

MiPLAN: A Learner-Centered Model for Bedside Teaching in Today's Academic Medical Centers

Chad Stickrath, MD, Eva Aagaard, MD, and Mel Anderson, MD

Abstract

Clinician educators and medical trainees face intense pressure to complete numerous patient care and teaching activities in a limited amount of time. To address the need for effective and efficient teaching methods for use in the inpatient setting, the authors used constructivist learning theory, the principles of adult learning, and their expertise as clinician educators to develop the MiPLAN model for bedside teaching. This three-part model is designed to enable clinical teachers to simultaneously provide care to patients while assessing learners,

determining high-yield teaching topics, and providing feedback to learners.

The "M" refers to a preparatory meeting between teacher and learners before engaging in patient care or educational activities. During this meeting, team members should become acquainted and the teacher should set goals and clarify expectations. The "i" refers to five behaviors for the teacher to adopt during learners' bedside presentations: introduction, in the moment, inspection, interruptions, and independent thought. "PLAN" is an

algorithm to establish priorities for teaching subsequent to a learner's presentation: patient care, learners' questions, attending's agenda, and next steps.

The authors suggest that the MiPLAN model can help clinical teachers gain more confidence in their ability to teach at the bedside and increase the frequency and quality of bedside teaching. They propose further research to assess the generalizability of this model to other institutions, settings, and specialties and to evaluate educational and patient outcomes.

Traditional models for clinical instruction in the inpatient setting include attending rounds, bedside teaching, and mini-lectures, but more focused teaching models (e.g., SNAPPS and the one-minute preceptor) have been introduced in the outpatient setting.¹⁻⁹ Both the SNAPPS⁸ and one-minute preceptor⁹ models were developed to improve on traditional clinical teaching methods and were designed in accordance with contemporary learning theory to be both time-efficient and learner centered. The implementation of such learner-centered teaching models has been shown to improve trainees' educational experiences in outpatient

settings.^{1,3} However, in the inpatient setting, the development and adoption of new or improved teaching methods has been lacking, even though duty hours restrictions and increasingly complex hospital systems are compressing the time in which medical trainees are expected to both learn and provide patient care.

Clinician educators today are facing new challenges in the inpatient setting: the implementation of further duty hours limitations, increased responsibilities as attendings to directly observe trainees, increased acuity of patients, and pressure to move patients through the health care system more rapidly to decrease length of stay.¹⁰⁻¹² These patient care and medical education challenges highlight the need for more effective and efficient inpatient teaching methods. In this article, we review the basic theoretical tenets of how medical trainees learn and describe a model we have developed to facilitate bedside teaching—that is, teaching in the patient's presence—in the contemporary academic medical center.

How Medical Students and Residents Learn

Research on constructivist learning theory,¹³⁻¹⁶ on the tenets of adult learning,¹⁷ and comparing experts with novices¹⁸ describes several concepts

that can assist us in understanding how medical students and residents learn: Learners enter new experiences with preexisting knowledge and preconceived ideas based on their past experiences, properly motivated learners will use new experiences and information to construct new knowledge, and highly competent learners will reflect on their understanding of a situation and gauge the need for additional knowledge to improve that understanding. (Not all of these concepts have been studied in the medical education context, but we believe they have intuitive applicability to the clinical teaching that occurs in the inpatient setting.) When educators acknowledge and address these concepts during teaching experiences, their trainees develop broad-based, conceptual knowledge that they can more readily retrieve, apply to new situations, and build on.¹⁵

Consider learners' preexisting knowledge

Both constructivist learning theory¹³⁻¹⁶ and adult learning principles¹⁷ assert that the learner's preexisting knowledge and life experiences influence how the learner perceives and interprets the environment, his or her motivations for learning, and the ways in which he or she acquires and integrates new knowledge. It is essential, therefore, that clinician educators assess

Dr. Stickrath is assistant professor of medicine, University of Colorado School of Medicine, Aurora, Colorado, and hospitalist, Denver Veterans Affairs Medical Center, Denver, Colorado.

