Promoting Fundamental Clinical Skills: A Competency-Based College Approach at the University of Washington

Erika A. Goldstein, MD, MPH, Carol F. MacLaren, PhD, Sherilyn Smith, MD, Terry J. Mengert, MD, Ramoncita R. Maestas, MD, Hugh M. Foy, MD, Marjorie D. Wenrich, MPH, and Paul G. Ramsey, MD

Abstract
The focus on fundamental clinical skills in undergraduate medical education has declined over the last several decades. Dramatic growth in the number of faculty involved in teaching and increasing clinical and research commitments have contributed to depersonalization and declining individual attention to students. In contrast to the close teaching and mentoring relationship between faculty and students 50 years ago, today’s medical students may interact with hundreds of faculty members without the benefit of a focused program of teaching and evaluating clinical skills to form the core of their four-year curriculum. Bedside teaching has also declined, which may negatively affect clinical skills development.

In response to these and other concerns, the University of Washington School of Medicine has created an integrated developmental curriculum that emphasizes bedside teaching and role modeling, focuses on enhancing fundamental clinical skills and professionalism, and implements these goals via a new administrative structure, the College system, which consists of a core of clinical teachers who spend substantial time teaching and mentoring medical students. Each medical student is assigned a faculty mentor within a College for the duration of his or her medical school career. Mentors continuously teach and reflect with students on clinical skills development and professionalism and, during the second year, work intensively with them at the bedside. They also provide an ongoing personal faculty contact. Competency domains and benchmarks define skill areas in which deepening, progressive attention is focused throughout medical school. This educational model places primary focus on the student.

In this article, we describe the recent formation and operation of a curriculum at our school that emphasizes bedside teaching and role modeling and focuses on enhancing fundamental clinical skills and professionalism.

The Problem
Substantial evidence suggests that U.S. medical schools devote inadequate attention to teaching fundamental clinical skills.1–17 Existing studies have not assessed whether inadequate education at one level of training affects skills at subsequent levels. If there is such a “cascade” effect, then medical school may be the most critical period for developing important habits, attitudes, and clinical reasoning approaches to medicine and may influence subsequent clinical competence among practicing physicians. Studies of physicians in practice show discrepancies between what they say is important among basic clinical skills, such as physical examination and history taking, and their training in these areas,18–20 and some studies document skill deficiencies among board-certified physicians in practice.21

Calls for reform in medical education have occurred frequently and regularly since the 1910 Flexner Report22–29 but have not focused directly on improving fundamental clinical skills. Diverse concerns cited have included declining time for and attention to teaching medical students, the effects on medical education of the changing nature of medicine, and inadequate attention to contemporary issues like managed care.30–33 Concomitant with calls for reform, medical educators have sought over the past 15 years to modify and improve curricular and teaching approaches.32,34–39 Often, however, these attempts to improve the curriculum relate to specific issues relevant to the contemporary health care environment, such as incorporating understanding about managed care, rather than focusing on fundamental clinical skills.

Inadequate attention to teaching students fundamental clinical skills may relate directly to the failure of clinical faculty to
focus their efforts on bedside teaching. Although bedside teaching has been a mainstay of medical education since Osler, it has declined substantially in recent years. Perceived factors contributing to the decline in bedside teaching are teacher related (such as declining bedside teaching skills), teaching-climate related (such as time constraints and lack of rewards for teaching), system related (such as short patient stays), and patient related (such as perceived patient discomfort being discussed by a large team).

As a result of the decline in bedside teaching and expansion in the size of many medical schools, students have less exposure to real patients, observe their teachers’ modeling skills less frequently, and are themselves observed less frequently. In a recent survey associated with field trials for the United States Medical Licensing Examination (USMLE) clinical skills examination, 4% of students said they had never taken a history or conducted a physical examination under the observation of a faculty member, and 20% said they had been directly observed only two or fewer times.

Addressing the Problem: The College System

Creation
To ensure that its curriculum is up-to-date, the University of Washington (UW) School of Medicine undertook a comprehensive curriculum review from 1998 to 2001. Several areas were identified for improvement that mirror areas identified nationally as problematic. First- and second-year students needed better introductory development in fundamental skill areas, including patient-interviewing skills, physical examination skills, and clinical problem solving, as well as in areas related to professional development, such as ethics and professionalism. In the third and fourth years, the need for more consistent and centralized attention to educational content and further refinement of clinical skills was identified as well as the need for better patient mix, teaching materials, and evaluation. An area for improvement at all levels of training was the need to personalize the medical school experience for students in the setting of a large, regionally decentralized medical school.

