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"Knowing is not enough; we must apply.
Willing is not enough; we must do." (Goethe)

Recommendations for Preclerkship Clinical Skills Education for Undergraduate Medical Education

Task Force on the Clinical Skills Education of Medical Students

Association of American Medical Colleges, **2008**

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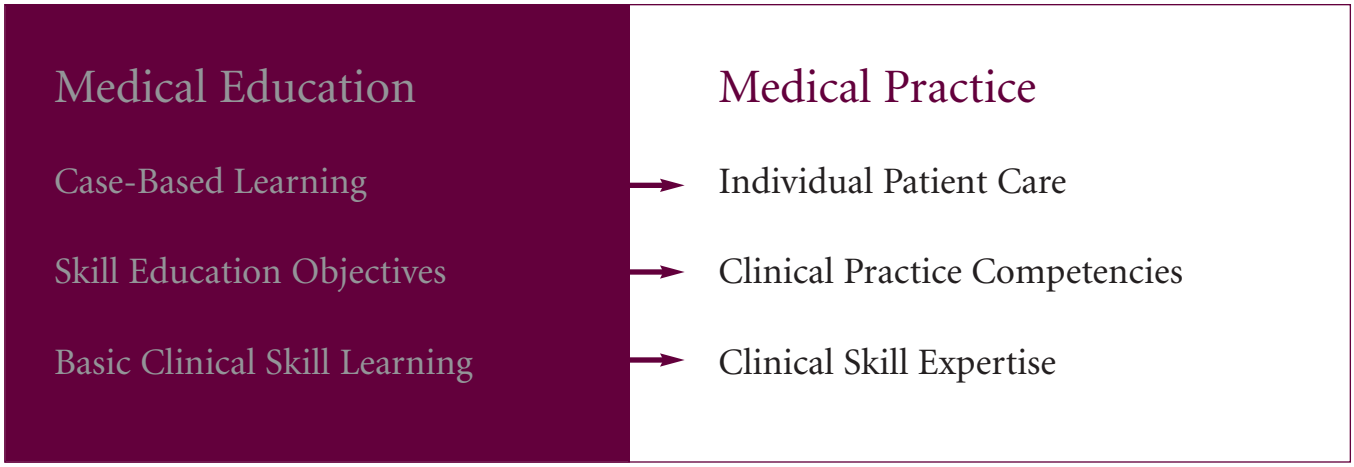
Achieving Excellence in Basic Clinical Method Through Clinical Skills Education: the Medical School Clinical Skills Curriculum



Several years ago, the Association of American Medical Colleges renewed its focus on improving the clinical education of medical students in the United States. In June, 2003 the Association convened a task force on clinical skills teaching that included representatives from the seven national clerkship organizations, the Alliance for Clinical Education and the American Academy on Physician and Patient. Each of these organizations has specific interest in improving the undergraduate medical curriculum. This task force has initiated a national consensus regarding the clinical skills education of medical students. The recommendations contained in their initial report represent the consensus of the organizations that set the standard for the clinical education of medical undergraduates. This next report proposes the design and content of a model undergraduate preclerkship skills curriculum. The intent of this series of monographs is to inspire educators in their commitment to this fundamental element of physician competency.

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"Clinical skills education in the undergraduate medical curriculum is fundamental to the development of basic clinical method and the lifelong achievement of excellence in clinical practice" (1)

Executive Summary

In undergraduate medical education, the purpose of preclerkship education is to initiate the process of clinical performance development and to prepare the student to be ready to participate in and optimally learn from the direct care of patients during the clerkship experience. In order to best achieve this goal, learning must occur in a clinical context and clinical skill performance outcomes should be explicit for students throughout the preclerkship period. That being said, it is important to note that currently, there is no nationally agreed upon consensus regarding the design and content of an optimal preclerkship clinical skills curriculum.

In 2003 the Association of American Medical colleges convened a task force on clinical skills teaching, culminating in an initial monograph proposing the design and content of a model undergraduate clinical skills curriculum (1). The AAMC Preclerkship Clinical Skills Education Task Force was formally established in October, 2006 in an effort to build upon this prior work and begin to establish a national consensus regarding preclerkship clinical skills learning and appropriate outcomes. The authors of this monograph were selected for their interest and established expertise in pre-clerkship clinical education. While their specialty disciplines represent most, but not all, of those that provide significant leadership for preclerkship courses in medical schools: internal medicine, family medicine and pediatrics, their task was to go beyond discipline boundaries. The intent of this report is to provide a coherent and broadly applicable model for preclerkship clinical skills learning and performance standards that will contribute to enhanced preparation of medical students for the clerkship experience.