Dr. Aagaard is associate professor of medicine and assistant dean, University of Colorado School of Medicine, Aurora, Colorado.

Dr. Anderson is associate professor of medicine, University of Colorado School of Medicine, Aurora, Colorado, and hospitalist, Denver Veterans Affairs Medical Center, Denver, Colorado.

Correspondence should be addressed to Dr. Stickrath, Denver Veterans Affairs Medical Center, 1055 Clermont St. (111), Denver, CO 80220; telephone: (303) 399-8020, ext. 3140; fax: (303) 393-5199; e-mail: Chad.Stickrath@va.gov.

Acad Med. 2013;88:322-327.

First published online January 23, 2013
doi: 10.1097/ACM.0b013e318280d8f7

students' and residents' life experiences, backgrounds, and motivations to understand the preconceptions that they bring to the educational environment and take into account any relevant preexisting information that learners will use to construct new knowledge. For example, if an attending learns that one of his or her medical students spent five years working in Sub-Saharan Africa, the attending may adjust the approach he or she uses to teach that student about tuberculosis.

Help learners construct and utilize new knowledge

Knowles¹⁷ indicates that, in addition to considering learners' prior experiences and motivations, teachers should acknowledge that adults are self-directed individuals who function as independent personalities, that their readiness to learn is oriented toward their social roles' developmental tasks, and that they typically focus their learning around addressing problems at hand rather than accumulating general knowledge for future use. Fortunately, in the clinical arena, educators have the opportunity to focus their teaching on concepts that learners can immediately apply and on skills that learners will need to develop to become competent clinicians. For example, teaching a student or resident how to manage the potential complications of the treatment proposed for a current patient with a dangerous cardiac arrhythmia may engage the trainee more fully than would teaching him or her about an equally important cardiac topic that is unrelated to the care of a particular patient.

Whereas Knowles¹⁷ describes principles that lead adults to engage in learning, constructivist learning theory¹³⁻¹⁶ helps us understand what adult learners do with the new information they have acquired. If this new information is consistent with their preconceived ideas, learners assimilate it into their preexisting knowledge, where they can build on it. If it is inconsistent, however, learners must adjust their preexisting knowledge to accommodate it.¹³⁻¹⁶ As people develop expertise, they become able to quickly assess how new information fits into larger concepts and to construct logical frameworks using these concepts. By storing pieces of information within larger constructs or frameworks, experts are able to recognize patterns, assess

the characteristics of new experiences to compare with these patterns, and access and use stored knowledge.¹⁸ Thus, although it is important for medical students and residents to learn new facts, it is just as important that they learn how to fit facts into larger concepts within a framework of knowledge that they can use in the future. For example, when caring for a patient with a possible joint infection, it may be more beneficial for a learner to grasp how features of the physical examination can determine whether urgent arthrocentesis is needed (a broadly applicable concept) than to learn multiple techniques for aspirating a specific joint.

Assist learners in becoming independent, self-directed experts

Metacognition, or knowing about knowing, has been recognized as a key attribute of successful learners and one that distinguishes experts from novices.^{13,18} To effectively employ metacognition, an individual must actively regulate his or her thought processes by planning how he or she will think about an activity before starting it, monitoring his or her thinking during the activity, and evaluating this thinking after the activity is complete.¹⁹ It is important for the teacher to help learners develop metacognitive skills that they can use to consciously add new information to their preexisting knowledge in a manner that allows them to apply the new information to related, but different, situations.^{13,18} For example, before the clinical teacher and trainees approach the bedside of a patient complaining of chest pain, the teacher can ask trainees to *predict* how the patient might answer questions about pain if that pain were related to a heart attack. Then, as the teacher asks the patient questions about the chest pain during the encounter, the teacher can demonstrate "reflection-in-action"²⁰ by verbalizing what he or she is thinking as the patient answers each question and relating why he or she is becoming less convinced that a heart attack is the cause of the chest pain and is beginning to favor pericarditis. Finally, after leaving the bedside, the teacher can demonstrate "reflection-on-action"²⁰ by thinking out loud about other types of information that it might have been useful to elicit, or whether there were better ways to ask questions to gather information more efficiently.