The curriculum review pinpointed five areas of focus for further attention to address these deficiencies—enhancing skills development, engaging the student, improving curriculum management and oversight, addressing specific content areas, and enhancing faculty development and teaching skills. The first two areas, engaging the student and enhancing skills development, were key to the development of a new organizational and curricular structure.

This new structure, called the College system, was the primary innovation that emerged from the curriculum review. The foundation of the Colleges is a core of 30 clinical teachers who commit a substantial portion of their time to teach and mentor medical students, as well as develop and assess the curriculum. The fundamental tools of the Colleges are the development and use of explicit benchmarks concerning core clinical skills. The new structure addresses the problems identified at our own school and also addresses many of the structural and curricular problems identified nationally. The College approach to teaching and evaluating clinical skills that we describe here represents a major change for U.S. medical schools, many of which have grown dramatically in size over the last 50 years and have lost a clear focus on fundamental skills.

Description

Regional medical school structure. The UW School of Medicine provides medical education for students from five states (Washington, Wyoming, Alaska, Montana, and Idaho). In this “WWAMI” program, students are accepted as “in-state students” from each member state, and for the first year of medical school, medical education is offered at the home universities of each of these states, in close collaboration with faculty based in Seattle. All medical students (approximately 180 per class) spend their second year in Seattle. For the third and fourth years, all students, independent of their states of origin, can spend all or a portion of their education at clinical clerkship sites throughout the region in addition to the Seattle-based clerkship locations.

Goals of the Colleges. The fundamental goals of the Colleges are to oversee a four-year integrated curriculum of clinical skills and professionalism and to provide better mentoring for students. Five clinical competency domains are delineated for continuous attention at increasingly advanced levels, with developmental benchmarks for each level of training: communication skills (including patient interviewing skills), diagnostic and physical examination skills, clinical reasoning skills and interpretation skills (including written and oral communication), professionalism and ethics, and biomedical informatics skills.

Central to the model is a one-on-one relationship between each medical student and a College faculty mentor. This relationship continues across the student’s tenure in medical school, and involves a combination of teaching, mentoring, and monitoring of the student’s progress. In addition to the one-on-one relationship, each student works within a small-group setting with his or her mentor, and has an identity within his or her College as well (Figure 1). Finally, each student functions in relationship to his or her entire medical school class; one of the goals of individual mentorship is to guide the student to take advantage of the skills and expertise of the school’s very large number of clinical and research-oriented faculty.

Integration of the mentor and teacher role is a key aspect of the model. The College faculty have four closely interrelated functions:

- They create continuity for the students throughout their medical school tenure, overseeing clinical skills and professional development and paying close attention to building upon skills the students have learned in prior stages of development.
- They are actively involved in developing curricula for and teaching the students they mentor in the second year of a two-year Introduction to Clinical Medicine course.
- They are responsible for defining benchmarks for the progressive expansion and refinement of basic skills in the first two years and working in concert with the clerkship faculty to develop benchmarks for the clinical years.
- They provide a continuous personal faculty contact for students.

Educational approach. The following assumptions underlie the educational approach used in the Colleges:
Students will learn best when new knowledge and skills are built onto the foundation of what they have already learned.

An integrated curriculum of clinical skills and professionalism—with explicitly stated, iterative, progressive, and consistently monitored expectations throughout the four years—will most effectively support learning and skills development and provide students with a structure for lifelong learning.

Assessment should be consistently formative and reflective in nature as well as summative.

Because new knowledge builds on existing core knowledge, both learning and evaluation are placed in the context of a progressive and iterative structure in which reference is constantly made back to prior principles and core knowledge. A close relationship between learning and assessment enhances students’ acquisition of fundamental clinical skills, especially when performance evaluations are tied closely to desired knowledge, skills, and behaviors.

During the process of curriculum development, the College faculty adapted the Sequenced Performance Inventory and Reflective Assessment of Learning (SPIRAL) framework for use in thinking about student development and in approaching expectations for student performance. This framework focuses on developmentally appropriate standards to assess, interpret, and provide feedback on students’ performance, based on the normal progression of students’ development from beginning to advanced skill levels. Areas evaluated are interviewing (data collection and communication techniques), physical examination, oral case presentation, clinical reasoning, documentation, educational conduct, ethics, and standards of professional behavior. Table 1 shows the four performance levels adapted for our setting and three of the evaluation areas and criteria used for giving feedback to second-year students in their clinical tutorials. Performance standards and expectations have been developed for each year. However, there is fluidity across levels and years, anticipating that most students will progress at an average rate but that some will progress faster and others more slowly. Within the competency-based curriculum, students know what is expected of them at each developmental stage, and understand how they are accountable.