The Preclerkship Clinical Skills Education Task Force recommends that medical schools:

1. Adhere to an explicit set of principles to guide the design and implementation of the preclerkship clinical skills curriculum.

   Skill education principles are required so that teachers, learners and institutions have a common understanding of the process of clinical skill education and their shared responsibility in it.

2. Implement a clinical curriculum that reflects the developmental nature of skills learning, including the designation of expected levels of skill performance.

   Clinical skill mastery is developmental. To this end, clinical skills education best occurs as an integrated and longitudinal educational process. As the student is exposed to an incrementally challenging skills curriculum, he or she has an opportunity to progressively master that set of skills as the foundation for further undergraduate and postgraduate training.

3. Adopt explicit competency goals which, in turn, determine the specific skill objectives in the preclerkship curriculum.

   The application of explicit competency goals, including the identification of skills to be mastered, will facilitate standardization of both the educational process and the assessment of skill outcomes.

4. Provide sufficient learning opportunities, using a variety of healthcare settings, that enable students to achieve specified preclerkship objectives.

   Comprehensive learning opportunities ensure that students learn how clinical method applies throughout the continuum of contemporary medical care. These opportunities should also provide for repetitive clinical skill practice and remediation when necessary.

5. Design and implement strategies to assess students' achievement of expected clinical skills outcomes.

   Skill development benchmarks provide explicit guides for measuring and standardizing student skill learning, and for determining competency goal achievement.

6. Provide the program elements critical to the success of the preclerkship clinical skills curriculum: leadership, programmatic infrastructure, and the resources required for continuous curricular enhancement.

   Specific programmatic elements assure that the curricular process is supported and effective in achieving its goals. Program evaluation is recommended to assist educators in identifying areas of success and to enable continuing curricular improvement.


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Introduction

In 2005, the AAMC published an initial monograph, The AAMC Project on the Clinical Education of Medical Students: Recommendations For Clinical Skills Curricula for Undergraduate Medical Education (1). It includes recommendations from an expert panel regarding the overall design of a clinical skills curriculum for medical students. This second monograph, Recommendations for Preclerkship Clinical Skills Education, specifically addresses the clinical skills curriculum and performance outcomes expected for preclerkship students. The monograph authors were selected for their interest and established expertise in pre-clerkship clinical education. While their specialty disciplines represent most, but not all, of those that provide significant leadership for preclerkship courses in medical schools: internal medicine, family medicine and pediatrics; their task was to go beyond discipline boundaries.

Recognition of the need for a monograph addressing preclerkship clinical skills education has been growing at the grass-roots level for several years. A number of medical education organizations have developed formal or informal task forces to look specifically at preclerkship clinical skills education (2-4). Until this time, however, there has been no national consensus regarding the clinical skills that medical students should learn prior to starting the clinical clerkships.

This monograph contains six preclerkship clinical skills recommendations (Table 1). These include: a set of principles that should inform the creation and implementation of a preclerkship curriculum ,recognition of the developmental nature of skill learning, the competency goals and skill objectives that should be attained by preclerkship students, the learning opportunities that medical schools should provide, assessment of student performance, and the essential program elements that are necessary to the success of a preclerkship curriculum.

The lifelong practitioner of medicine needs to apply an integrated understanding of contemporary medicine in a professional manner to the care of the individual within the patient's personal, cultural, socioeconomic, and healthcare system context. This is the universal act of clinical care. The core aim of undergraduate medical education therefore is to equip each student to develop the lifelong habit of skill learning and self-assessment, in order to further develop and maintain clinical performance expertise. *The responsibility for initiating the habit of clinical skill development rests within the preclerkship curriculum.*

Table 1: Preclerkship Clinical Skills Education Recommendations

Preclerkship Recommendations
1. Guiding Principles
2. Developmental Design
3. Competency Goals & Skill Objectives
4. Learning Opportunities
5. Skills Assessment
6. Essential Program Elements


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Recommendation #1: Seven Principles for Preclerkship Skills Education

Medical schools should adopt an explicit set of principles to guide the design and implementation of the preclerkship clinical skills curriculum.

Educational principles for clinical skills development are vital for achieving a common understanding among the teacher, the student and the institution regarding this essential educational process. Without this shared understanding, clinical skills education may not occur in an organized fashion within the clinical environment. The following principles have special relevance for the preclerkship clinical skills curriculum:

1. **The primary purpose of clinical skill performance learning is to improve patient outcomes by enhancing the quality of physicians' care.**

   Advancement in undergraduate medical education is traditionally dependent upon successful performance on written examinations which evaluate knowledge and clinical reasoning skills. In practice, however, clinical expertise is reflected in the quality of patient care provided by the physician. This depends not only upon the physician having biomedical understanding, but also upon their ability to actually *apply this understanding effectively* in the care of the patient. The student physician must be encouraged to make this important transition in their learning motivation at the outset of their professional career.