MiPLAN: A Model for Bedside Teaching in the Inpatient Setting

On the basis of the principles of learning described above and drawing from our decades of collective experience as medical educators, we developed a model for bedside clinical teaching in early 2010 and implemented it in our own teaching shortly thereafter. Our goal was to deconstruct the highly complex activities of effective clinical teachers and repackage them in a manner that would be memorable and helpful for other educators. In particular, we hope that this method will enable educators to become more confident regarding their ability to teach at the bedside and promote more—and higher-quality—bedside teaching.

The MiPLAN model (Figure 1) encourages teachers to schedule a meeting ("M") with their learners before engaging in shared clinical and educational activities. During bedside teaching, as the learner presents in the presence of the patient, the model suggests five behaviors for attending physicians ("i": introduction, in the moment, inspection, interruptions, independent thought). It also provides an algorithm for clinical teaching opportunities after the presentation ("PLAN": patient care, learners' questions, attending's agenda, and next steps). Below, we describe each aspect of the model.

"M": The meeting

We recommend scheduling a time early in the learning experience/rotation, preferably before the first patients are seen, to conduct a meeting with learners. During this meeting, the teacher can set the stage properly by making personal introductions, communicating goals and objectives, and discussing the learning climate, teaching methods, and expectations.

Beginning this meeting with introductions and ice-breakers allows all members of the team—teacher, residents, medical students—to get to know one another. Asking learners to suggest learning objectives allows the teacher to tailor educational activities to meet learners' individual needs. The teacher should also share his or her own goals and objectives as well as his or her expectations for learners. Agenda items for this meeting should include