**Figure 1** The structural relationships, within the College system of the University of Washington School of Medicine, of a medical student to faculty at four levels, and the ratio of students to faculty at each level. At the mentoring level, there is a dyadic relationship between student and mentor. At the small-group teaching level, there are small-group interactions of six students and one mentor. At the College community level, there are interactions among 36 students and six mentors, and at the class-wide/faculty-wide interactions level, there are interactions among 180 students in the class and the 30 College faculty, as well as between 180 students and the 1,500 regular faculty and the 4,500 clinical faculty.

**Implementation: Structure of the Colleges**

**Administration.** A College director (EAG), appointed by the dean (PGR), devotes 75% of her time to the position and also serves as a College head. The associate dean for student affairs (CAM) is the administrative head of the Colleges. The dean, the associate dean for student affairs, and the College director were directly involved in recruiting and appointing the remaining four College heads (SS, TJM, RRM, HMF). Selection criteria included excellent teaching skills, commitment to education, and willingness to dedicate 50% of their time. A balance was sought among College heads for specialty, gender, and stage of career. Funding is provided by the dean’s office.

**College faculty.** The College heads jointly recruited and selected the remaining 25 College faculty. Prerequisites were demonstrated excellence in teaching and clinical skills, a genuine interest in students, a commitment to patient-centered care, and a willingness to actively participate in continuous development and evaluation of the curriculum. Of over 80 clinical faculty who applied, 25 were selected as representatives of the best clinician–teachers at the medical school. Each commits 25% of his or her time to clinical skills teaching and mentoring, with salary funding for that time from the dean’s office.

The 30 permanent faculty have five-year appointments. Distribution of clinical departments among the College faculty are family medicine (seven faculty), internal medicine, including emergency medicine and dermatology (ten faculty), pediatrics (five faculty), surgery (two faculty), and one faculty member each from anesthesiology, neurology, obstetrics and gynecology, otorhinolaryngology, rehabilitation medicine, and psychiatry. The gender split is 16 women and 14 men.

**Teaching sites.** Three UW teaching hospitals in Seattle were selected to serve as the primary sites for teaching: the UW Medical Center, Harborview Medical Center, and Puget Sound VA Health Care System-Seattle. At each of these hospitals, at which students and mentors see patients (rotating quarterly), rooms were identified for teaching sessions; a patient interview coordinator was hired to identify, approach, and obtain permission from patients for teaching; and a process was developed for credentialing College faculty. In addition, a pediatric tutorial was added that offers the students experiences with children.
Table 1
Framework for Performance Expectations Used in the College System of the University of Washington School of Medicine*

<table>
<thead>
<tr>
<th>Area of evaluation</th>
<th>Beginning</th>
<th>Emerging</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication techniques</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of questions</td>
<td>Overuses closed-ended questions</td>
<td>Uses some open-ended questions</td>
<td>Generally balances open-ended and closed-ended questions</td>
<td>Effectively balances open-ended and closed-ended questions</td>
</tr>
<tr>
<td>Techniques</td>
<td>Does not use active listening</td>
<td>Uses active listening</td>
<td>Uses active listening and silence</td>
<td>Uses active listening and silence effectively</td>
</tr>
<tr>
<td>Transitions</td>
<td>Transitions are abrupt</td>
<td>Identifies transitions</td>
<td>Uses bridging questions</td>
<td>Makes smooth transitions</td>
</tr>
<tr>
<td>Directing the interview</td>
<td>Interrupts interview inappropriately or awkwardly</td>
<td>Occasionally interrupts interview</td>
<td>Directs interview</td>
<td>Skillfully directs interview</td>
</tr>
<tr>
<td>Empathy</td>
<td>Fails to convey empathy</td>
<td>Focused on own agenda</td>
<td>Generally empathetic and nonjudgmental</td>
<td>Conveys empathy and is nonjudgmental</td>
</tr>
<tr>
<td>Patient comfort</td>
<td>Does not recognize patient discomfort or nonverbal cues</td>
<td>Occasionally misses patient discomfort or nonverbal cues</td>
<td>Facilitates patient comfort and recognizes nonverbal cues</td>
<td>Anticipates patient comfort and responds to nonverbal cues</td>
</tr>
<tr>
<td>Language</td>
<td>Often uses medical jargon without explanation</td>
<td>Occasionally uses medical jargon</td>
<td>Avoids medical jargon</td>
<td>Makes effort to help patient understand</td>
</tr>
<tr>
<td>Closure</td>
<td>Does not attempt to reach closure</td>
<td>Attempts to reach closure</td>
<td>Reaches closure with patient</td>
<td>Reaches closure and invites feedback</td>
</tr>
<tr>
<td><strong>Physical examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic physical exam (PE)</td>
<td>Perform some portions of complete PE Uses many incorrect techniques Omit large portions of the examination</td>
<td>Performs a complete PE Performs parts of exam incorrectly Omit some key exam maneuvers</td>
<td>Accurately performs complete PE in an organized manner</td>
<td>Accurately and precisely performs a complete physical examination and includes some advanced maneuvers</td>
</tr>
<tr>
<td>Patient modesty</td>
<td>Inattentive to patient's comfort and modesty needs</td>
<td>Sometimes attends to patient's comfort and modesty needs</td>
<td>Always attends to patient's physical comfort and modesty needs</td>
<td>Anticipates patient's physical comfort and modesty needs</td>
</tr>
<tr>
<td>Notes/templates</td>
<td>Uses notes or other aids in a manner that is disruptive</td>
<td>Occasionally uses notes during examination</td>
<td>Uses notes only as a check at the end of the exam</td>
<td>Does not refer to templates or notes</td>
</tr>
<tr>
<td><strong>Clinical reasoning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem list</td>
<td>Identifies major patient problems</td>
<td>Beginning to prioritize problem list</td>
<td>Appropriately prioritizes problem list</td>
<td>Prioritizes problem list with appropriate detail</td>
</tr>
<tr>
<td>Differential diagnosis</td>
<td>Constructs a broad approach to patient problem</td>
<td>Constructs a broad approach with few details supporting hypotheses</td>
<td>Constructs appropriate differential for presenting problem(s)</td>
<td>Constructs detailed differential diagnosis</td>
</tr>
<tr>
<td>Data interpretation</td>
<td>Provides little or no detail supporting hypotheses</td>
<td>Provides some details supporting hypotheses</td>
<td>Provides details supporting hypotheses</td>
<td>Provides and correctly interprets specific details to support hypotheses</td>
</tr>
</tbody>
</table>