2. **Preclerkship clinical skill education should reflect a patient-centered care strategy.**

   All of medical education, especially clinical skills learning, should be patient-centered. When beginning to develop basic skills, students should learn to think and act within a clinical context. In this way they can at once learn the purpose, the clinical relevance and the techniques of basic skills. Supervised interactions with patients should occur whenever possible in order to enhance students' preparation for patient-centered care in the clerkship experience.

3. **Preclerkship clinical skills education should be interactive, experience-based, and learner-centered.**

   Maximal clinical performance learning occurs when students recognize the relevance of and engage the material they are expected to assimilate (5-7).

4. **The achievement of an individual's clinical skill competency is dependent upon self-directed habit.**

   Ultimately clinical skill expertise is a function of self-directed professional *habit*. Consequently, the development of this habit must be embraced by each student throughout her or his clinical education, including a commitment to ongoing practice and honesty in self-assessment. The maturation of self-directed learning skills and reflection are essential to the development of clinical expertise. The principle that self-directed learning is integral to the lifelong achievement of clinical competence must be modeled and clearly expressed to students.

5. **Clinical skills education is *developmental* in nature.**

   Performance expertise is achieved and maintained through a gradual and incrementally challenging educational experience. Thus, a developmental set of skill learning outcomes must be established throughout the four-year undergraduate medical curriculum with clearly defined objectives and levels of achievement for each phase of a student's education.

6. **Medical schools and their faculty have the primary responsibility of ensuring that students receive effective preclerkship clinical skills education through both teaching and assessment of clinical skills.**

   Coordinated skills teaching and assessment requires explicit faculty leadership and oversight.

7. **Continuous quality improvement must be a part of the preclerkship clinical skills curriculum design.**

   Evaluation of the curriculum should be continuously performed and the results used to improve the curriculum. When this quality improvement process is well done, it provides essential information for curriculum planners, faculty, resource allocation and ultimately, for enabling optimal educational outcomes (8,9).

Recommendation #2: A Developmental Approach to Learning

Medical schools should implement a clinical skills curriculum that incorporates the developmental nature of learning, including the designation of expected levels of skill performance.

Professional skill learning is a developmental process that is continually shaped and refined throughout the physician's career. Cultivation of skill acquisition in the foundation years of undergraduate medical education results from exposure to sequentially more challenging clinical learning experiences, repeated practice opportunities, observation and feedback based on definable performance outcomes, and self-directed proactive learning (10).

During the undergraduate medical experience, clinical skills acquisition occurs in three phases: preclerkship-clerkship-postclerkship. Inherent in this process is specification of the outcome that is necessary at the completion of each phase. The use of skill objectives makes the student, as well as the instructor, aware of the next step in skill development. In this schema, the emphasis in the preclerkship curriculum is on preparing the student to acquire sufficient clinical expertise to participate in clerkship level clinical care activities including continuing and repetitive practice of basic clinical skills.

Frameworks for a Developmental Curriculum

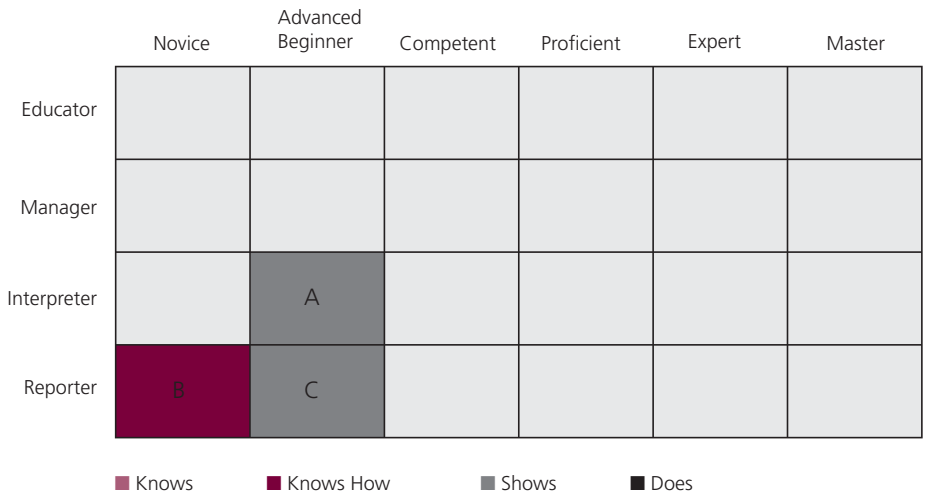
Educators have articulated explicit developmental models of skill learning that create a useful framework when considering student skill acquisition. Pangaro's RIME schema, Miller's Learning Pyramid, and Dreyfus' competency level model are frequently applied in the context of defining skill acquisition in medical education (11-13). Pangaro's RIME schema describes the developing clinical role of the learner. Miller's pyramid refers to the type of demonstrated learning, and Dreyfus' model relates to the general level of skill performance. While each of these models may not always be applicable to every skill objective, the task force suggests that combining components of these different models may help to more specifically define the appropriate skill outcomes for the developmental level of the learner. (Table 2, Figure 1)