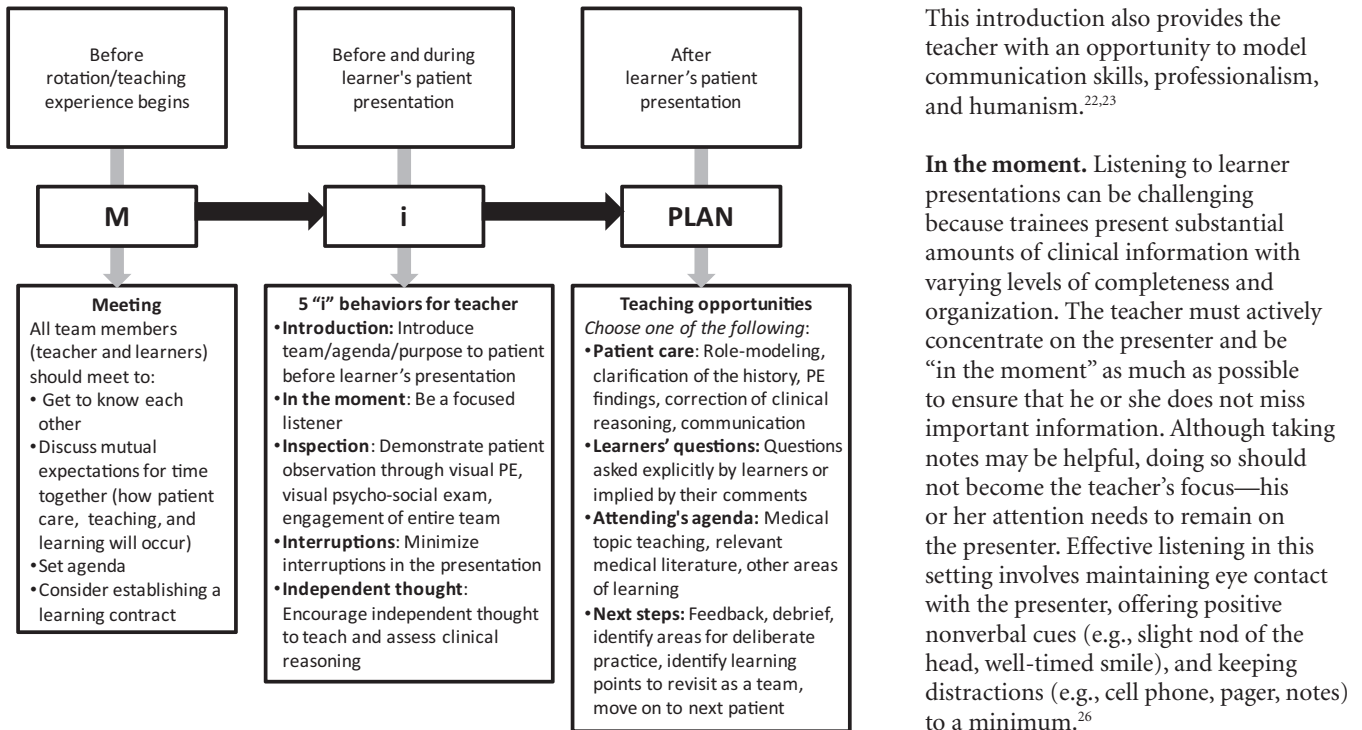


Figure 1 The MiPLAN model for clinical teaching in the inpatient setting. PE indicates physical examination.

- emphasizing team cooperation and creating a safe educational environment,
- providing specific instructions for delivering and expectations concerning effective bedside presentations,
- emphasizing the importance of allowing each learner to synthesize clinical information independently before discussing it with his or her direct supervisor,
- encouraging learners to practice their presentations and discuss them with senior team members prior to rounds,
- informing learners that they will be asked questions during rounds to identify areas of high-yield learning, and
- communicating other important information such as how patient care will take place and when/how trainees should contact the teacher.

This meeting allows the learners and teacher to refer directly to the principles of adult learning described above.¹⁷ It can also serve as a verbal learning contract between learner and teacher regarding the expectations and responsibilities of each and lay the groundwork for effective feedback and assessment.^{20–25}

“i”: The five teacher behaviors during the patient presentation

Next, we recommend five behaviors for the teacher during a learner’s bedside presentation. Together, these behaviors—which are based on the principles of constructivist¹³ and adult¹⁷ learning theories—advance the concept of a model that is both patient- and learner centered. Furthermore, by maximizing the teacher’s ability to engage in simultaneous patient care activities and teaching activities during the presentation, the “i” section of the model offers the teacher opportunities to improve the efficiency of rounds.

Introduction. At the start of each bedside encounter, the teacher should offer a brief introduction to quickly orient the patient to the purpose and procedures of the bedside presentation and to ensure the patient’s comfort. An example might be as follows:

Good morning, I’m Dr. Anderson, the attending physician on the team taking care of you. We’re on our morning rounds and we’re going to discuss what’s been going on to make sure we’re doing the right things for you and that we’re communicating effectively. Listen in, and let us know if you have anything to add. We’ll go over the plans for the day and any questions you have at the end.

This introduction also provides the teacher with an opportunity to model communication skills, professionalism, and humanism.^{22,23}

In the moment. Listening to learner presentations can be challenging because trainees present substantial amounts of clinical information with varying levels of completeness and organization. The teacher must actively concentrate on the presenter and be “in the moment” as much as possible to ensure that he or she does not miss important information. Although taking notes may be helpful, doing so should not become the teacher’s focus—his or her attention needs to remain on the presenter. Effective listening in this setting involves maintaining eye contact with the presenter, offering positive nonverbal cues (e.g., slight nod of the head, well-timed smile), and keeping distractions (e.g., cell phone, pager, notes) to a minimum.²⁶