*This framework was adapted from the SPIRAL framework. 50,51 Three of nine evaluation areas and associated criteria used with second-year medical students in their clinical tutorials are shown.

and familiarity with the Children’s Hospital & Regional Medical Center in Seattle.

Assignment, communication, and involvement with students. Each entering student is assigned to one of five Colleges and a faculty mentor within that College. Students from all medical school classes are represented in each College. The College system was fully implemented across all medical school classes in 2004–2005. Each faculty mentor now advises and counsels 24–30 students—typically six in each class—who are followed across their medical school tenure.

To provide structure and substance to the mentoring relationship, students maintain a Web-based learning portfolio,52–54 which measures students’ progress against learning objectives and developmental benchmarks in the five competency domains.

The role of the College faculty and the nature and intensity of interactions between College faculty and students vary over each student’s tenure in medical school; they are briefly described below.

- **Year one**: Students and their mentors initiate a dialogue and planning through meetings or, for students at
the regional WWAMI universities, via telephone and videoconferencing. The goals are to become acquainted, review the clinical skills and professionalism curriculum for the first year—including developmental benchmarks—and discuss students’ learning goals for the year. Peer counseling meetings of paired College faculty and their students from all years occur once each quarter.

- **Year two:** The College mentor serves as the Introduction to Clinical Medicine II (ICM II) teacher for his or her group of six second-year students. In addition to the ICM-II lectures and small-group exercises on a variety of topics that took place prior to the College structure, all second-year students now also spend one-half day each week with their faculty mentor and small group, seeing patients at the bedside and learning and practicing clinical skills. This component of the curriculum replaces a previous clinical tutorial system in which each student saw one patient every four to six weeks, one-on-one, with a member of a widely dispersed faculty of community and hospital-based physicians.

During one tutorial per month, students learn history-taking and physical examination techniques linked to the organ system they are studying in the classroom, thus providing a clinical link to the basic sciences. For the remaining three tutorials each month, two of the six students in each group perform a complete history and physical examination on a patient. During the history and physical, the mentor either alternates between the two patient rooms, observing the students and providing feedback, or else observes a complete history and physical examination by a single student. The responsible students then present the patient’s history and physical at the bedside to the other members of their tutorial group and mentor. The mentor and students then debrief and discuss the case as a group. The mentor gives feedback to the individual student and instruction to the entire group, with opportunities for all students to review physical examination findings on the patient. Discussions also focus on the patient’s experience, recommendations, and perceptions concerning communication and professionalism. Presenting students submit write-ups, and mentors provide written comments. A strong emphasis in these tutorials is on practicing, enhancing, and refining basic skills while maintaining a constant focus on the patient at the center of the clinical experience. All students are observed for part or all of a history and physical examination at least six times during second year.

