Chapter 5

Instructional Methods and Strategies

Christopher White, MD and Lynn Manfred, MD, EdD, Co-lead Authors

**Judy Bowen, MD, Martin Leamon, MD, Jennifer Koestler, MD,
Lyuba Konopasek, MD, Marilyn Kimmelman, EdD, Paul M. Krueger, DO,
David A. Rogers, MD, MHPE,
Co-authors**

Introduction

Methods are the means or ways that we use to teach material to our students. Our choice of methods depends on *what we want to teach* (content), *who we are teaching,* and the *level of competence expected***.**

Content can be divided into the three domains of knowledge: Skills, Attitudes, and Values. When we are teaching knowledge, we can use a variety of methods, with the goal of getting the learner to actively engage in learning the material. When teaching skills, we need to demonstrate and point out important aspects, supervise the student doing the skill, or talk the student through the skill. When teaching about attitudes, we need to use methods that require the application of the attitude in particular situations.

Bloom suggested almost 50 years ago[1] that we could learn content at many levels of expertise – from simple recitation of information that we do not really understand to knowing information so well that we can list it, discuss it, analyze it, use it in a variety of situations and extrapolate it to other similar problems. If we expect our learners to master the clinical material they are taught and to be able to use information in clinical settings, we need to give them opportunities to practice, not just expect them to know facts about a topic.

The methods that we choose often depend on who we are teaching. Sometimes we have one level of learners, such as a group of third-year medical students, and other times, such as inpatient rounds, we may have multiple levels of learners from preclinical students to senior residents and fellows. The methods used to create meaningful learning experiences for multilevel learners may differ from those used for a uniform group. The latter is more likely to have similar backgrounds and experiences with the material to be presented, while mixed groups may range from no prior experience to vast experience – creating a bigger challenge for the teacher.

Clinical educators will find that different teaching methods work better in different circumstances. Thus the sections of this chapter are divided into the major venues in which a clerkship director (CD) might be required to teach: The classroom or lecture hall, small groups, the inpatient setting, and the ambulatory setting. With the increasing need for students to be taught at sites remote from the main campus, we have included

a section that addresses strategies for distance learning. Finally, clinical education often involves the teaching of skills, and thus we have included a section on clinical skills training. There is some planned redundancy between sections to make each section useful on its own.

Classroom Instructional Methods

Many, if not all, clerkships contain didactic sessions that are distinct from the clinical teaching that happens at the bedside, in clinic, or on rounds. For clerkships using multiple sites, these sessions may be held at each site, or students may be brought together at a single location for combined sessions. This section will focus on teaching methods that are generally used in such classroom settings. To reduce the overlap with methods discussed elsewhere in this book, the "classroom" teaching setting will be defined as one in which 15 or more students meet together in the same physical space with a single instructor.

The Lecture

Lecturing is probably the most widely used formal educational method in the world, and has been for some time. Bligh defines lecturing as "more or less continuous exposition[s] by a speaker who wants the audience to learn something," (p.4) and notes that its use is not restricted to the formal educational setting, but is used in arenas such as politics (speeches) and religion (sermons).[2] Noting that "lecture" has its etymological roots in the Latin participle *lectus* (to read), it has been suggested that the academic lecture developed prior to the printing press as "the only way that the knowledge stored in books could be transmitted to a large number of students."[3] There are many readily available resources on effective lecturing, such as the classic texts by Bligh and McKeachie.[3,4] Many universities have on-line resources, as do other academic programs.[2, 5-7]

A lecture can be used to provide a broad-brush overview or introduction of a topic, particularly where the educational goal is for the learner to acquire a background familiarity with the subject, as opposed to a working knowledge. For learners who have a general knowledge of a topic, a lecture can provide an explication of the material, a cognitive framework for organizing the material, or a re-structuring of the material to make it more relevant to the situation at hand. Lectures are much less effective at changing attitudes, developing other learning skills (e.g., analysis, evaluation, teamwork, etc.) or helping learners apply knowledge to working situations.

Preparation

In preparing a lecture for the classroom setting, the instructor should make sure and learn about the intended audience, particularly the members' prior experiences and level of knowledge about the material as well as their motivations for learning the material. The lecture should be tailored accordingly to link the material presented to the earlier learned knowledge. In the clerkship setting, it's almost never recommended that

the instructor read a lecture verbatim – such a presentation can be stultifying. Notes can be prepared as prompts or reminders of key points, but they must be legible at the distance and under the lighting conditions under which the lecture will be given. Lightly penciled handwritten notes can be hard to read on a lectern three feet away in a room with dimmed lights!

Presenting lecture material in multiple modalities simultaneously has become standard and can help increase retention and understanding. Slideware (such as Microsoft PowerPoint) is ubiquitous, almost to the exclusion of overhead projector transparencies. Table 1 lists some suggestions for visual presentations.[8]

Table 1. Slideware Presentation Tips

- Use slideware to illustrate and enhance, not duplicate verbal material.
- Plan for a maximum of 1 slide for every 1½ – 2 minutes of lecture.
- Use pictures, graphs, video, or handouts to display complex material rather than reducing to over-simplified bullet points.
- Never use a slide with key elements that you know will be too hard to see or read.
- Relevant detail in charts and graphs must be readable from the back of the hall.
- Keep text slides simple:
    - San serif fonts are most readable
    - Font size less that 24 point may be too small to read
    - Maximum of six text lines, six words per line.
    - Text animation often distracts and detracts – use minimally if at all.
- Don't read the slides – let the audience do that.
- Face and talk to the audience, not the screen.
- Use laser pointers minimally – they require you to face the slide.

The instructor should be thoroughly familiar with the presentation and notes, and have at least mentally rehearsed it several times in advance. Thus prepared, the lecturer can focus attention on the audience members, rather than on a script or notes. Along these lines of minimizing other distractions, the lecturer should be familiar with the classroom, know how to use any audio-visual support technology, and have a backup plan in case of equipment failures.

Delivery

In the clerkship setting with an audience of 30 or so, the lecturer has more tools available than in the large hall setting with an audience of 100 or more. From the teacher's perspective, the lecture is a very efficient use of time. The teacher can deliver information to more people at a time. It is organized, and can be given with audio-visual supports that assist in conveying the information. The goal is to interrupt the learners' proclivity to slip into the passive listening role. Handouts are distributed before the

lecture and note-taking is encouraged, which also improves retention of information. The lecturer can say something like, “Write this down!” and wait to see pencils at the ready before continuing.

Talk to individual students, making brief eye contact with different people in different parts of the classroom. Encourage some questions during the talk, as opposed to asking students to hold them until the end. Pose questions or problems to the audience as a whole, to clusters of students sitting near each other, or to individuals, allow a minute or two for thinking, and then solicit answers with encouragement. For introducing verbal skills, such as asking patients about alcohol use, students can pair up and take turns asking each other scripted questions with scripted answers, and the experience discussed in the group as a whole. It may be possible to encourage student response, either directly or through the lecturer, to other student comments.

It is important to actively monitor audience level of attention and arousal while lecturing, and to adapt the pace or mode of presentation accordingly. The lecturer, as noted above, must be intimately familiar with the presentation content, format, and technology to devote this kind of attention to the audience.

Assessment

Given that the lecture is best suited to conveying information, any of the usual methods for assessing informational learning can be used to assess lecture effectiveness. Angelo and Cross have developed a number of classroom assessment techniques that allow the lecturer to “test” what his audience is learning in real time.[9] If a well-developed instrument is used, student evaluations of a lecture will correlate highly with student learning, and thus also with lecture effectiveness.[10]

Additional strategies for evaluating a lecture include observation and video-taping. Having the lecture observed by a trusted colleague who will provide honest feedback or by an educational “coach” can also be useful. An excellent way of getting this type of feedback can be to have the lecture videotaped (from the back of the room, including the audience) and then review it with a colleague or coach. While either of the last two methods can provoke anxiety for the lecturer, they provide unique opportunities for teacher development.

Strengths and Utility

The lecture offers the opportunity to deliver a great deal of information to a small or large number of learners while using the teacher’s time efficiently. The teacher can organize and prepare the content and practice the delivery until satisfied that the lecture will help the most learners possible. The teacher can help the students to pull information together, understand it better, or organize it in a way that allows the learner to know when he can and can’t use it.

Weaknesses and Problems

The major struggle faced by the lecturer is to keep the students actively involved. Passive listening rarely promotes learning. Strategies for promoting active learner involvement include asking questions of the group, or an individual, using a variety of audiovisual aids, highlighting ("if you don't learn anything else today, remember that….") and organizing the material ("There are three things to be learned today…first….second…"), use of audience responses (either by raising their hands or by an electronic response system), notes, and handouts.

Audience Response Systems

The audience response system (ARS) is a technology that can provide additional ways for the instructor and learners to interact during a presentation. ARS promotes attention to task, and possibly active learning, by requesting the learners to respond to questions embedded in the presentation. Typically conceptualized for use in large lecture settings (e.g., 100 or more) it has been used in a clerkship setting with far fewer students.[11,12] ARS consists of an individual input device given to each audience member (e.g., proprietary keypads, PDA, or laptop software) that communicates an anonymous response (usually wirelessly) to a central lecture computer, which can quickly display the pooled results on the projected screen. The lecturer poses the question, the audience responds, and the results are promptly available for the lecturer and class to examine or discuss.

Well-designed ARS questions can provide an immediate assessment of student learning, allowing the instructor to clarify points, modify a presentation as it is being given, and personalize it to the students at the time of lecture. It can also promote problem solving in class, extending a lecture beyond the simple providing of information.

Use of ARS requires an institutional investment in the specific technology, a faculty investment in learning to use the system and a commitment to available onsite technical support during a lecture. (Technological problems can require a lecturer to reorganize a presentation on the fly.) The instructor would develop the content and design of a presentation specifically to take advantage of the ARS technology, which requires additional time devoted to planning of lecture material, compared to the traditional lecture.

Team-Based Learning

Team-Based Learning (TBL) is an educational method that bridges large group (i.e., classroom) and small group approaches. Developed in the 1970s by Michaelson at the University of Oklahoma, it has spread into medical education since 2001.[13-16] TBL combines in-class activity with out-of-class preparation. A large class is divided into a number of student teams and preparatory homework assignments are given. The subsequent sessions, conducted with all the students in the large classroom, are highly structured and include the following components: individual and group quizzes that are immediately scored to foster accountability; discussion of quiz results; presenting a

problem designed to be solved by the teams simultaneously during class; and subsequent open grading and discussion of the teams' separate solutions. Print and Web-based resources are available for instructors wanting to learn more about TBL.[17,18]

TBL is a method suitable for an entire course or multiple sessions within a course, and not to a single classroom experience. The educational goals can include the development of professionalism and teamwork competencies as well as problem solving and critical thinking that are much more difficult to achieve through the traditional lecture.

TBL requires a skillful instructor – students may perceive a poorly run TBL session as more of a failure than a poorly delivered traditional lecture. The instructor should be committed to his/her own development as a TBL teacher. The method also often requires educating students about the method, teaching them how to perform the structured tasks.

Case Method

The Case Method was developed at Harvard Business School in the 1970s by Barnes and Christensen, and it remains a widely used method today in business, law, and education.[19] It has not been as widely adopted in medical education as has TBL, however.[20,21] The Case Method is predicated on the assumption that the "real world is messy" and that there are many variables that can be considered in managing real problems. The class is given a complex problem, the case, to analyze outside of class. The case is aligned with the course learning objectives and usually is designed not to have a single correct answer, but to have multiple reasonable approaches or solutions. Working outside of class, each person or team is expected to evaluate the case and research any necessary information. In the subsequent class session, the facilitator comes prepared with questions that probe and challenge the reasoning and solutions. The class considers the conditions under which certain evaluation and management strategies might be used and when they might be inappropriate. The facilitator encourages the use of the knowledge each student has about the content to analyze, synthesize, critique, and build new conditional knowledge. At the end, the facilitator should consider some summary of what was learned from the session.