Inspection. Bedside rounds afford tremendous opportunities for teaching physical diagnosis skills. As classic texts remind us, inspection should occur before the other cardinal steps of the physical assessment.²⁷ The clinical teacher rarely has uninterrupted time during which to observe patients. As an expert, however, the teacher can actively listen and pay attention to a learner’s presentation while also conducting periodic visual inspections of the patient. The teacher can obtain high-yield information in this fashion, including degree of respiratory effort, presence of pursed lip breathing or accessory muscle contraction, presence of elevated jugular venous pressure with large ventricular waves, levels of alertness, facial asymmetry, muscle atrophy, and presence of any medical devices (e.g., intravenous lines, urinary catheters) and their attendant risks. The teacher can also invite other team members to inspect the area of interest during the presentation; for example, as the presenting trainee describes a skin rash, the rest of the team can look at it. By conducting an inspection during the presentation, the teacher accomplishes three actions at once: (1) verifies the findings to ensure that clinical conclusions and therapies are based on accurate information, (2) verifies the findings as a means of assessing the clinical skills of the presenter, and (3) demonstrates his or her findings to team members to teach physical diagnosis skills.

Interruptions. For many learners, bedside presentations are anxiety-provoking experiences.^{28–30} Presentations are the most effective and efficient when the teacher does not interrupt as the presenter completes his or her assessment and plan because interruptions can be distracting and may disrupt the learner's train of thought.²⁵ Clearly, the teacher may need to interrupt the presenter to address such issues as inadequate history-taking, disorganized presenting, or failing to be concise. As we suggest above, laying out expectations in a meeting at the start of the experience/rotation can make learners aware of the teacher's prescribed method for presentations, the period of time they will be allowed to present without interruption, and the conditions that may prompt the teacher to step in. For example, if it becomes clear that the clinical history the learner has taken is uncertain, the teacher may need to interrupt to repeat the pertinent history in order to collect needed clinical information and to model history-taking for trainees. In most circumstances, however, limiting interruptions will ensure that learners get through their presentations and communicate their thoughts about what is going on.

Independent thought. Trainees must learn to arrive at independent conclusions about diagnoses and treatments based on their own interpretations of clinical data. In the initial meeting, the teacher should clearly communicate the expectation that learners will engage in independent thought. In other words, the teacher should explain to trainees that they will be expected not only to perform a thorough history and physical examination for each of their patients but also to use the information they gather to generate a differential diagnosis and plan to solve the puzzle and treat the patient (i.e., engage in clinical reasoning). Learners will be prepared, then, for that pivotal first question about what they think is going on.⁸ This expectation of independent thought acts as the foundation for the teaching that follows. It is the basis for encouraging the learner to make a cognitive commitment and sets the stage for the questions the teacher will pose once the learner's presentation is complete. This aspect of the MiPLAN model is explicitly grounded in adult learning theory.¹⁷

“PLAN”: Algorithm to prioritize teaching opportunities

Once the learner's patient presentation is complete and the team's attention turns to the teacher, the teacher can use the PLAN algorithm to prioritize and select the highest-yield teaching opportunities. The goal is not to teach to all four PLAN elements—patient care, learners' questions, attending's agenda, next steps—for every patient but, rather, to choose topics that will maximize the efficacy and efficiency of bedside teaching in today's time-condensed rounding environment. As we describe below, PLAN encourages the teacher to first assess learning needs on the basis of the patient care that was delivered and to teach to those needs, according to the principle that adults are most motivated, engaged, and interested in learning about concepts that have immediate and direct applications.¹⁷ Then, the model recommends that the teacher shift his or her focus to learner-generated teaching topics, which take precedence over faculty-driven teaching topics and providing feedback to learners.

Patient care. The first and most pressing category of teaching topics focuses on patient care. The teacher who has been “in the moment” and has conducted an inspection during the learner's presentation may readily identify topics for patient-centered bedside teaching. If such topics are not apparent after the presentation, the teacher should engage in interactive questioning with the learner to identify appropriate patient-specific topics.^{8,31} The teacher's questions should focus on diagnosing the learner—that is, on identifying gaps in the learner's medical knowledge and clarifying his or her clinical reasoning: What do you think is going on? What else did you consider? How did you rule out those other things? What would you like to do next?⁹ The teacher can ask questions “up the chain” of learners to better diagnose various team members and to allow more experienced trainees to provide some of the teaching. After completing a series of questions concerning the learner's clinical reasoning, the teacher has often reached his or her own conclusions. If the teacher determines that there is any substantial discordance between what he or she is thinking and what the learner and other team members are thinking and doing for the patient, the teacher

can use these differences as the basis for patient-centered teaching. As we noted above, teaching toward patient-focused topics advances patient care and learning simultaneously and, therefore, should be the clinician educator's first priority.