Throughout the year, students have a minimum of 26 half-day sessions with their mentor and small group (ten in fall, eight in winter, and eight in spring), where they learn history and physical examination skills or work together in small groups. Some mentors also schedule additional sessions with their group or with individual students. This compares to an average of six or seven clinical sessions total in previous years that varied in duration from 15 minutes to three hours, depending on the individual preceptor. Students now also have special-topic tutorials with their College tutorial group throughout the year as well, such as pediatrics, geriatrics, and psychiatry tutorials.

College mentors regularly review the students’ portfolios, including write-ups from patient presentations, written reflections, and learning goals. The College mentors meet individually with students to review second-year goals and developmental benchmarks, develop and discuss the student’s learning goals, and review and discuss other work and overall academic progress. The time commitment for counseling and mentoring students varies throughout the year and student-to-student. The combination of weekly small-group teaching sessions at the bedside and individual meetings creates a close working relationship and provides insights into each student’s strengths, weaknesses, goals, and approaches to learning objectives as student and mentor prepare for the clinical years.

- **Clinical years:** All students complete some clinical rotations in Seattle and are accessible to their College mentors. When completing clerkships out of the Seattle area, each student interacts with his or her College mentor via telephone and e-mail. The learning portfolios, available electronically to both students and mentors, also provide a means of continuous contact.

During year three, each student and his or her mentor review overall goals and developmental benchmarks for clinical skills and professionalism and individualize learning objectives for the third year based on their shared assessment of the student’s strengths, weaknesses, and learning needs. This may include working with his or her mentor at the beginning of each required clerkship to review benchmarks and adjust learning objectives as needed, meeting or talking with his or her mentor to review progress against benchmarks, confirming and discussing completion of a required mini-clinical evaluation exercise (mini-CEX) focused on a key skill area for that clerkship,35–37 and discussing the student’s clerkship experience. At the end of the clerkship, student–mentor teams may again review achievement of learning goals, plan for the next clerkship, and revise learning goals as needed. The mentor also works with students in peer counseling sessions and in evaluating students’ progress in other aspects of the curriculum. The frequency and amount of time that students and faculty devote to reviewing and revising learning goals vary considerably mentor-to-mentor and student-to-student. In order to facilitate these interactions, an electronic reminder system has been developed for faculty mentors that addresses and reviews important milestones within the third and fourth years. College faculty regularly receive these e-mails as a prompt to contact their students and as a reminder of important areas and topics to cover.

Each required clerkship has a faculty liaison from the Colleges who is a member of that department and specialty. The faculty liaison works with the clerkship director and other faculty in that department in identifying and developing third-year benchmarks, curricula, and appropriate topics of professionalism and specific areas of clinical skills to address in the clerkship.

During the fourth year, students continue to meet or talk with their College mentors during rotations to...
College faculty activities. The College heads meet biweekly, and each College head and faculty within their College meet monthly, in addition to monthly meetings of the entire College faculty. The College faculty develop educational materials for the first- and second-year ICM curricula and formal skills assessments, and assist in the development of curricula focused on advancing clinical skills through third- and fourth-year clerkships. The College faculty hold regular faculty development sessions to review history-taking and physical examination skills unique to the organ systems taught in ICM II.

Involvement of College faculty in curriculum development. Each College faculty member belongs to one or more working groups. Areas of responsibility for these groups include (1) Web-based learning portfolios; (2) professionalism and ethics; (3) benchmark and curriculum development in several areas, such as physical examination, communication skills, and clinical reasoning; (4) mentoring; (5) student feedback and evaluation; and (6) program evaluation. These working groups assume chief responsibility for setting direction, developing materials, and presenting their work for evaluation and discussion by all College faculty.

The College faculty work on curriculum development continuously, using a competency-based model and developmental standards. Development of benchmarks in each of the competency domains emanates from working directly with students in the educational setting, and from collaborating with colleagues with relevant expertise, including those directing basic science courses and clinical clerkships. This process—developing benchmarks, making modifications based on what experience with the students suggests, and further collaboration with colleagues—permits a continuous quality improvement approach in which modifications are responses to the actual needs of the students and encourage a constant engagement of the College faculty in the curriculum development and review process. Continuous interaction is maintained between curriculum development and delivery, benchmarks, and feedback and evaluation.

Implementation: Tools for skill development and assessment

Benchmarks/performance expectations. The UW School of Medicine’s curriculum review identified the use of performance benchmarks as essential tools for producing desired learning outcomes. Benchmarks help students to efficiently gather and thoroughly perform reliable and accurate patient histories and physical examinations and incorporate analytically sound clinical reasoning. Benchmarks also serve as the basis for observation of student work and standardized evaluations.