The Case Method is notable for promoting critical thinking and discussion on topics about which reasonable persons can disagree. Case method teaching has been used very effectively to teach students topics in ethics and cultural competency and to discuss values and attitudes. It may be less successful at presenting information. The instructor must be a skilled discussion leader and come to the class prepared with questions that are designed to promote critical discussion of the issues raised by the case. The cases need to be sufficiently complex to allow for discussion and should address one or more learning goals. They should be as close to real situations as possible.

Demonstrations

Classroom demonstrations can be very valuable to teach and critique many skills and examine attitudes and values. Videotapes and pictures can show rashes, limps, murmurs, deformities, and intonation that cannot be described verbally. The shift in classroom dynamic draws the learners' attention. The use of other senses increases what is remembered.

Seeing a patient who describes and demonstrates his problem to the group enhances learning in ways that no words can ever do. Watching and critiquing a live interview can improve interviewing skills and mental flexibility.

Active learning systems

Many games and quizzes have become available for use in classroom settings. Jeopardy, Name that Rash, Who Wants to be a Millionaire? and others are available as proprietary products and individuals have constructed similar games for use in the classroom. The learners are often separated into teams and competitions are held to see which team can answer the most questions correctly. These foster active learning and can interest and motivate students in areas that are not inherently interesting to them.

Conclusion

A number of different teaching methods can be used in the classroom setting. The method selected will depend on the learning objectives, the technological resources available, the overall course design and educational methodology, and the instructor's training.

Small Group Teaching Methods

What is small group teaching?

Small group teaching is defined by group size, usually 6 to 10 participants, and a focus on active learning and communication between members of the group.[22] These sessions can occur in a conference room, an administrative or clinical office, or even at the bedside of a patient. You will need to assure that the room is large enough for everyone to be able to sit and make eye contact. Tutorials, seminars, and attending rounds are the traditional modes of small group instruction in the clerkships. Small groups can be effective in accomplishing many tasks:

- Introduction of new material/concepts (basic science and/or clinical)
- Review of material
- Application of material
- Journal club discussion of article(s)
- Case-based formats for review, introduction, integration, or application of material

- Patient-centered discussions (e.g., bedside teaching; ambulatory teaching)
- Team projects

As Steinert has written, “small group teaching offers students an opportunity to discuss and refine their understanding of complex issues, to problem solve and apply their knowledge to new situations, and to reflect on their attitudes and feelings.”[23] This method also provides an opportunity for integration of domains such as professionalism, humanism, communication skills, and self-directed learning into the formal curriculum of the clinical years. Finally, small group teaching allows for much closer contact with faculty than the traditional lecture approach.

Categories of small group teaching

The main categories of small group teaching methods that will be presented in this section are focused discussion, problem-based learning, student-led seminars, and role-play.[22]

Focused Discussions

In focused discussions, a faculty member will present a case or a problem and then lead a discussion with the rest of the group. Cases should be relevant to the learners, address defined learning objectives, and contain teaching points that can be applied to other situations.[24] Cases can be prepared in advance by the faculty member to “capture real life situations in which a professional (representing the students who are training to adopt similar professions) confronts a dilemma common to the discipline.” [25] Cases can also be prepared by students, based on a memorable or relevant clerkship experience. The discussion is usually led by the faculty member, but can be assigned to the student. One can also consider using video clips, handouts, or study guides to stimulate discussion, reflection, and learning in the small group setting.[23]

Strengths and Weaknesses:
The strengths of focused discussions are that they are case-based, relate to potential clinical experiences, and encourage the learner to actively apply knowledge. Additionally, the team approach to solving the case helps develop communications skill for use on the ward and other clinical settings. The limitations of focused discussions are that prepared cases may not be directly relevant to the learners’ own experiences on the clerkship.

Problem-Based Learning (PBL)

This technique is similar to the focused, case-based discussions, but encourages increased learner independence. PBL traditionally has been used for teaching in the first 2 years of medical school, but can also be an effective teaching strategy in the clerkship years. As part of a small group (ideally 4-6 members), students are first presented with a clinical problem that unfolds over 2 to 3 sessions with progressive disclosure of historical information, physical exam, laboratory data, etc. Students define the facts, develop hypotheses based on these facts, and then develop their own

learning objectives and plan for solving the clinical problem. At the beginning of each session, students self assign their roles in the session, as Leader (moderator), Reader, Scribe, or Participant. These roles will rotate with subsequent sessions, ensuring maximum active participation from all members in the group. Learning objectives are researched between sessions by students and presented back to the group for discussion. This type of small group fosters self-directed learning and teamwork among participants. The faculty member's role in PBL is to facilitate this process, rather than to direct and lead it. For more information about problem-based learning, the brief overview by Wood should help.[26]

Strengths and Weaknesses:
Because PBL is cased-based, students are more focused on the clinical usefulness of the information they look up and report to the group. Students also learn to work more independently, and there is a greater focus on self-directed learning. Teamwork is encouraged. PBL takes more in-class time than other methods. Faculty have less control over the learning environment than in focused discussions because they function as facilitators of the process and not discussion leaders.

Student-led Seminars

In these seminars, the student is charged with presenting a topic to the rest of the group. The nature of the topics is usually negotiated within the small group. A topic may be chosen to complement a previous discussion or clinical experience, or a new topic may be presented. The presentation is usually followed by a focused discussion. Expectations for length of presentation, use of handouts, or audio-visual material should be clearly stated in advance.

Strengths and Weaknesses:
A major benefit of student-led seminars is that the topic discussed is relevant to the learning needs of the small group and is taught at the level of the learners. This strategy also provides an opportunity for students to teach each other. One weakness of this teaching method is that student–led seminars rely on the student teacher's knowledge of the topic and application of effective teaching methodology. Thus, discussions may not be well presented or facilitated, and there is a danger that the clinical relevance and applicability will not be clear.

Role-Play

Role-play is an excellent technique for building clinical skills in the safety of the small group setting. It is particularly effective for practicing communication skills. Role-plays can be based on previously scripted written scenarios or on a real case that may have been presented to the group. Clear instructions must to be given regarding the nature of the roles, timing, and specific objectives. The role-play may be enacted in groups of two, with one student playing the "physician" and another playing the "patient." Role-play can also take place in groups of three, with an observer added to the group. The observer should be given a checklist to facilitate observation and feedback. The role-play should always be followed by a debriefing and an opportunity for self-assessment

and feedback. The student in the role-play, the physician, should first be given the opportunity to self-assess by being asked “what went well” and “what would you have liked to have done differently?” Opportunities for a “re-play” may be given if desired. Ideally, students should switch roles so that each one has the opportunity to practice each role. An alternative is to have a role-play demonstration, also known as a fish bowl, with the rest of the group observing and participating in the feedback session.

Strengths and Weaknesses:
The role-play method allows learners to practice clinical skills, particularly communication skills, in a safe environment without the expense of paying for a Standardized Patient. The faculty member can directly observe the skills of multiple students during a single session. By playing the role of the patient, the student can get a better understanding of the patient’s point of view. The biggest limitation of role-play is the almost universal hesitance of students (and sometimes faculty) to role-play.

Categories of Small Group Teaching

	Brief Description	Student Preparation	Faculty Participation
Focused Discussions	Faculty-moderated discussion of a case	Students should read on topic area in advance	Faculty member guides the discussion based on defined learning objectives
Problem Based Learning	Student-driven, problem-centered case discussions that unfold over two-three sessions	Students identify learning issues during the case session which they research between meetings	Faculty member facilitates the student's discussion of the cases and student-identified learning issues
Student-led Seminars	Topic-centered discussions led by students	One student (the "teacher") prepares a presentation on a topic relevant to a case	Faculty member should be prepared to assist the "student teacher"
Role-play	Students are assigned roles based on written scenario to simulate real interaction in a classroom setting	Preparation generally unnecessary	Faculty member demonstrates technique and serves as observer to assess skills and to provide feedback

Using Small Groups Effectively

For small group instruction to be effective, the instructor should keep in mind five principles of adult learning theory.[27] Adults learn best when:

- Instruction is relevant
- Instruction is conducted in a safe learning environment that encourages a processing and verbalization of thought
- Instruction draws from the learner's experiences
- Instruction is problem-centered
- The adult learner is provided with feedback

Encouraging Participation

One of the biggest concerns of any small group facilitator is getting all the group members to participate. Jaques describes a number of techniques for breaking down a group of learners into smaller units, thereby increasing student participation and decreasing the involvement of the faculty member: [28]

- “Group Round” - Participants are given a brief period of time to say something and then move to the next member of the group (for example, an icebreaker in which students are asked to state their name and its meaning).
- “Buzz Groups” - Students pair up with a neighbor to discuss their own answers to a particular question for a set period of time. Then the larger group reconvenes and discusses the answers.
- “Snowball or Pyramid Groups” - Participants are initially asked to carry on a discussion with their neighbor (buzz group) and then sequentially neighboring groups are paired to form groups of four, then eight. A representative from this group then presents the group’s findings back to the larger classroom group.
- “Fishbowl Groups” - The group is divided in two, where there is an inner, discussion or role-play group, and an outer observational group. After a period of observation and a debrief session, the roles may be switched.
- “Crossover Groups” - Students are divided into subgroups for the initial discussion. The subgroups are then divided and participants are split into new subgroups to maximize the amount of information crossover.
- “Circular Questioning” - Each member of the group asks a question to another group member, who briefly answers the question. Then the next person in the circle asks a question. The exercise is complete when everyone has asked a question. The facilitator can wrap up the session by summarizing questions asked and responses.
- “Horseshoe Groups” - Small groups are arranged around tables and each table is arranged in horseshoe fashion around the lecturer. This allows the facilitator to move between lecturing and interactive small group activity.

The Role of the Faculty Preceptor In Small Group Teaching

In small group teaching, the faculty member should view himself as a facilitator of discussion rather than as an instructor. The facilitator’s primary function is to structure an effective small group learning environment. Ideally, this structure allows the group to function effectively in the absence of the facilitator.[29] Allowing students to struggle with a problem is an important part of the small group learning process. However, providing guidance, reinforcing what is right, and correcting errors are also essential. The facilitator must stay engaged and connected with the group process, yet give the students the opportunity to work independently.

An effective facilitator will accomplish the following tasks:

- Prepare, or assign preparation of, material to be used
- Negotiate and check agreement on small group learning objectives and ground rules
- Facilitate small group activities and discussion
- Provide focus as needed
- Check that learning objectives are attained and tasks are completed
- Troubleshoot problems in group dynamics
- Monitor the flow of the session and attend to time management
- Assess and give feedback on student performance.

Practical Steps for a Successful Small Group Teaching Session

Assuring a structured, safe, and stimulating learning climate is important to the success of small group teaching. A safe learning environment is one in which the students feel they are freely able to express their thoughts and ideas. Techniques for achieving this goal have been derived by group learning theory[30] and adult learning theory. Some practical suggestions for small group teaching, including how the educator can create a safe and stimulating learning environment, are outlined below.