Directed, interactive questioning to diagnose the learner is the foundation of some well-defined clinical teaching methods.^{8,9} Done well, this sort of questioning provides the teacher with immediate insight into aspects of the learner's medical knowledge and the learner's clinical reasoning, communication, and interpersonal skills, which sets the stage for the learner to receive targeted teaching. Done poorly, however, interactive questioning can be ineffective, disengaging, and even demoralizing.^{32,33} The ground rules for this questioning merit inclusion in the initial meeting between the teacher and team members. For example, the teacher could explain:

There will be questioning on rounds as one mode of teaching. The purpose of these questions is never to show that you don't know something but rather is to find the limits of what you know in order to add to your understanding.

The teacher can also clarify that the questioning relationship is not one-sided; if a learner asks a question, the teacher must respond directly, earnestly, and honestly.^{34,35}

Learners' questions. If the teacher determines that all patient care issues are well in hand, we recommend that he or she allow learners to determine teaching topics. Adult learners are capable of fashioning questions to guide their own development and can be conditioned to develop clinical questions for this purpose.⁸ If the teacher has communicated his or her expectations well, trainees will be aware that the attending will ask them whether they have any questions regarding the care of their patients. They will therefore come to rounds prepared to pose questions that can guide the collective teaching. An alternative is to regroup in a conference room at another time for a small-group learning session, with the topic chosen by the learners.³⁴ Having learners set the agenda in this fashion highlights their role in the learning process.

Attending's agenda. If there are no patient care issues or learner questions to address, then the teacher can pursue his or her own teaching agenda. For example, the teacher can share prior experiences, suggest pertinent medical literature, or make physical diagnosis points that are not directly related to the patient's care. The primary challenge for teaching driven by the attending's agenda is to ensure that the content is relevant to the learners.

Next steps. This final category of teaching points focuses on providing feedback to the learner. Questions the teacher could ask himself or herself when considering feedback include the following: What are the next steps or areas for additional study for the learner? How could the learner share what he or she learns with the rest of the team? What did the learner do well during the presentation, and what are potential areas for improvement? The teacher should keep in mind that offering a reasonably narrow learning prescription enhances the odds that the learner will complete it successfully. For example, the teacher could suggest "learning about the complications of diverticulitis and how to diagnose and treat them" rather than "reading more about diverticulitis"; similarly, the teacher could recommend "learning more about the causes of acute monoarthritis and how to differentiate among them" instead of "reading more about acute gout." Such specific learning prescriptions advance learners' clinical reasoning and go beyond the acquisition of additional facts.³⁵

The next steps category also serves as a reminder that there may not be specific teaching points for a particular patient on a particular day. The most effective and efficient use of time may be to move on to the next patient, who may offer higher-yield teaching points for the attending to address. When there are numerous new patient presentations or it is a patient's seventh day in the hospital, it may be in the learners' best interests for the attending to focus the limited teaching time on a carefully selected subset of patients.

Implementing MiPLAN as an Effective, Efficient Teaching Model

For faculty to successfully implement the MiPLAN model for bedside teaching,

they need to become comfortable with its rationale, understand each section, plan ways in which it can be used, and anticipate the challenges that they may face in their specific environments. We recommend that faculty undergo training in how to successfully implement the MiPLAN model before they apply its concepts during clinical care and teaching.³⁶

In conducting numerous MiPLAN faculty development workshops at our institution and elsewhere, we have found that clinician educators perceive several barriers to teaching at the bedside. They are frequently concerned that bedside teaching will take more time than conducting rounds in a conference room or hallway. Gonzalo and colleagues,³⁷ however, found that the total amount of time spent on rounds was not significantly different when rounding at the bedside or in a conference room. Other faculty concerns involve patient comfort with and learner dislike for the method. Numerous studies, though, have demonstrated that patients are not uncomfortable with bedside learning encounters and that they actually prefer hearing about their care in this manner.^{27–30,37,38} Although trainees have reported some discomfort with participation in bedside rounds,^{28–30} they find bedside teaching to be a valuable educational experience.^{35,37,38} A final issue is teacher confidence. One of the primary reasons we developed the MiPLAN model was to give teachers a simple and memorable method that would enable them to confidently provide education in this valuable setting.