Students in years one and two receive performance benchmarks for competency domains at predesignated points. Each set of benchmarks builds upon those at previous stages of development. The benchmarks describe what students should learn and the level to which they will be held accountable in clinical examinations designed to evaluate their skill levels. In the second year, benchmarks have been developed for each organ system in the physical examination as well as other clinical skills domains, including the medical interview, written documentation, oral case presentation, clinical reasoning, and professionalism. Chest examination benchmarks for second-year students are shown as an example in List 1, and professionalism benchmarks for second-year students are shown in List 2.

In the clinical years, the benchmarks are being developed and/or refined and will serve as the basis for the relevant curriculum in each required clerkship and elective. The benchmarks will also provide the basis for individualized feedback between student and mentor. Third-year developmental benchmarks for required clerkships will focus on one organ system and/or basic skill and at least one relevant professionalism topic. Each required clerkship topic will be structured around curriculum, benchmarks, an observed component via a mini-CEX, and evaluation.

The student learning portfolio. The student learning portfolio serves as a key focus for ongoing discussions between the student and his or her College faculty. The major purposes of the portfolio are to provide a repository for written work, to share selected and required work with the College mentor and student colleagues, to allow the College mentor to track the student’s progress, to serve as a notebook for e-mail communication with students in other classes, and to maintain a record of evaluations and grades. By the end of year four, the personal portfolio components will include the student’s entire record of accomplishment, including documentation of learning objectives, write-ups and reflective exercises, formative feedback and summative evaluative information (including mini-CEX evaluations), learning recommendations, and achievement summaries written by the student’s College mentor. In short, the portfolio documents the student’s progress. As they review their work over time, the portfolio gives the students a mechanism for measuring their own progress.

The mini-CEX. The mini-CEX is a formal observation by a faculty member of a focused clinical encounter with a consented patient. Each required clerkship and highly subscribed elective takes responsibility for at least one mini-CEX, focusing on physical examination, history-taking, and clinical reasoning in the organ system area for which it has primary responsibility.

OSCEs. A required objective structured clinical examination (OSCE) is taken at the end of the second year and at the beginning of the fourth year, following completion of the third-year required clerkships. Competencies assessed in OSCEs relate directly to benchmarks that the students have been responsible for mastering. Each second-year student must pass the second-year OSCE before beginning the required clerkships. Beginning in the 2004–05 academic year, each beginning fourth-year student in the College-based curriculum must pass the fourth-year OSCE to graduate. Remediation, which is required of any student who fails to pass either OSCE, is the responsibility of the student’s College mentor and the College head. Remediation may take one or more of the following forms: review/discussion
List 1

Chest Examination Benchmarks for Second-Year Medical Students in the College System of the University of Washington School of Medicine

Basics

The chest examination occurs after the head and neck examination, ideally with the patient seated.

Although it is technically not part of the chest examination, when standing behind the patient to inspect, percuss, and auscultate the chest, it is also a good time to visually inspect the spine, percuss the spine for tenderness, and check for costovertebral angle tenderness.

In the hospital patient who cannot sit upright, the posterior lung fields may still be auscultated by having the patient turn from side to side. If even that isn’t possible, one can still frequently pass the head of the stethoscope between the patient’s back and the bed to auscultate the posterior lung fields.

1. Inspection

Do:
- Observe respiratory efforts and note presence/absence of respiratory distress.
- Observe symmetry of chest movements with respiratory efforts.
- Observe shape of chest.

Know:
- In respiratory distress, some of the following may occur: patient agitation, accessory muscle use, nasal flaring, intercostal retractions, abdominal paradox, diaphoresis, and sometimes cyanosis.
- A barrel-shaped chest may be seen in COPD.

2. Palpation

Do:
- Confirm midline tracheal position with gentle palpation anteriorly.
- Place hands on posterior chest and confirm symmetrical chest expansion with inhalation.
- Assess vocal tactile fremitus.
- Place your palms and fingers lightly on patient’s posterior chest.
- Ask patient to say “toy boat” or “coin.”
- Move your hands sequentially from the apices, to the interscapular region, and then to the pulmonary bases.

Know:
- Tracheal deviation may occur with tumor or tension pneumothorax.
- With vocal tactile fremitus:
  - Increased vibrations suggest consolidation (which is “solidification” of lung tissues from pathological engorgement, such as in acute pneumonia).
  - Decreased vibrations are noted with pleural effusion, pneumothorax, large pulmonary blebs, and after pneumonectomy.