Tips for Successful Small Group Teaching in the Clerkships [22,23,31,32]

Planning is important for small group teaching to succeed. Negotiating a plan with your students will make your teaching more learner-centered and assure its relevance. Consider creating a formal learning contract that explicitly details the expectations of the learning setting. A learning contract is "an agreement negotiated between a learner and teacher that certain activities will be undertaken in order to achieve particular learning goals and that specific evidence will be produced to demonstrate the goals have been reached." [33]

Arranging the physical environment in ways that enhance group interaction can play a major role in the success of any small group. Arranging people in a circle maximizes eye contact and reinforces expectations that students will learn from one another as well as from faculty. Use a room with furniture that can move so that different arrangements can be created easily. Jaques provides other suggestions (with diagrams) on how to arrange the participants in a small group setting. [28]

Getting off to a good start sets the tone for all subsequent group interactions. Remember to spend some time on introductions on the first day and try to learn all of the students' names as quickly as possible. Let students know how you want them to address you in the small group ("Dr. Smith" or "John") and clarify how they should they address you in front of patients. If you have trouble remembering names, consider using name plates or identification tags. Before actually starting the group's formal agenda, consider using an icebreaker to get everyone involved. For example, have the students go around the circle to introduce themselves and say something about themselves (hometown, hobbies, interesting books read, favorite movies, etc.).

Be sure to establish a set of ground rules for the small group functioning together on the first day. Describe your role and responsibilities as the faculty member and facilitator. Discuss and define learning objectives for the small group sessions overall, as well as for each individual session. Ask the students about their expectations. What do they hope to learn from the course or class? Try to engage the students' motivation for learning by linking the small group learning to the goals and objectives of the individual clerkship, as well as the overall curriculum. Assess your learners' knowledge base and prior experience by asking "Has anyone ever seen a case like this before?" and adjust questions to individual learners accordingly.

Create a stimulating learning environment by demonstrating your own enthusiasm and passion for medicine. Try to vary your teaching methods. Encourage the students by having them draw on their prior experiences in the case discussions. Students will remember information better if it can be linked to clinical practice or goals that they value (For example, “This type of information is commonly seen on board exams.”).

Create a safe learning climate by asking questions that invite questions. (“Have I made that clear enough?” “What else would you like to know about that?”) Acknowledge that asking questions is essential for self-directed learning. Remember that you are modeling behaviors, such as professionalism and self-directed learning, even if you are not teaching them explicitly. Thus, If you do not know the answer to a question, it is an ideal opportunity to model self-directed learning by acknowledging that you do not know the answer and discussing how to look it up. Be sure to return to the question later.

By asking open-ended, appropriately challenging questions, you will encourage group discussion and participation. Although you are the content expert, avoid providing solutions to all questions; students learn more if they find the answer on their own. If you are asked a question, consider asking if anyone else in the group knows the answer before you respond. Ask questions that encourage application of knowledge, synthesis, and analysis rather than factual recall. Remember to use appropriate wait time after asking a question - counting to 10 allows time for cognitive processing – especially for complex questions. Encourage the students to talk directly to one another instead of going through you each time. Adjust your gaze so that you look at all the group members, both when you are talking and when they are talking. This sends the message that they are talking to the group, not just to you.

It is important to manage group time effectively. Remind students of time allotted to specific small group activities and keep an eye on the clock. Taking an interesting “side road” or tangent can be fun and maintain interest, but remember to focus the activities on the learning objectives – don’t let your learners stray too far.

Use reflective practice to improve your teaching. After each session, consider what was effective, what could have worked better, and the potential reasons. Adjust the next session accordingly. If you are having trouble with group dynamics, discuss them with a colleague or ask for the group to help.

Teaching Multiple Levels of Learners in a Small Group Setting

In the clinical setting, it is common to have small groups composed of learners who have different experiences and/ or educational levels. The most obvious example of this is ward-based teaching during attending rounds. Teaching in this setting requires that the faculty educator identify and acknowledge the different levels of students to ensure that all learners are included in the learning process. One can do this by using skilled questioning at the outset to define their clinical experiences to date. Asking the simple question, “Have you ever seen a case like this before?” will help assess the learners’ level of experience. When questioning is used as an educational tool, the faculty

member must recognize that the questions being asked must be appropriate for the developmental stage of the learner. For example, the facilitator may ask a third-year medical student to report and interpret the clinical findings and ask a senior resident to address management issues.

While there are challenges to having multiple levels of trainees in a small group, there are also benefits as well. The assembly effect of students with different educational and clinical experiences provides a rich forum for discussion. This setting can enable teaching among students to take place, fostering independence and development of effective communication and teaching skills. When a question is posed, you can call upon a more advanced learner to teach the junior learners rather than answering the question yourself. Similarly, you can encourage the students to provide each other with feedback, which can further enrich the learning climate.

Feedback and Assessment

Feedback and assessment are major motivators for students, so it is important to address these issues early on, preferably in your first small group session. Clarify how the students' small group performance will be assessed and how it will contribute to their clerkship evaluation. Also, explain that you will give feedback on performance in small group sessions during the course of the clerkship. The content of your feedback and assessment should be linked to the small group objectives. If you will be using an assessment tool for small group performance, you should review this tool with the students in the orientation session to demonstrate the link between objectives and assessment. It is also important to set aside time for students to reflect and give feedback on the process and content of the small group learning.[34] This can be accomplished within the small group setting or in individual meetings with the students.

Tips for Delivering Effective Feedback

Feedback should be provided in a timely manner to reinforce what students are doing well and to give them an opportunity to improve in response to constructive criticism. At a minimum, feedback sessions should be scheduled with individual students midway through their clerkship or time spent with you as a small group facilitator. One useful approach is to begin the feedback session by having the student to assess his/her own performance. This will give you information to make your comments more relevant and provide information about the student's insight into his/her performance. The content of your feedback should be specific and based on behaviors you observed in the small group setting. It can relate to a number of domains, including professional qualities (e.g., attendance, punctuality), group process skills, communication skills, application of knowledge, and clinical reasoning. You should be specific and include both positive and constructive comments in the feedback session. Always conclude the session by discussing strategies for improvement. Ende's classic reference on feedback is essential reading for all CDs.[35]

Strengths and Usefulness of Small Group Teaching

The small group instructional method has multiple benefits. Active small group discussion encourages application, analysis, synthesis, and evaluation of facts and concepts. This process is essential for developing competence in clinical reasoning and critical thinking.[22] Working in small groups allows students to take an active role in their own education. Students learn facts and concepts best when they use them to solve problems. Small group teaching with mixed levels of learners also offers the opportunity to set expectations of learners at all levels and demonstrate expectations for progressive competence in the continuum of medical education.

In the clerkship, the small group is most useful for allowing students to process information, facilitating a higher order learning of material. Small group sessions can also complement the information presented in lectures by allowing students time to ask questions in a non-threatening environment and to think critically. This allows the students to detect and correct errors (their own, and sometimes those of the facilitator). Small group teaching also offers students opportunities to problem solve, make clinical decisions, and practice clinical skills, especially communication skills. These groups are also useful in promoting student reflection, independence, and life-long learning.

By their nature, small groups also foster increased interaction among students and faculty. Students learn to function as a team, develop the ability to learn from one another and develop an appreciation for others' point of view. This setting also provides an opportunity for students to offer feedback to one another in a safe environment and for a faculty member to offer directed feedback to students as well.

Weaknesses and Problems of Small Group Teaching

A major drawback of this teaching methodology is the large amount of faculty time required. Another potential problem is the dependence on the faculty member's small group facilitation skills. An ineffective facilitator leads to a poor learning climate. Poor facilitation can also lead to a lack of participation from group members (e.g., students are not engaged in the process; students are not prepared for the session). The group learning process can be disrupted if students become more concerned with "performing" for a good evaluation than contributing to the group process. Similarly, poor group dynamics can result from too much competition among group members, or if one student dominates the session). Most of these problems can be averted by negotiating and clearly defining the ground rules and learning objectives in the first session, and readdressing them when necessary. Providing adequate structure for the small group is also very important. Finally, faculty development is useful for training effective facilitators.

The student who does not participate and the student who dominates are two of the most common problems encountered by small group facilitators. Here are some specific techniques for dealing with these common situations.[34]

The Quiet Student: The Student Who Talks Too Little

Some students are quiet and reluctant to participate in small groups. The reasons for the lack of participation may be due to disinterest, lack of preparation, being shy, or being engaged but not needing to speak as much. The small group process depends on cooperation and the participation of students. A lack of participation not only impacts on the individual student's learning, but also on the learning of his/her classmates.

Here are some tips for helping the quiet student. Find out why he/she is quiet and address it accordingly. Ask if the student is comfortable with his/her level of participation or would he/she like to participate more. Remember that a student's culture may play a role in his/her small group interactions. Try to get to know the student individually outside of the small group setting. Consider asking him/her to participate in areas in which he/she has special knowledge. Invite quiet students into the group discussion by asking them open-ended questions requiring more than a "yes" or "no" answer. Consider giving them a specific task, such as the scribe in the problem-based-learning group. Create an environment through your own verbal and non-verbal cues that supports and encourages their participation.

The Dominant Student: The Student Who Talks Too Much

There are many potential reasons why a student may talk too much. These range from a student coping with anxiety and insecurity by speaking incessantly, to wanting to be in the post light and get a better grade.

Here are some suggestions for dealing with this common situation. First, try to find out why the student is dominating and address it. Speak with the student privately, beginning by asking him/her to assess his/her own level of participation. Define a specific duration (15 seconds, for example) that each speaker can speak and use a time keeper. This trains everyone to speak in 15-second bursts. Give the dominating student a specific task, such as the scribe or the time keeper. Try to hand over the conversation to another speaker by interjecting. One way to do this is by talking over the student's voice and asking another student's opinion on what the dominant student has just said.

Giving regular feedback on their group process skills to both the quiet and the dominant student is essential for encouraging behavior change.

Finally…..remember to have fun!

Your enthusiasm, interest, and enjoyment will be directly transmitted to the group and will very much impact on your success. If you are having a good time and learning, it is a good bet that your students are doing the same.

Clinical Teaching Methods for the Inpatient Setting

Themes for Improving Inpatient Teaching

Setting the right tone and climate for inpatient rounds is the foundation for successful learning on the inpatient service. Starting the month by setting mutual goals involves the learners from the outset and shows how much you value their learning. Showing interest in what medical students want to learn, using their names, and speaking respectfully to each member of the team all contribute to a positive learning climate. The choice of rooms may be limited for inpatient teaching discussions, but do your best to make sure that it is set up so all learners can see you, the board, and each other. The temperature and lighting should be conducive to learning and all participants should be seated comfortably.

Setting appropriate goals and expectations should be done at the outset. Although students should have an opportunity to express their learning objectives, often the preceptor will bring goals to the table that were not considered by their learners. Making bedside rounds on the inpatient ward provides a rich opportunity for students to hone their physical diagnosis skills, and bedside teaching should be part of every inpatient attending's teaching repertoire.

Time management is particularly important on the inpatient service. Each member of the team is busy and starting late and ending late only adds to this problem. Also, the attending physician should be certain that time is allocated to achieve the goals and objectives set by the team. If one of the learning goals is to work on physical diagnosis skills, then planned opportunities for physical diagnosis should be made.

Promoting learning should be the goal of all teaching activities! Learners who take an active role in their learning, learn more. As the instructor, you can organize activities in a way that promotes your learners' active involvement. For example, you can assign portions of a topic to each learner, you can give a clinical case out in advance to encourage reading and reflection, you can have students "find the mistake," or you can have each learner write a test question on the topic of the day. If you are talking about the evaluation of the patient with chest pain, you can assign different people to look at one or more available tests and talk about that test in the context of the patient on the service. Or, you can have each participant present a case from his or her own experiences and compare and contrast that to the presentation of the team's patient.

Each learner is unique in how he or she learns. Some are very visual learners, while others remember better what they have heard. Regardless of how we learn, most of us only remember what we use. Therefore, the trick is to use the material in whatever teaching method you choose.