We are currently collecting data to explore whether MiPLAN faculty development workshops lead to increased bedside rounding by attendees and to determine whether using the MiPLAN model during bedside teaching has impacts on efficiency, learner outcomes, and patient outcomes.

In Sum

Attendings and trainees in today's academic medical centers are under intense pressure to complete numerous patient care and teaching activities in a limited amount of time. Using key concepts from educational theory and the principles of adult learning, as well as our expertise as clinician educators, we created the MiPLAN model for bedside

teaching. This model is designed to increase faculty confidence in conducting bedside rounds and combines a number of patient care and teaching techniques to ensure that rounds can be completed efficiently. It will be important to evaluate the generalizability of this model to other institutions, settings, and specialties and to examine educational and patient outcomes associated with its implementation.

Funding/Support: None.

Other disclosures: None.

Ethical approval: Not applicable.

Previous presentations: Previous versions of this model have been presented in poster or workshop format at the Annual Meeting of the Society for General Internal Medicine, Orlando, Florida, May 12, 2012; the Association for Program Directors in Internal Medicine (APDIM) Chief Medical Resident Meeting, Atlanta, Georgia, April 24, 2012; the Society of Hospital Medicine's Annual Meeting, Dallas, Texas, May 12, 2011; and the APDIM Chief Medical Resident Meeting, Las Vegas, Nevada, April 12, 2011.

References

- 1 Aagaard E, Teherani A, Irby DM. Effectiveness of the one-minute preceptor model for diagnosing the patient and the learner: Proof of concept. *Acad Med.* 2004;79:42–49.
- 2 Crumlish CM, Yialamas MA, McMahan GT. Quantification of bedside teaching by an academic hospitalist group. *J Hosp Med.* 2009;4:304–307.
- 3 Ferenchick G, Simpson D, Blackman J, DaRosa D, Dunnington G. Strategies for efficient and effective teaching in the ambulatory care setting. *Acad Med.* 1997;72:277–280.
- 4 Miller M, Johnson B, Greene HL, Baier M, Nowlin S. An observational study of attending rounds. *J Gen Intern Med.* 1992;7:646–648.
- 5 Priest JR, Bereckney S, Hooper K, Braddock CH 3rd. Relationships of the location and content of rounds to specialty, institution, patient-census, and team size. *PLoS ONE.* 2010;5:e11246.
- 6 Shankel SW, Mazzaferrri EL. Teaching the resident in internal medicine. Present practices and suggestions for the future. *JAMA.* 1986;256:725–729.
- 7 Williams KN, Ramani S, Fraser B, Orlander JD. Improving bedside teaching: Findings from a focus group study of learners. *Acad Med.* 2008;83:257–264.
- 8 Wolpaw TM, Wolpaw DR, Papp KK. SNAPPS: A learner-centered model for outpatient education. *Acad Med.* 2003;78:893–898.
- 9 Neher JO, Gordon KC, Meyer B, Stevens N. A five-step "microskills" model of clinical teaching. *J Am Board Fam Pract.* 1992;5:419–424.
- 10 Goitein L, Shanafelt TD, Wipf JE, Slatore CG, Back AL. The effects of work-hour