3. Percussion

Do:
- Percuss the chest on both right and left sides as follows:
  - Posteriorly: apices, interscapular region, pulmonary bases
  - Laterally: midaxillary line

Know:
- The following sound variations with percussion (and what they mean):
  - Resonant (normal lung)
  - Flat or dull (consolidation, atelectasis, or pleural effusion)
  - Hyperresonant or tympanitic (pneumothorax, large bleb, or emphysema)

4. Auscultation

Do:
- Auscultate the chest using the diaphragm of the stethoscope on both right and left sides as follows:
  - Posteriorly: apices, interscapular region, and pulmonary bases
  - Laterally: midaxillary line
  - Anteriorly: assessing bilateral superior lobes, right middle lobe, and lingual division of left superior lobe

If consolidation is suspected clinically, then also assess for E-to-A change (egophony): auscultate over the area of suspected consolidation while asking the patient to say “E.” It will sound like “A” over areas of pulmonary consolidation.

Know:
- The following sound variations heard with auscultation (and what they mean):
  - Vascular breath sounds (normal “lung” sounds)
  - Tubular breath sounds (abnormal, fairly loud, high-pitched sounds heard over areas of consolidated lung connected to patent bronchi. The consolidated pulmonary tissue results in increased transmission of airway sounds as compared to the usual sound-filtering quality of normal air-filled alveoli).
  - Adventitial (extra) sounds (these are all abnormal):
    - Discontinuous sounds
      - Coarse crackles = coarse, low-pitched “rattles” heard during early and mid-inspiration. They are produced by rapid airflow through large central airways causing the rupture of fluid films and bubbles along airway walls (as occurs in acute and chronic bronchitis).
      - Fine crackles (rales) = sound like “hairs being rubbed together” or like fine Velcro being pulled apart. They tend to occur during late-inspiration and are produced by the sudden reopening of partially collapsed small airways. (The small airways may be partially collapsed by scarring [pulmonary fibrosis], pus [pneumonia], blood [alveolar hemorrhage], or serum [pulmonary edema]).
    - Continuous sounds (These are produced by the “fluttering” of the airway wall, similar to a reed in a wind musical instrument)
      - Wheeze = high-pitched, hissing or musical type sounds produced by fast jets of air forced through tightly compressed airways (as in asthma or COPD exacerbations)
      - Rhonchus = low-pitched, snoring-like sounds produced by partial airway obstruction from mucus or bronchoconstriction (as in chronic bronchitis and occasionally asthma) or aspirated foreign bodies or endobronchial tumors
      - Pleural rubs: loud, creaky, “sandpaper”-type sounds (caused by two inflamed pleural surfaces rubbing together)
of the topic with one’s mentor; review of written materials; repeating portions of the physical examination tested in the OSCE; or repeating an OSCE station.

**Written reflections.** Students complete reflective exercises in each year of medical school. In the first year, students have limited reflections related to continuity of care, done in conjunction with clinical experiences and discussions with a preceptor. One reflection focuses on patient-centered continuity issues, one on physician-centered continuity issues, and one on personal perspectives. In the second year, students have one or two reflective exercises per quarter linked to specific learning experiences focused on long-term care, alcohol and substance abuse, life-threatening and terminal illnesses, and human sexuality. When this article went to press, discussions were under way between each required-clerkship director and College faculty liaison to develop reflective exercises concerning a relevant aspect of professionalism, with the goal of incorporating these into the third- and fourth-year curricula.

**The Value of the College System**

As the health care environment has become more complex, some of the greatest costs to medical education have resulted from fragmentation of physicians’ time and attention. Related costs include declines in true bedside teaching and clinical interactions involving faculty, student, and patient, and a loss of attention to training in basic clinical skills. As the faculties of many U.S. medical schools have grown dramatically in their size and expertise, the advantages of a more personalized approach to education have often been lost.

The impulse to overload the medical school curriculum is strong, and teaching of basic clinical skills has suffered as breadth replaces depth. Although in mid-2004 the USMLE instituted a clinical skills examination mandatory for all medical students graduating in or after 2005, and although a large majority of Americans consider good clinical and communication skills critical for physicians, there are few indications that the teaching of fundamental clinical skills receives the attention that ultimately results in sound clinical practice. In addition, with a few exceptions, relatively few medical schools have instituted competency-based curricula that ensure mastery of fundamental clinical skills. Many, if not most, medical schools have long since abandoned the old medical student clerkship curriculum of the past that required students to perform a breadth of activities in each clerkship. Instead, clerkships have become more focused and have required students to perform a limited number of responsibilities. As a result, students are no longer required to perform well in all the clerkships, and often they are not required to perform well in the clerkships that are important for their future careers.
skills. If implemented, competency-based curricula achieve full meaning only when closely tied to teaching, observation, and evaluation. Understanding this will become increasingly important in medical schools, since we anticipate that undergraduate medical education will increasingly move to a competency-based model, following the example of graduate medical education.