Evaluating what your students need to know, teaching that content, and then evaluating whether they learned the material is the key to providing the best possible educational experience. Asking learners to tell what they know about a topic or giving a pretest can help the preceptor discover what the students need to learn. Asking learners to summarize take-home points or respond to the question, "What did you learn today?" can be very revealing. This information can also help the preceptor refine or modify his/her teaching methods to maximize student learning over the course of the month.

Above all, the teaching method should fit the material being taught. To teach knowledge, one can use a variety of formats, including reading together, summarizing what has been read, presenting and organizing structure for the material, as well as playing games such as Jeopardy, matching games, and “show and tell.” When teaching skills, one should start by providing a framework for performing that skill and then allow the participants to try the task under guidance. Another strategy that works well is to have one student teach another how to do the skill. The rest of the team can also observe and critique the student who is performing the skill. Teaching attitudes and values is difficult because they are context dependent. One useful approach is to discuss attitudes and values in context. These opportunities arise often on the inpatient service. For example, stating an observation that a resident seems to talk differently to or about one particular patient compared to his other ones can spark a very useful and timely discussion. Discussing cases that are read or viewed in advance are also very practical ways to promote thoughtful evaluation of attitudes and values.

Conference Room Attending Rounds

Most specialties in medicine have some form of attending rounds. These began in the early 1900s as walk rounds with the professors and experts in the field who would help the house officers to diagnose and treat the patients. As medical education developed, ward teams became groups of different levels of learners who worked together. Having many levels of learners with different learning needs on inpatient rounds represents a major challenge to the attending physician.

In choosing a teaching method for attending rounds, the teacher should consider the following:

1. What the goals are for each level of learner (knowledge, skills, and attitudes/values) for today and for the rotation.
2. How to actively engage as many learners as possible.
3. Which methods best display the content of the session.

The Case Presentation

Case presentations are the backbone of attending rounds. Often these cases are selected because they are complex, interesting, or both. In general, a clinical case is selected by the team, and the resident or medical student following that patient presents it to the group. Traditionally, the attending then points out some aspects of the case, asks the group to generate a differential diagnosis for the case and then the group narrows down the differential and decides how to make the diagnosis or manage the patient. How each of these steps is done determines the effectiveness of the teaching conference.

How the Case Is Chosen

The attending and the ward team need to consider what their learning goals are in

choosing the case. Do they want to compare and contrast this case to other cases they have seen? Was a mistake made in diagnosing or treating the patient that all should learn to avoid? Is this a difficult management case? What are the diagnostic or treatment options for this patient? Choose cases with a definite goal in mind. Arrange the time to focus on that goal. For example, if the goal is to learn about a common medical problem, comparing and contrasting two or more patients with the same diagnosis to can facilitate learning. If the goal is to develop treatment options for this patient, then focusing on the features of the case that highlight various treatment options is a better approach.

How the Case Is Presented

This is determined by the goals of the session. Is the goal to distinguish between several diagnoses or to discuss the broader differential? If the goal is to work on the broad differential diagnosis of chest pain, then one might have the presenter give only a short history and then have the group ask questions that narrow the differential. When trying to distinguish between different diagnoses, working on the choice of questions is very helpful in honing clinical skills.

How the Attending Focuses the Discussion

Does the attending have the same agenda and learning goals for the learners? Some attendings “share their expertise,” which can be helpful, but this can easily develop into a “mini-lecture.” When the attending shares his/her information in the context of a patient cared for by the team, the students are more likely to remember and use what is taught. Other useful approaches are to raise questions about the diagnosis, point out contradictions in the case, or to speculate on how things would be different if one feature of the case was changed. Comparing the case to others the attending has seen can be useful as well.

How the Differential Diagnosis Is Generated

Choosing and stating a method for developing the differential diagnosis can be the most helpful way to promote critical thinking among the group. Traditionally participants in attending rounds generate a huge differential diagnosis. They then rule out many of the diagnoses from the history, physical examination, and laboratory tests, and finally they develop a plan on to how to proceed. This method has the advantage of considering many diverse diagnoses, allowing the learners to take home information about some of these. However, the information obtained is often minimally related to the case, making it more difficult to remember and retrieve for use later.

Lucey and Williams[36] have promoted using a novel method for attending rounds: illness scripts. They point out that specific characteristics define each illness. Conversely, there are characteristics that mandate that some diagnoses should be discarded. They propose that the case be presented and the signs and symptoms “defined” or translated into medical terminology that narrows the differential to a very small number of

diagnoses that can be discussed in detail. For example, the patient who has made several trips to the emergency room for upper abdominal pain after dinner is translated to recurrent postprandial pain. The woman who has gas, bloating, and pain after eating fried fish, ice cream, or popcorn with butter at the movies has fatty food intolerance. They recommend that the group also consider the worst possible diagnosis and be certain to rule that out.

Barrows and Pickell[37] suggest using a clinical problem-solving model that recommends that the group consider each of the problem-solving steps in the process of differential diagnosis. The model begins with the generation of an initial perception, analyzing why the perception occurred. From that point, an initial concept is developed. From the initial concept of the disease, multiple hypotheses are generated. From these hypotheses, an inquiry strategy can be developed. If no clear inquiry strategy develops, then the group can scan by asking a fairly complete review of systems. From these steps, key features of the illness are developed and a problem synthesis is defined. Developing a differential diagnosis models what the clinician does in performing a history and physical examination. Thus, these two methods[36,37] may be more helpful to the learners in developing their clinical problem-solving skills.

How the Management Is Decided

While the group can discuss “what to do with the patient,” a more formal way of developing a plan can be much more useful. For example, using a format that includes developing a diagnosis, a therapeutic plan, and a plan to monitor for improvement is more helpful to students than just planning to use antibiotics to address the problem. The group can use this portion of the conference to look at the evidence for the management of common medical problems and begin to critique “what we usually do.” Alternatively, the group can list all the possible ways to manage a particular problem, and assign each group member to research one method and report back to the group. “What would happen if…” or “what would you do differently if …” questions often help the group to learn more management strategies than they would if they merely considered the case in isolation. These questions help set the parameters around the management options.

Assessment

The assessment of this teaching method can take many forms, from feedback scales measuring student satisfaction, to a brief post test or student discussion of how conference changed the evaluation or management of patients with this problem. Angelo and Cross[9] have developed a series of classroom assessment techniques that can be useful in this assessment. One very quick and practical one is to ask each student to write down 1 to 3 things that he/she learned today and then share them with the group. An alternative method is to ask learners to record “one thing that you will do differently because of today’s conference.” As another assessment method, don’t discount your own sense of “how it went.” Experienced teachers often watch the reactions of their learners and listen carefully to the questions they ask to decide how

helpful the session was to the learners.

The advantages of using this traditional case presentation format are that it is familiar to most medical students, the content is relevant to their practice of medicine, and they can use what they learn right after attending rounds. It is an ideal forum for demonstrating and encouraging critical clinical thinking, modeling evidence-based medicine and examining attitudes and values in practice.

A caveat to using this format is that it can become all too familiar and mind-numbing as the students passively listen to the presentation and the recitation of the differential diagnosis. Thus, if you use this format for your inpatient conferences, mix it up. Ask questions that push your learners to question their assumptions. Ask questions that change some of the specifics of the case to help your learners define when they would do things differently. Go see the patient and demonstrate physical findings. Present a contrasting case and ask for similarities and differences.

Prepared Case Presentation (Case Method Teaching)

This method of teaching complex material has been used extensively in schools of education, business, and psychology.[19] It is particularly useful to teach content that has many different possible solutions, each with its merits and drawbacks. Thus, in medicine, there are often several different ways to evaluate a particular problem, none of them right in all situations and only a few of them are wrong. A good case presents one or more decision points and gives the group the opportunity to discuss the advantages of different decisions at these points in the case. For more information, see the discussion of Case Method teaching in the first section of this chapter, under “Classroom Instructional Methods.”

Topic Presentation

Topics of interest can be decided at the beginning of the rotation or can arise during the rotation as a result of issues arising from patient care. The key to a successful topic presentation is that it should involve something that the group decides would be important or useful to learn. It should be sufficiently narrow and focused so as to be manageable in the time allotted to attending rounds. As discussed in the lecture section of this chapter, any strategies that will promote active learning during the session will help increase what is learned. Participation can be enhanced by dividing the topic up and asking each member of the team to present one aspect of it. Alternatively, one can assign each team member a “role to play” or a perspective to take when looking at the topic. For instance if the topic is “rashes,” one person could look at them from the view of the gastroenterologist, another from the primary care role, yet a third from the perspective of the parent.

The hazard in a topic presentation is that it will become a lecture. Unfortunately, the amount retained by the students in these sessions, as in a lecture, is usually less than desired. Nonetheless, it is a time-honored way to communicate large quantities of

information quickly and in an organized way.

Fun and Games

While many of these types of sessions have not been formally evaluated for their teaching effectiveness, the response from learners is so positive that most of us believe that substantial learning must occur. Games such as Jeopardy, Name that Rash, etc., have been developed both locally and nationally for use with small groups of learners. Competition among two or more teams of learners often occurs, so there is much learning potential here.

Walk Rounds

Walk rounds can take many forms. They can be formal work rounds where the attending sees each patient with the inpatient team, trying to assist the resident and students to do their jobs better. The coaching role is significant and especially useful if there are some leadership issues or organizational issues that could be addressed. Working rounds can also be used to watch students and residents as they manage patients, coaching them to a better performance. Patient interactions, physical examinations, and oral presentations can all be evaluated and feedback given during rounds.

Walk rounds can also be done with a subset of the group to teach physical diagnosis. Listening to a number of patients' lungs with different types of findings, for example, can help students improve their clinical skills. With larger groups of learners, one or two members of the team can do a portion of the physical examination and the rest of the team and the attending physician can give them feedback.

Observation rounds can also be quite fun. The group can walk down the hall and observe a patient from a distance. Group members can try to guess the patient's diagnosis, define his limp, etc. For young children, the group can try to guess the patient's age by assessing his/her size and developmental abilities. Another option is rounds in the playroom. Each participant goes to the playroom and plays with one or more children. Participants are not to ask the child's age or diagnosis, just play with the child. Then the group reassembles in the conference room and discusses the age and diagnosis or development for each of the children with whom they played.

Clinical Teaching Methods for the Ambulatory Setting

Introduction

Clinical teaching in ambulatory settings differs from the typical hospital-based third-year student clerkship in several ways. First, students are most often assigned one-on-one with an attending physician. The student/intern/resident/attending "team" is absent. Responsibility for assuring a high-quality experience for students in this setting falls solely to the ambulatory preceptor. Second, ambulatory settings are fast-paced

environments precluding the typical lengthy, comprehensive inpatient evaluation. Expectations for and by students and faculty must be adjusted accordingly. Third, patients are not passive, bed-bound participants. Rather, they are autonomous individuals taking time out of their busy lives to seek health care, prepared to negotiate time-limited encounters, and entirely in charge of carrying out their own treatment plans. Fourth, students generally have significantly less exposure to ambulatory settings during their clinical training. Many medical schools are introducing students to the clinical environment early in the first year of school, and these assignments are often in ambulatory settings. But, the majority of the clerkships remain hospital-based. Students will bring a wide range of experience to the ambulatory setting. These factors influence clinical instruction in this setting.

Orientation

Because students will have an unpredictable exposure to learning in ambulatory settings, the most important first step in teaching in this setting is orientation. Ambulatory-based teaching faculty should 1) assess students' prior experiences, 2) clarify expectations for performance, 3) set learning goals with students, and 4) explain the structure of the ambulatory "team," including the roles of team members (See also Chapter 16, Clerkship Orientation).

