remediation.

Another challenge is the identification of other factors that could be confounding the issue. Stress in one's family life, substance abuse, or mental illness all can impact a resident's attitude and/or performance negatively.[4] The degree to which these factors contribute to residents' deficiencies also can vary, depending on the type of stressors involved and the individual resident.[4]

Once a remediation plan has been implemented, it is important to reassess the resident's deficiencies at more frequent intervals. However, formal national tools of assessment – such as the in-service exam – are administered only once a year and primarily test clinical knowledge. Other standard tools used to reassess deficiencies often are scheduled at intervals too widely spaced to be of great value if a resident's deficiencies are identified late in his or her clinical training; therefore, re-evaluation ideally has to occur more frequently.

Finally, resident training takes place in a unique setting. The program has to adhere to the standards of the institution in which it is centered; institutions have rules and regulations designed to ensure patient safety and continuity of care, and programs are bound by legal guidelines. These different facets make remediation a complicated process.

Current Remediation Practice

Recommendations from the CORD Remediation Task Force, which were released in 2010, provide guidelines for residency programs. The guidelines stress establishing clear expectations – beginning in orientation – and emphasize the need for early identification of deficiencies, development of written individualized plans, monitoring of resident progress, and clear criteria for the completion of remediation.

Evaluators must be trained to ensure accuracy and consistency in the process of assessment; there are varied levels of medical educator experience in any given program. In order to succeed at teaching these competencies, it is important to first make sure all medical educators are working from the same reference points and with the same tools. Part of this training is ensuring that the educators fully understand the core competencies of the remediating resident, based on the core competencies, in order to provide specific plans for improvement.

The practice of medical education is ever-changing. It is important to remember that, at the heart of it all, is a desire to empower residents to reach their full potentials as doctors. Remediation is common; and, with diligence and the right attitude, many residents navigate it successfully.

As a resident educator, you may be asked to help a fellow resident succeed at remediation by lending support throughout the process. If asked to offer guidance, work closely with your residency leadership to determine the best ways to aid your fellow resident. The four essential elements illustrated in Table 1 can help programs create successful remediation plans; and help you, as a resident educator, to better understand the often-humbling remediation process.

Table 1. The Four Essential Elements of Remediation

1.	Conduct initial assessment using multiple tools to identify deficiencies.
2.	Diagnose deficiencies and develop individualized learning plan.
3.	Provide instruction including deliberate practice, feedback, and reflection.
4.	Reassess and certify competency.

(Adapted from Hauer, 2009).

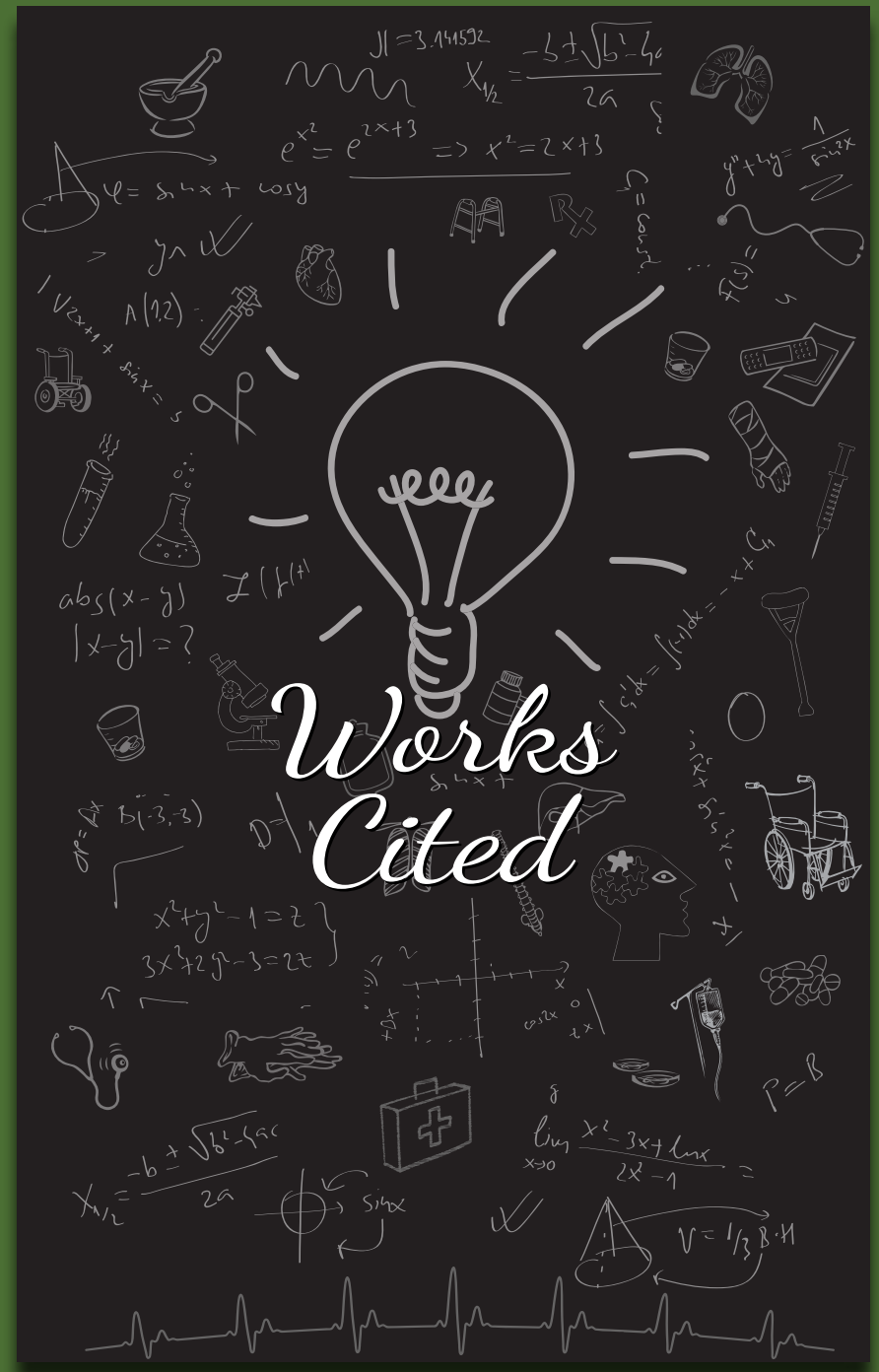### *Suggested Readings*

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