Understanding this will become meaningful only when closely tied to competency-based curricula achieve full primary care has been well recognized. Further, our approach is the only one we have initiated nationally, ours is one of the few that combines intensive bedside teaching and role modeling, supported by explicit benchmarks, with mentoring, in which the mentors both support the medical students and teach and reflect with them on their clinical skills development over the course of their medical school training. The importance of continuity in primary care has been well recognized.

A significant aspect of the College structure is its focus on training students to internalize and utilize a variety of learning tools. In the first year, students are introduced to competency domains and explicit benchmarks that define those areas in which deepening, progressive attention throughout medical school will be focused. In the second year, skill learning is initiated in these domains at the bedside and under the supervision of a teacher/mentor, along with broad attention to the structure of medical interviewing, presentation, and clinical reasoning. Students can then carry this structure and the core of fundamental knowledge they have learned in years one and two into their clinical years, where they experience broadened care settings, more complex patient histories, and additional higher-level evaluation and management competencies.

Medical education has moved increasingly away from inpatient settings over the last two decades. With its focus on bedside teaching, the College structure goes against the contemporary grain and reestablishes the inpatient setting as a learning environment for students during formative clinical training and in preparation for training in other care settings. Where the ambulatory setting is conducive to one-on-one teaching, the inpatient setting is conducive to weekly small-group bedside teaching. The inpatient setting gives students an early opportunity to learn focused history-taking, review complex physical examination findings, and initiate clinical reasoning. Since patients are selected and approached prior to the bedside encounter and because patient “turnover” is relatively rapid, a planned approach is possible in which patient histories can reflect the basic science topic or organ system being studied in the classroom. The College approach facilitates this integration, which is not possible when clinical skills are taught by hundreds of physicians in widely diverse ambulatory practices. Conversations between patients, students, and faculty in the College system can focus on issues around the core competency of professionalism and what is important to patients when they see clinicians. With the solid foundation they obtain during the second year, students can expand their clinical experience in years three and four to other care settings.

A key to promoting teaching of fundamental clinical skills rests on providing funding for individuals to teach and on investing in a core of teachers who are themselves fully invested in the curriculum. Identifying this core of expert teachers, ensuring financial support for their teaching activities, providing them with a combined teaching/mentoring role, giving them a strong voice in curriculum development and revision, coalescing them into a core group of fellow educators who interact on a regular basis, and giving continuous system-wide attention to the importance of teaching create an environment that refocuses the school’s most precious resources on teaching and evaluating core clinical skills. At our school, the commitment of dean’s funds to support these faculty and to releasing them from departmental obligations for the percentage of time designated for teaching and mentoring activities are essential elements to the success of this approach.

The University of Washington’s College system is still young but has worked remarkably well to date. Evaluative data currently being gathered will provide future information concerning the effects of the College system on students’ performance, satisfaction with their education, and the evolution of the third- and fourth-year curricula. Other schools may profit from using this approach, or may develop variations that satisfy their own needs. We believe, however, that a successful system will consider the need to focus on fundamental clinical skills in a continuous manner across all four years of medical school, to incorporate effective and structured bedside teaching, to use a competency-based model, to commit time and money to an expert group of clinical teachers, and to develop a sustained, dynamic structure of learning that students can internalize for use throughout their careers.
The authors gratefully acknowledge the Josiah Macy, Jr. Foundation, The New York Academy of Medicine, and the Association of American Medical Colleges for their support through the national project titled “Enhancing Education for the Clinical Transaction.” This article does not necessarily reflect the opinions or policies of these organizations.

The authors also gratefully acknowledge the 25 members of the College faculty who work as partners with the authors in the University of Washington School of Medicine College program; Dr. Kelly Fryer-Edwards, assistant professor in the Department of Medical History and Ethics, University of Washington School of Medicine for her contributions to the professionalism working group and benchmarks; and Dr. James P. LoGerfo, professor of medicine, University of Washington School of Medicine, for his review and critique of the manuscript.

References

42 Shankel SW, Mazzaferri EL. Teaching the resident in internal medicine. Present practices and suggestions for the future. JAMA. 1986;256:725–9.
45 An analysis of U.S. student field trial and international medical graduate certification testing results for the proposed USMLE clinical skills examination; February 2003 (www.usmle.org/news/Step2CSNews/Step2results2503.html). Accessed 31 January 2005


51 Olson L, Schieve D, Pangaro LN. Complementary developmental approaches to assessing medical students—SPIRAL and RIME. Presented at the annual meeting of the Association of American Medical Colleges, November 10, 2002, San Francisco, CA.


54 Derstine PL. Implementing goals for non-cognitive outcomes within a basic science course. Acad Med. 2002;77:931–2.