Assessing students' prior experiences

On the first day of the ambulatory rotation, the teacher should schedule time to meet with the student, usually first thing in the morning. Failure to schedule this time results in orientation "on the fly" or no orientation at all. Ask the student to talk about other clinical experiences in settings similar to this one, including early experiences in the pre-clinical years. The responses should range from "I've never rotated to the outpatient setting" to "I worked in the outpatient clinic on my Peds, OB, and Family Medicine rotations, and I've already done an elective in the emergency room." Students with some experience in the ambulatory setting may feel more comfortable, but assumptions about performance or short cuts in orientation should be avoided. The "rules of the game" may not transfer from one ambulatory setting to another.

Clarifying expectations

The teacher should explain the differences the student will encounter in the ambulatory setting compared with hospital-based training (Table 1), using these differences to clarify expectations. The two most important points of clarification are 1) students are not expected to (and should not) perform comprehensive histories and physicals in the ambulatory setting, and 2) formal teaching will occur as time allows because the primary focus is patient-centered care that is sensitive to the patients' time. The teacher should then specifically outline both the routine for a typical day in the ambulatory setting (Table 2) and the expectations for a typical encounter (Table 3).

Setting learning goals

Given the wide range of prior experiences, teachers should help students to identify specific learning goals for the ambulatory rotation, keeping in mind the clerkship curriculum for this setting. Goals can be identified in several domains. For example:

- Learning about and consolidating medical knowledge for common outpatient conditions.
- Identifying key features in presentations of common outpatient conditions.
- Learning communication skills for the ambulatory setting.
- Learning to be time-efficient.
- Learning systematic approaches to caring for patients with chronic conditions (e.g., diabetes).
- Learning the roles and responsibilities of other health care team members in the ambulatory setting.

Specific goals will depend on the student's developmental progress as a clinician. Once preliminary goals have been set on the first day of the rotation, the teacher will observe the student's performance and should revisit the list of goals as early as the end of the first day but no later than the end of the first week. On occasion, the goals should be significantly revised based on the teacher's observations and the student's reflection. Start by asking the student to reflect on the initial goals ("What do you think about your progress toward your goals?"). Students often will be more self-critical than necessary, setting up the teacher to provide positive reinforcement for things done well and to corroborate with specific examples the concerns the student raises. The teacher can then focus on refining goals with the student and creating a plan of action to achieve those goals.

Identifying the Ambulatory Team

Students coming from hospital-based rotations will be used to working in teams with other learners in the discipline of medicine. They may have some understanding of the nurses' roles in caring for hospitalized patients. Since the outpatient team is different, identifying members of the outpatient "team" is an important component of orientation. Students should be introduced to the front office support staff (appointment schedulers, receptionists, practice managers, etc.) and to the back office support staff (medical assistants, nurses, social workers, pharmacists, etc.) One time-efficient strategy is to have the student role-play being a patient in the practice, starting with scheduling an appointment through closure of the office visit. At each step, the outpatient team member should introduce him/herself and explain his/her role in facilitating the patient's care. Thereafter, students can be expected to facilitate patient care by understanding these team members' roles and responsibilities and how to work with them.

Teaching Strategies

Medical students often come to the clinical teaching environment with the notion that "being taught" means sitting down in front of a white board and having something explained to them. It is important to explain to students that teaching in clinical settings can take many forms and most often is organized around clinical cases rather than

topics. Each time a patient's history or physical examination is reviewed and related to the patient's diagnosis or management plan, teaching is occurring. Each time a faculty member models how to take a history, perform a physical, communicate effectively, or educate a patient about his/her disease, teaching is occurring. One-on-one case discussion and role modeling are the most common strategies for teaching in the ambulatory setting. Labeling these activities as teaching also helps the student to recognize it. Similarly, giving feedback on the student's performance in the evaluation and presentation of ambulatory patients can help students to develop their skills more quickly.

One-Minute-Preceptor

One of the most widely used case-based teaching strategies in the ambulatory setting is the "One-Minute-Preceptor."[38] This approach uses five "microskills" to "diagnose" the student's knowledge and understanding of the clinical case, direct the teacher to intervene in the delivery of care to the extent required; and address how the teacher should respond to the student, providing clinical teaching and feedback. An example is provided in Table 4.

Microskill 1: "Get a commitment"

The purpose of this microskill is to provide the student with meaningful participation in and responsibility for the case. After the student has presented the clinical case, the student will pause. *The teacher's tendency will be to tell the student what he/she thinks is going on in the case*. However, the teacher should respond to this cue with inquiry ("What do you think is going on?"). It is critical for the teacher to show restraint at this point and ask for the student's ideas. In this way, the teacher can assess the student's knowledge and understanding of this particular clinical case, and weigh this understanding against the general expectations one should have for a student at this level of training.

Microskill 2: "Probe for supporting evidence"

The purpose of this microskill is to explore the extent of the student's understanding in the case. After the student responds to the probe of microskill 1, the student will pause again. The teacher should then ask "What findings in the history and physical led you to that conclusion?" and/or "Did you consider anything else?" In response to these questions, the student will think out loud about the case. The teacher should listen for evidence of an organized thought process, relevant or missed key features to the diagnosis, misinterpreted findings, and/or gaps in knowledge. This step allows the teacher to determine what he/she thinks the student needs to know about the case, what the student did well, and to identify any errors that need correcting. Without this step, the student's response to microskill 1 could be a "lucky guess."

Microskill 3: "Teach general rules"

This microskill is a direct response to the teacher's "diagnosis" of the student's

understanding of the case. General rules are those concepts that can be learned from this specific case and *transferred* (remembered and applied) to the next similar case. Teacher statements that start with the phrase, “In cases like this one, it is important to….” are general rule teaching points. The teacher is generalizing from this specific case to the general case type that this case fits into, improving the chance that the student will apply this newly learned material to the next similar case.

Microskill 4: “Provide positive reinforcement”

The purpose of this microskill is to specifically identify what the student did well and reinforce that good behavior, increasing the likelihood that such behaviors will be repeated.

Microskill 5: “Correct mistakes”

This important, but often overlooked step is critical. Uncorrected mistakes are often repeated, simply because the student doesn’t know that he/she made the mistake. The teacher should identify the error and correct it. Providing cognitive feedback is especially effective when teaching students to reason about clinical problems. For example, after probing for supportive evidence (microskill 2), the teacher may note that the student has used irrelevant findings in drawing his/her conclusions. The teacher should point out the redundant or irrelevant findings that don’t help make the diagnosis, identify the key features and diagnostically meaningful information, and discuss the relative “weight” of the clinical findings in drawing conclusions. This can often be accomplished by asking the student to describe a typical case for his/her chosen diagnosis and then to compare the current case to that typical case. Key features are identified and the absence of key features becomes meaningful.[39-41]

Microskills 3, 4, and 5 can be done in any order. For example, once an error is identified from listening to the student’s reasoning response to microskill 2, the teacher can identify the mistake and use the general teaching rule to correct the error, and then reinforce what was done right.

The One-Minute-Preceptor (OMP) works well when the student has clinically relevant knowledge for addressing the patient’s complaint, and can identify the key relevant clinical features that are present or absent. Some experience with the type of problem under consideration is required. Students early in their third year of school will lack clinical experience, and students without prior ambulatory experience may not be able to apply learning from their prior experiences to this setting. Under those circumstances, the OMP doesn’t work very well as a precepting strategy.

Alternative Precepting Strategies

There are three general situations when the teacher should abandon the microskills of the One Minute Preceptor and select an alternative approach: 1) the case presentation lacks cohesiveness, preventing the teacher from formulating a diagnostic impression; 2) the student’s knowledge about the clinical problem is limited or absent; and 3) the

student has an attitude problem or a skill deficiency.

Disorganized case presentations

Experienced clinicians formulate diagnostic considerations early in the patient interview or the student's case presentation. When listening to case presentations, the teacher will be looking for information that fits or doesn't fit with these early diagnostic impressions. If the student's case presentation is disorganized, the teacher likely won't be able to identify the problem type or generate a differential diagnosis. When the teacher cannot mentally summarize the case and identify early diagnostic impressions, he/she should abandon the OMP. Two approaches are recommended. First, the teacher could simply state, "It seems like this case is confusing for you. I'd like to go see the patient and then explain to you how I think about this type of problem," modeling an approach by having the student observe the teacher interacting with the patient. Alternatively, from the patient's chief complaint, the teacher could identify the problem category (e.g., dizziness) and suggest for the student an approach to that problem type. For example, the teacher might say, "When I am evaluating a patient complaining of dizziness, I think about it in three broad categories: cardiovascular, neurological, and psychological. Can you put the data you gathered into this framework?" Students with some experience evaluating the complaint of dizziness may then be able to reason further. In both cases, the teacher should go to the bedside to gather primary data earlier rather than later in the teaching encounter.

Limited or absent knowledge

When using the first two microskills of the OMP, the teacher may hear back from the student, "I don't know" in the form of a straightforward statement or in many other forms. Sometimes a disorganized case presentation should be recognized as "I don't know." Other times, a long rambling answer to the inquiry "What do you think?" suggests a lack of knowledge about the patient's problem. The student may also provide the faculty member with long lists of possible causes for each abnormal finding rather than a coherent clinical reasoning response. In all these situations, the teacher should abandon the OMP and go to the bedside to gather primary data from the patient.

Attitude problem

Occasionally, the student's response to the teacher's inquiry about the case will reveal an underlying attitude problem. The student's body language, facial expressions, or other non-verbal gestures may be clues to the problem. Alternatively, the case presentation may be truncated, suggesting that the student didn't think the patient or the patient's problem deserved a thoughtful evaluation. The student may also give verbal cues in the way he/she labels the patient (e.g., "This patient is noncompliant") or the problem type (e.g., "This patient just wants more narcotics."). When teachers detect this problem, they should abandon the OMP and address the attitude.

Giving feedback about attitude problems can be difficult. Start with naming the emotion

that you detected (e.g., “You seem frustrated that the patient wants more narcotics.”) Next, show empathy and respect without being judgmental (e.g., “I know it is hard to obtain the history from a patient who is focused on pain medication.”) Then, explore the student’s biases (e.g., “What has been your experience so far with patients like Mr. _____?”) Next, show the student an alternative approach (e.g., “When I feel my biases coming into play in a patient encounter, I always try to be even more vigilant about exploring underlying medical conditions that could be causing the problem in order to avoid missing something important.”). Finally, encourage the student to self-reflect and offer to role model an alternative approach in the exam room.

Teaching in the exam room

Role-modeling an approach to the patient and the patient’s medical concerns is an effective teaching strategy in many settings. It is important to “set up” the exam room teaching to optimize learning. First, students want and need to know what to expect when the patient is present. Second, providing students with opportunities for meaningful participation in patient care in the exam room will improve his/her satisfaction with learning in that setting. To accomplish these goals, the student must be oriented to each exam room encounter. The teacher should consider taking the following steps:

Negotiate the bedside learning agenda

What the student wants help with in the exam room may not be the same thing the teacher thinks the student needs. Clarifying and agreeing on what both want to accomplish in the exam room is an important first step.

Determine exam room roles

In most situations, the teacher needs to demonstrate interviewing, examination, or communication skills for the student. In some cases, the teacher will want to observe the student in action with the patient. If the student is observing, the teacher should be explicit about what the student should look for in the demonstration. This step gives the student an active role in the exam room.

Explain how surprises with be handled

Sometimes three-way encounters in the exam room result in unplanned events. For example, patients may ask unexpected questions, may provide unexpected feedback, or have unexpected findings that direct the patient’s evaluation in an entirely new direction. Before going to the bedside, discuss with the student how you plan to handle such surprises.

Debrief the encounter

After exiting the exam room, the teacher should debrief with the student. For example, if the learning agenda was related to taking the history, the teacher could ask, “What questions did I ask that were particularly helpful in eliciting that history?” This step reinforces for the student the expectations regarding the previously negotiated agenda and exam room roles, and reinforces learning the modeled approach.