- limitations on resident well-being, patient care, and education in an internal medicine residency program. *Arch Intern Med.* 2005;165:2601–2606.
- 11 Harrison R, Allen E. Teaching internal medicine residents in the new era. Inpatient attending with duty-hour regulations. *J Gen Intern Med.* 2006;21:447–452.
 - 12 Reed DA, Levine RB, Miller RG, et al. Impact of duty hour regulations on medical students' education: Views of key clinical faculty. *J Gen Intern Med.* 2008;23:1084–1089.
 - 13 Bransford JD, Brown AL, Cocking RR. *How People Learn: Brain, Mind, Experience, and School.* Washington, DC: National Academy Press; 2000.
 - 14 Piaget J, Garcia R. *Psychogenesis and the History of Science.* Feider H, trans. New York, NY: Columbia University Press; 1989.
 - 15 Piaget J. *Genetic Epistemology.* Duckworth E, trans. New York, NY: Columbia University Press; 1970.
 - 16 Vygotsky LS. *Mind in Society: The Development of Higher Psychological Processes.* Cambridge, Mass: Harvard University Press; 1978.
 - 17 Knowles MS. *The Adult Learner: A Neglected Species.* Houston, Tex: Gulf Publishing; 1990.
 - 18 Glaser R, Chi MTH. *The Nature of Expertise.* Hillsdale, NJ: Erlbaum; 1988.
 - 19 Shaw G, Moshman D. Metacognitive theories. *Educ Psychol Rev.* 1995;7:351–371.
 - 20 Schön D. *Educating the Reflective Practitioner.* San Francisco, Calif: Jossey-Bass; 1987.
 - 21 Fitzgerald FT. Bedside teaching. *West J Med.* 1993;158:418–420.
 - 22 Kroenke K. Attending rounds: Guidelines for teaching on the wards. *J Gen Intern Med.* 1992;7:68–75.
 - 23 Ramani S. Twelve tips to improve bedside teaching. *Med Teach.* 2003;25:112–115.
 - 24 Knowles MS. *Using Learning Contracts.* San Francisco, Calif: Jossey-Bass; 1986.
 - 25 Back AL, Arnold RM, Tulsy JA, Baile WF, Edwards K. "Could I add something?": Teaching communication by intervening in real time during a clinical encounter. *Acad Med.* 2010;85:1048–1051.
 - 26 Robertson K. Active listening: More than just paying attention. *Aust Fam Physician.* 2005;34:1053–1055.
 - 27 Sapira JD. *The Art and Science of Bedside Diagnosis.* Philadelphia, Pa: Williams & Wilkins; 1990.
 - 28 Anderson RJ, Cyran E, Schilling L, et al. Outpatient case presentations in the conference room versus examination room: Results from two randomized controlled trials. *Am J Med.* 2002;113:657–662.
 - 29 Rogers HD, Carline JD, Paauw DS. Examination room presentations in general internal medicine clinic: Patients' and students' perceptions. *Acad Med.* 2003;78:945–949.
 - 30 Wang-Cheng RM, Barnas GP, Sigmann P, Riendl PA, Young MJ. Bedside case presentations: Why patients like them but learners don't. *J Gen Intern Med.* 1989;4: 284–287.
 - 31 Irby DM, Wilkerson L. Teaching when time is limited. *BMJ.* 2008;336:384–387.
 - 32 Detsky AS. The art of pimping. *JAMA.* 2009;301:1379–1381.
 - 33 Wear D, Kokinova M, Keck-McNulty C, Aultman J. Pimping: Perspectives of 4th year medical students. *Teach Learn Med.* 2005;17:184–191.
 - 34 Rolfe IE, Sanson-Fisher RW. Translating learning principles into practice: A new strategy for learning clinical skills. *Med Educ.* 2002;36:345–352.
 - 35 Parsell G, Bligh J. Contract learning, clinical learning and clinicians. *Postgrad Med J.* 1996;72:284–289.
 - 36 Wilkerson L, Irby DM. Strategies for improving teaching practices: A comprehensive approach to faculty development. *Acad Med.* 1998;73:387–396.
 - 37 Gonzalo JD, Chuang CH, Huang G, Smith C. The return of bedside rounds: An educational intervention. *J Gen Intern Med.* 2010;25:792–798.
 - 38 Simons RJ, Baily RG, Zelis R, Zwillich CW. The physiologic and psychological effects of the bedside presentation. *N Engl J Med.* 1989;321:1273–1275.