Supplemental Didactics and Conferences

Medical students are often widely distributed to a variety of ambulatory-based clinical practices for learning outpatient medicine. Depending on the ambulatory setting, it is not reasonable to expect that individual clinical teachers will be able to provide didactic instruction to supplement learning in the ambulatory setting. Students should be scheduled to attend teaching conferences and case discussions that already exist for other learners (e.g., the residents’ pre-continuity clinic teaching conference) when those conferences are available at the same site. Additional core curriculum didactic teaching should be organized at the medical school or delivered remotely via self-directed learning modules. Students will learn the most from their own clinical cases and teachers should recommend supplemental readings (textbooks and review articles) to consolidate learning about outpatient problems.

Table 1

Comparison of Hospital-based and Outpatient-based Learning Environments

	Hospital wards	Outpatient clinic
Patients	Often bed-bound Available for lengthy evaluations More passive recipients of plan of care	Independent, ambulatory Have only limited time to give to education Active decision-makers Entirely in charge of carrying out treatment plans
Setting	Opportunity for comprehensive history and physical examinations	Fast-paced, briefer encounters that are problem-focused and designed around the patient's availability
Teaching	Team-based with other medical learners Often time for extended discussion linking pathophysiology to clinical cases	Isolated learners working directly with a faculty member Case discussions are brief, occur as the time allows
Student experience	Primary focus of most of the clerkships	Highly variable Prior experience usually limited

Table 2

Example of a Typical Outpatient Teaching Routine

Time	Activities
Daily orientation (beginning of day)	Teacher reviews schedule of patients with student; identifying patients for student to evaluate including *specific focus* of the encounter
Patient care (variety of options listed, can occur in any order)	Teacher sees patient, student observes Student interviews and examines patient, teacher observes Teacher introduces student to patient, asks permission for student to independently interview and examine Student presents case to teacher at the bedside, teacher corroborates findings, discusses diagnosis and plan Student charting, order writing, follow-up on test results from previous day
Debriefing and reflection (will occur throughout the day)	Student and teacher debrief encounters, identifying questions, teaching points, and together determine self-directed learning plan Both reflect on diagnostic uncertainty, challenging communication issues, the joys of long-term physician-patient relationships, etc.
Next day orientation (end of day)	Teacher reviews the following day's schedule with student, identifying patients for student to see, making reading assignments for student to prepare for these encounters

Table 3

Example of a Typical Individual Patient Encounter

- Teacher orients student to the learning agenda, explaining how to perform focused assessment ("This patient has several chronic medical conditions. I want you to focus on her valvular heart disease."), and a concise case presentation (When you present clinical cases to me, I want you to tell me the patient's chief complaint and then only the relevant history and examination information. If I want more information, I'll ask you for the details.")
- Teacher checks with patient about student involvement ("I have a 3rd year medical student with me today. I'd like for you to tell her about your mitral valve problem. Would it be OK if she performed a cardiovascular exam today?")
- Teacher orients student to exam room case presentations and negotiates how the teacher and student will handle unexpected findings at the bedside
- Teacher introduces student to the patient
- Teacher leaves student with the patient
- Teacher returns to the exam room to hear the student's assessment of the specific problem assigned, leaving room for unexpected issues that may have come up
- Teacher reviews history, physical, and instructs student in examination techniques as appropriate, models discussion of findings and recommendations with patient, models closure of visit
- Teacher and student exit exam room and debrief encounter as time permits ("Tell me what you observed me to do in the room that you'd like to learn to do"; "Do you have any questions about the history or key physical exam findings in mitral regurgitation?"
- Teacher assigns further reading
- Student begins documentation of encounter

Table 4

Example of the One-Minute-Preceptor

Student's Case Presentation (abbreviated): "My next patient is a 79-year-old man with 3 days of fever, cough, and shortness of breath. His past history is significant only for Type 2 diabetes controlled on oral agents. On physical exam, his temperature is 102, BP is 110/60, HR is 110, and RR is 16. His lung exam is notable for crackles on the right in the back."

TEACHER ACTION	STUDENT RESPONSE
Microskill 1: Get a commitment	
What do you think is causing his symptoms?	I think he has pneumonia.
Microskill 2: Probe for supportive evidence	
What led you to that conclusion?	Patients with pneumonia usually have fever and cough, and his lung exam is abnormal.
Did you consider anything else?	I thought about bronchitis, but I wouldn't have expected his lung sounds to be abnormal or his fever so high. I also thought about COPD but he's never smoked, so I don't think that is the problem.
Microskill 4: Provide positive reinforcement	
You've done an excellent job putting this case together. You identified three important diagnoses and used the clinical information correctly to make the diagnosis of pneumonia.	
Microskill 3: Teach general rules	
The key features of lobar pneumonia are fever, cough, and lobar lung findings. A CXR would help us to confirm the clinical examination findings.	
Microskill 5: Correct mistakes	
In patients with diabetes who are significantly ill, it is important to check a blood sugar. And you should compare his current BP to his usual BP to be sure he's not hypotensive. We'll need this information to determine our treatment approach.	

Teaching Methods and Distance Learning

Overview

Traditionally, inpatient clinical resources served as the educational base for undergraduate medical student education. Recent trends in health care delivery have resulted in fewer hospitalized patients in academic medical centers available for medical students to see. Additionally, accreditation agencies such as the LCME require that students be educated in “appropriate clinical settings.” These settings are becoming increasingly more ambulatory-based, particularly in the primary care disciplines. As a result of these and other factors, many medical schools are sending their students off-campus for significant portions of their clinical education. This section will address instructional strategies that are available to the CD for teaching students who are located at clinical sites remote from their home institution. This is not meant to be an exhaustive review, but enough information will be presented so that the CD will understand each strategy and can decide if it is something that could be used in his/her clerkship (See also Chapter 4, Technology).

E-mail

E-mail can be used in a variety of ways to engage students who are located in distant sites, and it’s free! Here are some suggestions:

Keeping in touch

Students who are off-campus sometimes feel detached from their peers. Sending an e-mail (and requiring one in return) on a regular basis helps the student feel connected. It’s also a good way to detect problems at distant sites, by using students as sentinels.

Clinical Exercises

Send a clinical exercise out to the students using e-mail. You can either embed the case in the e-mail, or include it as an attachment (which is helpful if you have pictures, graphs, etc). They can submit their answers back using e-mail as well. Obviously this is not a secure method and students can collaborate, but having the students respond to a short assigned clinical exercise can be a way of ensuring that they all are exposed to certain clinical problems or cases.

Giving Assignments

Some other possibilities for using e-mail: 1) sending the students to an Internet link where they can find an assignment; 2) sending them a clinical question to search using Medline or PubMed. In addition to providing their answer, you can also require them to send copies of their search strategy if you want.

Weaknesses and Problems with E-mail

E-mail is not secure. Be careful not to send any identifiable patient information. Also, student collaboration cannot be excluded, so don't send anything that requires individual effort. Also, e-mails can be stored, so students will likely develop a database of your cases and/or answers. Students who rely on these databases for their responses, however, are usually pretty easy to spot.

Web-Based Course Management Systems

Overview

There are many "pre-packaged" course management systems (CMS) available. The two most widely used are WebCT (http://www.webct.com) and Blackboard (http://www.blackboard.com). These enable someone with modest computer skills to design and post an entire course on the Internet or your school's server. Many medical schools will purchase the enterprise version of these programs, enabling faculty to use them at no cost. If your school has already acquired one of these systems, you will probably have to use that system – it is too expensive to do otherwise.

How to use Course Management Systems

What can be done with CMS?

- Provide content such as handouts, schedules, etc.
- Provide audiovisual content such as slides, short videos, etc.
- Host Chat Rooms for virtual synchronous interactions with students
- Host Discussion Forums for virtual asynchronous interactions with students
- Give assignments
- Give Quizzes or Exams

What are the advantages of CMS?

- Ease of use. It is much easier to put a course on the Internet using a CMS than doing it from scratch using FrontPage© (www.microsoft.com) or DreamWeaver© (www.macromedia.com). Beware, however; there is a learning curve. . . .
- Security. Students gain entrance to your course using a login and password. You control who can get in. Thus, you can post information and content in your course that ordinarily you could not put on the Internet. For example, a scanned table from a journal article or a radiograph (with all patient identifiers removed). This is very helpful for posting exams and quizzes as well.
- Tracking. This is a great feature to CMS. You can track who accesses your course, how long they spent on any page, etc. This is great for assignments and self-assessment quizzes and exercises. For example, if you post a quiz that you want your students to take, you know when each student took the quiz, how long he/she spent on each question and on the entire quiz, etc.

- Grading. If you use the CMS to give an exam, the computer will grade all the multiple-choice questions, and provide data on each question for the group of students taking the exam. This enables you to analyze your questions, and easily pick out the questions that need to be revised or removed. You can also control when to release the grades to the students. For example, if you assign a self-assessment quiz, the student could get feedback on each question as he/she answers it, at the end of the quiz, or after all the quizzes have been completed – the choice is yours.
- Giving secure exams. CMS can enable the CD to give a computer-based exam simultaneously to students in any location with computer access. Thus, students do not need to return to their home campus to take an exam. All that is required is for the student to be in a location where he/she can be monitored while taking the exam. Some institutions are using an additional program such as "Secure Browser" (http://www.tropsoft.com/secbrowser) to "lock the student in" to the CMS quiz site for the exam, preventing him/her from cheating. Using computer-based testing can be cost-effective as well. At the Medical College of Georgia (MCG), the Pediatric Clerkship saved over $1000 per year in FedEx charges for sending and receiving written exams from students who were based off-campus.[42]
- Maintaining contact and interacting with students. Students can communicate with the instructor and their classmates in a synchronous environment (Chat Room) or asynchronous environment (Discussion Forum), using ready-to-use tools supplied with the CMS. A great example how to use a discussion group to connect with and teach students in a variety of off-campus sites is Project L.I.V.E., developed by the Department of Pediatrics at the University of Colorado School Of Medicine.[43]

Discussion Groups and Chat Rooms

Sometimes an instructor or another student may want to post a question or assignment and allow the rest of the group to interact by responding in writing. All members of the group can see all the responses. When this is done over a period of time (usually a few days or more), it is called a discussion group. The advantage of a discussion group is that it enables learners to feel connected, and sometimes introverted and/or shy students may become surprisingly more assertive in this environment. The type of information that can be posted for discussion is only limited by the imagination of the instructor. Another advantage is that students and instructors can interact at a time that is most convenient to their schedules.

Instructors may wish to have a "virtual" discussion with their students in a synchronous environment using a chat room. All participants are on-line simultaneously, and comments written by participants appear as soon as they are written. One of the most common uses of a chat room is for the instructor to be available to his/her class to answer questions or clarify issues. Students know in advance that the instructor is available at a predetermined time, facilitating student contact with the instructor. The disadvantage to this modality is that all parties have to be present at a specified time.

However, it can be an effective way of keeping in touch with off-campus students.

The easiest way to create a discussion group or a chat room is through a “pre-packaged” course management system (see discussion above).

Videoconferencing

Videoconferencing is defined as: “Conducting a conference between two or more participants at different sites by using computer networks to transmit audio and video data. For example, a *point-to-point* (two-person) video conferencing system works much like a video telephone. Each participant has a video camera, microphone, and speakers mounted on his or her computer. As the two participants speak to one another, their voices are carried over the network and delivered to the other's speakers, and whatever images appear in front of the video camera appear in a window on the other participant's monitor.”[44]

Videoconferencing technology

The most basic videoconferencing can be done relatively inexpensively using a desktop computer and web camera at each site. The quality of the video is usually only adequate enough to show the face of each speaker, but the audio quality is quite acceptable. This type of communication can be done using a telephone modem connection, and is usually fairly easy to set up. Sometimes the most important aspect of distance learning is just keeping in touch with your students and this form of videoconferencing works fine for this purpose.

Much more expensive cameras and high-speed Internet connections can produce much higher quality video images. However, the cost of equipment can be prohibitive. As technology advances and high-speed Internet access increases, however, this may be a much more viable option. Uncompressed video connections can provide extremely high-quality audio and video connections, but they are very costly. If you are located at an institution that makes extensive use of telemedicine, you might be able to use the technology for student education. It is likely that telemedicine will become less important for distance education as improvements in high-speed Internet access make videoconferencing more accessible.

Strengths and Utility of Videoconferencing:

- Instructors and students are interacting in “real time” just as they would if they were in the same room.
- A variety of teaching methods can be incorporated, including lecture, small group interaction, and even problem-based learning.
- This technology most closely approximates traditional learning environments.
- Off-campus students feel more connected to their instructor and their peers.

Weaknesses and Problems of Videoconferencing

- The technology can be a problem. Everything needs to work at both ends for the session to be successful. There is a significant learning curve for the instructor and learner. Many schools will provide technical support, however, making this much less of a problem.
- Timing can be problematic. Everyone needs to be present at the same time and in the appropriate place for the session to occur. This can be difficult, particularly if more than two locations are being used.
- Videoconferencing is fairly expensive, particularly if high-quality video is required.
- The demands on instructor time can be enormous. Educating faculty and students in the use of equipment, troubleshooting the inevitable technical glitches that occur, maintaining and upgrading equipment all take time. The instructor must also adjust his/her teaching style to take into account the remote learners in addition to his/her regular class/group. In the author's experience, expect to cover 25% less material during a videoconferencing session compared to a regular teaching session.

For several overviews of videoconferencing and distance education, see the following references.[45,46]

Delivering Lectures and Conferences to Learners at Distance Sites

Most clerkships have a core lecture series covering key content in their discipline. The content of these lectures do not change dramatically, since the material is fairly basic. When learners are located in distant sites where commuting to the lecture site is not possible, there are variety of ways of delivering lecture and conference content. This list is not meant to be exhaustive, but rather to provide ideas for the CD facing this situation.

Videotape

Although this may be "low tech," VHS videotape is reliable, cheap, and videocassette players are ubiquitous (although this may change significantly in the future as new technologies are developed). The cheapest way to do this is to simply tape the conference with a VHS camcorder, and make copies of the conference for distance learners. In this way, a library of tapes encompassing the entire lecture series can be made for each student. The student can sign out the tapes at the beginning of the rotation, and return them at the end of the rotation. Audio quality can be greatly enhanced by buying a wireless microphone (available for less than $150). VHS camcorders are becoming rare as 8mm and digital camcorders proliferate. It is relatively easy to transfer the movie from one format to another, using cables supplied with the camcorder and a standard VHS player.

Computer-Based Formats

One method that has been very successful in some clerkship sites is putting the conference sessions on compact discs (CDs).[42] The advantage of this is that a 1-hour lecture can be put on a single CD, and thus the student can check out a “wallet” of CDs containing all the lectures instead of a box of VHS videotapes. The format can vary, but using a widely available format such as MPEG1, which can be played on any computer running Windows 95 or newer, or a Macintosh computer, reduces problems with computer incompatibility. The quality of MPEG1 is roughly the same as VHS. There are a variety of ways to get the conference tapes transferred to the MPEG1 or other formats. The method I use is very easy, using an Apple computer and “iMovie,” (which comes standard with every Apple computer). Other formats can be made using iMovie such as MPEG4 or MPEG2 (DVD). These will produce higher quality video images. However, the problem with using these formats is that more specialized equipment is needed to play them, and this may not be readily available for the students. Also the cost of burning a CD is very inexpensive compared to DVDs.

Streaming Video

“Streaming video is a sequence of "moving images" that are sent in compressed form over the Internet and displayed by the viewer as they arrive. Streaming media is streaming video with sound. With streaming video or streaming media, a Web user does not have to wait to download a large file before seeing the video or hearing the sound. Instead, the media is sent in a continuous stream and is played as it arrives. The user needs a player, which is a special program that decompresses and sends video data to the display and audio data to speakers. A player can be either an integral part of a browser or downloaded from the software maker's Web site. Streaming video is usually sent from prerecorded video files, but can be distributed as part of a live broadcast "feed."[47]

The most common formats for streaming video are RealOne Player (www.realnetworks.com), Windows Media Player (www.microsoft.com), and Quicktime (www.apple.com). RealPlayer files can even be made directly from PowerPoint, using Microsoft PowerPoint Producer (http://www.microsoft.com/office/powerpoint/producer/prodinfo/default.mspx). Whichever format you use, the players used by the students to view streaming video are free. However, a computer must be identified and equipped on your campus to send the streaming video content out to your students. Additionally, the file must be converted into the appropriate format for streaming, which is well beyond the discussion of this chapter. If you would like to pursue this option, it would be best to discuss it with the computer resource personnel at your institution.

One disadvantage of streaming video is that the students must have an Internet connection to view the lecture. If your school does not provide Internet access to off-campus students, they will not be able to see the lectures unless they use their own Internet Service Provider (ISP).

Other Options

Apreso (www.anystream.com) has designed a variety of technologies (Apreso for Powerpoint, Apreso Classroom) to seamlessly capture lectures presented in PowerPoint and easily convert them into format for streaming on the Internet. The cost of this technology is a bit steep for an individual clerkship, but not if your medical school adopts this technology across campus. Using Apreso, students can see PowerPoint presentations of surprisingly good quality with accompanying audio. The content can be streamed or burned to a CD so that the student does not need an active Internet connection to view the presentations.

As technology advances, there will likely be many more options available to get your content to learners through the Internet. Some colleges, for example, are giving their students iPods (www.apple.com), which can be used as portable computer hard drives to deliver lectures and other content.[48] Usually there are people within your department or on campus who enjoy keeping up with technology. Check with them periodically to find out what's new in this area.

Computer-Assisted Instruction (CAI)

CAI is not specific for distance learning, but it is an excellent way of presenting core clerkship content in an interactive way that engages the learners, regardless of their venue. A discussion of this topic is contained in the "Technology in Clerkship Education" section of the Handbook. One example for Pediatrics is CLIPP (http://www.clippcases.org/). CLIPP was developed by pediatric CDs in North America as a means of teaching the core clerkship content through CAI. We have used CLIPP at MCG by assigning three cases each of the first 5 weeks of the clerkship, and providing a short WebCT-based multiple-choice self-assessment quiz each week covering the assigned cases. This can be done at a time that is convenient to the student, and thus is well-suited for distance learning.

Is Distance Education Effective?

CDs are understandably concerned about the quality of the education for students assigned to off-campus sites, and the Liaison Committee on Medical Education (LCME) requires that programs document equivalence of educational programs in geographically distant sites. In the first 5 years that junior medical students were assigned to community-based practices for their entire pediatric clerkship at MCG, we showed that the off-campus students performed as well or better on their standardized written examinations compared to students assigned at the academic medical center for their clerkship.[49] Students on their family medicine clerkship who used an online curriculum to learn diabetes performed better than students who completed a face-to-face curriculum.[50] Nursing students taught in a distance learning environment had 29% greater communication time with the instructor than students taught in the traditional classroom format.[51]

Thus, the evidence shows that distance education can work. However, it places greater

time demands on the CD. Additionally, it cannot be successful unless sound educational principles are followed:

- A thoughtful, organized curriculum must be designed that meets the needs of the students.
- All learning modules, whether lectures, small group discussions, CAI, written assignments, or patient care activities should be targeted to meet the curriculum goals and objectives.
- Expectations for student performance must be very clear, as those assigned to off-campus will not have ready access to the CD.
- Since "evaluation drives learning," student evaluations (both objective and subjective) should be clearly defined, targeted to the curriculum goals and objectives.

CDs should also have mechanisms in place to evaluate the quality of the off-campus educational sites. Not only is this required by the LCME, but it is also the right thing to do as a course director. While each clerkship will be different, some suggestions for monitoring the success of an off-campus educational program evaluation include:

- Standardized test scores
- Scores on USMLE Step 2CK and 2CS
- Student feedback on their experiences, and their preceptors
- Numbers and kinds of patients seen

Finally, off-campus students should have local resources available when the need arises. At our campus, the local Area Health Education Center (AHEC) Preceptor Coordinator for the geographic region where the student is assigned is extremely helpful in providing local support and assistance for the student.

Independent Study as a Teaching Method

Overview

The independent study method differs from other types of teaching because the student plays a central role in deciding what is to be learned, monitoring his/her own learning progress, and measuring success in learning. The independent study method represents a shift in educational responsibility for learning from the teacher to the learner. Throughout the process, the role of the clerkship director is to guide the student in the creation of goals, objectives, content and methods, and to assess student learning with student input.

Independent study has been widely used as a learning strategy in many educational settings including distance education, problem based-learning (PBL), experiential education, self-directed learning, individualized instruction and lifelong learning. It involves empowering learners by motivation, inspiration, and training, to assume personal responsibility for their learning. Students who demonstrate self-discipline and self-motivation are most successful in this learning method.[52]

Self-directed learning has been studied in adult education for decades. Most adults have a desire for learning that is self-directed in nature,[53] with an estimated 70 percent of adult learning being self-directed.[54] Almost 90 percent of all adults conduct at least one self-directed learning project a year. Most engage in five or more projects, spending an average of 100 hours on each project.[55] By harnessing their learners' desire for self-directed learning, medical educators can enhance the learning of their students.[56]

In traditional courses and clerkship settings, students are expected to do some independent study, working on their own or in small groups. If independent study is to be used effectively in the clerkship, facilitators need to be trained to motivate students to seek out relevant information and concepts, to use this data logically, and apply what is learned in a clinical setting. This process affords faculty and students the opportunity to realize the full potential of the learning environment.[57] Facilitators need to be sensitive to students' needs for guidance in the learning process, being present in the process, when necessary, while encouraging students to learn on their own.

Using Independent Study Effectively

Like any teaching methodology, an independent study approach requires the learner to have clear goals and learning objectives. The designation of clearly stated objectives should be a collaborative process between the teacher and the learner. These objectives then serve as the basis for self assessment, formative and summative evaluation. The clerkship director may choose to develop a guide for the learning experience, or a learning contract describing learning resources and agreed-upon objectives. The learning contract may be adjusted throughout the process according to the learner's needs.

With appropriate guidance and feedback from faculty, learners can: 1) identify their learning needs, 2) formulate learning goals to meet those needs, 3) create the steps, or objectives to achieve their goals, 4) select and implement learning strategies, and 5) decide on an assessment plan. As students move through this process, faculty can help them become more aware of learning resources, learning strategies, and ways to evaluate outcomes.

In the clinical years, independent study can be challenging as it may conflict with teaching rounds, book clubs and scheduled lectures. In order to incorporate this learning method, clerkship directors must be willing to adapt to create a clerkship environment that is flexible and allows students to negotiate the pace, content and methods which will best facilitate their learning. Residents and faculty coach students towards successful outcomes by modeling successful learning strategies, including information seeking, some mini-lectures, Socratic questioning and discussion.[52] Active discussions centered around case-based exercises are an effective tool, encouraging students to draw on their strengths, take risks and receive support from other students and faculty. It often fosters intellectual curiosity and learner excitement.

Every patient interaction provides a potential learning opportunity. From the initial history-taking encounter to the clinical examination and formulation of conclusions, students should play an active role and be encouraged to commit to a diagnostic or therapeutic plan. Through reflection and interaction with their preceptors, students should be encouraged to identify specific learning issues for their own independent study.

Another use of independent learning involves the use of journals or portfolios. Not only can these documents serve as record of work the student has accomplished, but they can also serve as a means of encouraging self-reflection about what the student has learned. Independent student learning may also be facilitated with study guides, summaries of key concepts and frequent feedback in the use of analytical and problem solving skills.

Assessment

In the independent learning setting, the learner must receive frequent feedback if he/she is to accomplish the agreed-upon learning objectives. The regular use of self-assessment instruments or objective assessment measures such as quizzes, reports, write-ups, etc., must also be utilized throughout the experience if the learner is to stay on target. Students who are unfamiliar or inexperienced with the independent study method may need frequent formative intervention to focus their learning.

Learners should be encouraged to actively participate in the assessment process by selecting methods that complement their learning styles. Appropriate assessments could include the use of standardized patient encounters, OSCE, behavioral checklists, traditional multiple choice examinations, critiques of written materials, clinical logs, case-based learning and oral or written questions pertaining to patient encounters.

Strengths/Benefits

Independent study is a dynamic learning method that can be self-paced and can overcome geographic barriers. Students trained in these methods have similar standardized test scores to traditionally trained students, but they usually feel that they have learned more and can apply it better.[58] Independent study as a method is most successful when the learner has qualities of self-motivation, self-management, confidence, inner-direction, self-discipline and pacing. It can prove beneficial for the learners who make the most of the experience by developing independent theories, forming hypotheses and relating information to past experiences. The act of learning independently may help learners develop critical thinking, problem solving and research skills and develop their own ideas in more detail. Self-directed learners demonstrate a greater awareness of their responsibility in making learning meaningful and in monitoring their own progress.[59] It may also help increase medical students' abilities to successfully navigate in the world beyond their medical education, as independent, self-directed, lifelong learners.

There are strategies that a clerkship director can use to enable students to succeed in independent learning. One is to help students set their own daily learning objectives around the overall goals and objectives within the clerkship. Also, clerkship directors must provide formative feedback so that students can monitor their progress. Feedback may be given informally, in clerkship and exit interviews, formal sessions that are graded, or in regularly scheduled conversations. Clerkships directors should resist the temptation to structure learning; rather, they might use an enrichment session format that encourages student directed learning.

Weaknesses/problems/caveats

Students come to medical school trained largely by passive learning methods, shaped by experiences from their prior learning. Their expectation of passive learning is often reinforced in the first two years of preclinical medical education, where many institutions still use the lecture and test method. The independent study model requires that students change their expectations from "being taught" to taking personal responsibility for learning. Some students are intimidated by this independence and resist the transition. Some students lack the motivation, the resources, the vision, or the confidence to do this. The clerkship director must encourage learners to make their own decisions and assume responsibility for their learning efforts.

Faculty time is always a concern during periods of academic change. Theoretically, independent learning should require less faculty time. However, formative feedback and assessment should occur regardless of whether the students are learning independently or in more traditional programs. In some instances, more faculty time will be required using independent study for the clerkship. For example, the student may require more than average guidance, or the faculty member may want to expose students to many learning resources. One potential drawback of independent learning is that, if not closely monitored, students may miss areas of learning that are important to their development as physicians.[59] It is, therefore, essential that student performance and progress be monitored throughout the learning process.

Some researchers [60, 61] state that when students receive more guidance than they need in the self-directed learning process, they may waste energy and become bored, lazy or irritated. If they receive too little guidance in the process, they may not acquire the knowledge required of the educational task. Achievement of a balance between guidance and self-regulation is recommended for optimal independent learning.

Conclusion

Educational scholar John Dewey [62] noted early on that learners were capable of greater and more active roles in the learning process. Independent study is one way that medical educators can embrace learning theory, empower learners and better prepare students for life-long learning. The clerkship director is the guide and facilitator in the independent study method. The motivated, self-directed learner and the clerkship

director choose the content, learning methods and assessments. Using this teaching method, a process of maturation occurs as future physicians hone their competence and lifelong learning skills, which hopefully will result in more informed patient care throughout their careers.

Teaching Medical Procedures

Procedural instruction for medical students continues to be an unmet challenge for many medical schools.[63] The reasons for this failure have not been completely elucidated, but likely relate to unique challenges posed by teaching procedures to medical students. CDs must deal with relatively large numbers of learners with diverse learning needs and interests. Further, resources may be limited for developing a procedural curriculum for medical students. Fortunately, the barriers to effective procedural instruction challenges are not insurmountable. In designing a procedural curriculum, the CD should first recognize that clinical skill acquisition is different from mastery of knowledge. Designing a clinical skills program based on courses designed to impart only knowledge is likely to produce dissatisfied learners who have not acquired the skill of interest. Worse yet, it might produce confident but incompetent learners with negative implications for patient satisfaction and safety. These adverse outcomes can be avoided by gaining some familiarity with the process of technical skill acquisition.

One Model of Motor Skill Acquisition

While there are several different models of motor skill acquisition,[64] the one described by Fitts and Posner has received attention in the medical literature[65] and consists of three stages: cognitive, associative, and automatic.[66] During the *cognitive* stage, the learner develops a mental understanding of the task to be performed. In a recent study of neonatology skill instruction, medical students were shown videotaped images of a variety of different skills but were not provided an opportunity to practice the skill.[67] There was evidence of attainment of a level of mastery for some of the skills, lending support to the existence of a cognitive phase of skill acquisition for these medical procedures.

During the *associative* phase, the learner practices the skill, eliminates errors, and improves efficiency. The gradual improvement that occurs during the associate phase of learning has been shown to occur when experts learn new surgical procedures.[68] The greatest improvement in performance occurs with the early repetitions of the skill, demonstrating that the procedural expertise of a group can be improved with a few opportunities to practice the procedure. It is important to recognize that individual learners do not improve in a completely predictable fashion and may actually worsen for several repetitions. Therefore, a skills course must be flexible enough to accommodate these individual differences. Feedback provided during this stage of skill acquisition is imperative for learning to occur. A recent investigation of colonoscopy training showed no performance improvement in a group that received no feedback despite a substantial period of practice on a virtual reality simulator.[69]

During the *automatic* stage, the skill is performed without significant cognitive awareness devoted to its performance. Anecdotal evidence suggests that this stage of skill acquisition exists for medical procedures, but there have been no specific studies to support this observation.

Needs Assessment

Career choice will have a significant impact on the procedural learning needs of medical students. Surveys of experts suggest that there are some skills that all physicians should have.[70-71] There are also some medical specialty-specific procedural competencies.[72-73] Of particular relevance to planning a medical student procedural curriculum are those needs assessments that define what skills should have been mastered as the student enters graduate medical education.[74]

A thoughtful medical teacher may also be interested in teaching students the clinical skills that they will likely need to know in the future. Projecting the future relevance of clinical skills is somewhat daunting given the continued and rapid emergence of new technologies and the changing nature of health care delivery.[75]

Educational objectives

Educational objectives can be fashioned using the traditional elements of performance, conditions, and criterion.[76] Procedural objectives may be related to both knowledge and performance. Evolving accreditation requirements for undergraduate medical education suggest that realism is imperative in fashioning procedural objectives for medical students. For example, it may unreasonable to expect medical students to master the skill of doing a lumbar puncture as part of a clerkship. More likely, they would be able to list the indications for and describe the steps of doing this procedure. If the goal is for the medical student to demonstrate competency with a skill, then the student will need to have many more opportunities to practice the skill than is usual in the undergraduate curriculum.[66,77]

Instructional Methods

Educational tools

There is a growing experience with the use of virtual reality tools for skills instruction.[78] These tools offer the opportunity for supervised practice in an environment that simulates a real medical situation without exposing patients to risk. However, these devices are often quite expensive to acquire and maintain. Further, low-cost high-fidelity models can be created at much less expense using inanimate models, and the training with these less-expensive tools has been generally comparable to that observed when virtual reality tools are used.[79] It is possible to create low-cost, effective training models from items found in the hospital,[80-81] local supermarket,[82-83] or hardware store.[84]

Educational environment

There are a number of barriers to effective instruction of procedural skills in the patient care setting.[85] Creating a dedicated space for teaching procedural skills would eliminate many of these problems and offer the opportunity for supervised practice. Given the diversity of procedures that might be taught to medical students, a logical approach would be to create a shared space that could be reconfigured to teach a number of different skills to both medical students and residents.[86]

Coaches

Feedback may be the most important determinant in assuring successful procedural skill mastery. Traditionally, clinical faculty members have provided this feedback; however, not all faculty members feel comfortable completing this essential instructional task.[87] Further, even if faculty members feel comfortable teaching a skill, other demands on faculty time suggests that it may be better to recruit non-faculty procedural coaches. The ideal procedural coach is an individual who is comfortable performing the skill and also understands effective coaching behaviors. In the cognitive phase of skill acquisition, the coach describes how the task is performed correctly. Describing common performance errors at this point in skill acquisition may also improve the learners understanding of the task.[88] Once the learner begins to perform the skill, the coach must identify the errors and describe the corrective actions. When dealing with medical students, gentleness in providing feedback is an important coaching attribute as the medical student attempts to master the new skill. Non-physician medical staff may be available to teach skills. For example, it may be possible to recruit phlebotomists to teach phlebotomy to medical students. If a dedicated environment is available, it may be better to train a procedural skills coach to teach a number of different types of procedures.

Curriculum Development

An important part of curriculum development is determining the most appropriate place in the overall curriculum to teach the skill. Procedural skills likely to be used by all physicians should be taught during the pre-clinical stage or in the clerkships. Procedural skills specific to a medical discipline should be taught later in the curriculum as the medical student begins the transition into his or her residency.

Another component of curriculum development is to develop the specific instructional materials required for the task. This begins with a behavioral task analysis that results in the component steps of the task.[80] It may also be helpful to perform a cognitive task analysis to understand what procedural experts are thinking as they perform the task.[89] Instructional material may be printed with illustrations. An alternative is to create the materials using a digital media where the motion of the procedure can be displayed. Models can be created or acquired once the instructional template is available. If non-faculty coaches are available, they can be recruited and trained.

The specific course type will depend on the number of students who require training, resources required for the specific training, and types of personnel who might be available. An intermittent large-scale course may be appropriate if a large number of

students are to be taught a skill that requires feedback from a limited number of experts. This type of course may also be optimal in the setting where a dedicated space is not available. If a specialized skills center is available, students can be scheduled to receive training in small groups. This small group setting provides an opportunity for more individualized instruction and feedback.

Transfer to Patients

Patients are increasingly autonomous and perhaps less welling to let non-experts be involved in their care.[90] One argument for creating an environment for procedural learning is that medical students would begin performing procedures on patients at a higher level of proficiency than if they had not had a chance to learn the skill in this simulated setting. Unfortunately, the evidence that proficiency in a simulated environment transfers to an actual environment has been mixed.[81,91-93] Eventually, it will be possible to identify those aspects of the simulated environment that enhance transfer of the skill proficiency to the patient care environment. Until that time, it is important that initial attempts to perform a skill on patients be properly supervised. This supervision could be done by a non-physician skills coach or by a physician who has been prepared to serve in this capacity through a faculty development course.[94]

Conclusion

Medical student education occurs in a variety of settings, from the classroom to the bedside to the Internet. Rich Sarkin, MD, a gifted clinical teacher and former president of the Council on Medical Student Education in Pediatrics (COMSEP) who was tragically killed in a plane crash in 2004, coined the term, “Arrows in the Quiver” to refer to the teaching tools that each medical educator has in his/her repertoire. Our hope is that the material in this chapter will increase the number of arrows in the quiver of the CD, enabling him or her to be a more effective teacher in the many settings where medical students are taught.

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