Pangaro's RIME schema describes the expanding and progressive clinical role of the student, first as a reporter of clinical information, and then an interpreter of gathered information. At the third level, the student learns to become a manager of clinical problems; and ultimately, as one who can be an educator of patients, families, other health care professionals and peers about clinical problems. Miller's four levels of learning describe whether the learner can demonstrate *knowledge* of the material, and then *knows how* the skill is performed. Next, the learner, *shows how* to do so in a controlled or simulated setting, and finally, actually *does* it in clinical practice.

Table 2: Clinical Learning Models

Clinical Learning Role *Pangaro*	Type of Demonstrated Learning *Miller*	Levels of Skill Performance *Dreyfus*
Reporter Interpreter Manager Educator	Knows Knows How Shows How Does	Novice Advanced beginner Competent Proficient Expert Master

Figure 1: Categories of Skill Development



Dreyfus' model describes levels of competence from novice through mastery. Skill development progresses through the continuum of medical education, including postgraduate and continuing education.

All three models are intended as frameworks for choosing teaching methods and assessment strategies for learner performance development. Together they imply that the learner should be able to demonstrate skills at "higher levels" as they progress along the continuum of medical education. We suggest that they can be combined into a matrix that illustrates a three dimensional picture of the clinical learner at any particular point in time (Figure1).

For example, at the end of the preclerkship period, for the skill of history taking, a student should be at least an advanced beginner, showing how to do so in the reporter role (see point C). For the skill of communicating with a non-English speaking patient, the student might be a novice, knowing how to use a professional medical interpreter in the reporter role (point B). As some preclerkship skills involve the student in the interpreter role such as in cardiac auscultation, for these skills students should be between the novice and advanced beginner level (point A). In general we are defining beginner to advanced beginner as the minimum expectation for basic clinical skill performance by the end of the preclerkship period. Obviously this does not preclude any student from performing at a more advanced level.

By including explicit developmental models in the design of the preclerkship skills curriculum and the assessment of the student, it becomes easier for learner and teacher to move to the "next step" in progressive skill development.

Recommendation #3: Clinical Method Competency Goals and Skill Objectives

Medical schools should adopt explicit competency goals, which determine the specific, measurable clinical skills objectives for students during the preclerkship curriculum.

Competency goals describe the outcomes that educational programs are intended to produce in terms of the students' demonstrable clinical performance. Competencies describe high-order abilities that combine the cognitive, affective and psychomotor domains for effective performance of complex tasks. The focus is on what the student can do as a result of the learning, rather than on the content or process of the instruction. These goals guide the design of the curriculum, the choice of teaching methods and the choice of appropriate assessment tools. In clinical terms, they reflect the generic competencies required to perform the clinical act of patient care.

The Accreditation Council for Graduate Medical Education (ACGME) organized GME competencies in six areas: medical knowledge, practice-based learning and improvement, patient care, systems-based practice, professionalism, and interpersonal and communication skills (14). Competency goals for undergraduate medical education (UME) should prepare students so that they can eventually accomplish the competencies expected at the GME level. The GME competencies reflect more advanced clinical development, while those for

Table 3: Clinical Method Competencies

UME Competency	GME Competency
Professionalism	Professionalism
Patient Engagement & Communication	Interpersonal & Communication Skills
Application of Scientific Knowledge & Method	Medical Knowledge
• History-taking • Mental and Physical Examination • Clinical Testing • Clinical Procedures • Clinical Information Management • Diagnosis • Clinical Intervention • Prognosis	Patient Care
Putting Care in Practical Context	System-based Practice
* Self-directed learning & self-assessment	Practice-based Learning & Improvement

** This principle should be embedded within each of the preceding competencies, preparing the student for this corresponding GME competency.*

medical students focus on the fundamental clinical method competencies that are the foundation for later and more sophisticated levels of clinical practice (1).

The twelve recommended UME clinical method competencies correspond to the six GME areas as noted in Table 3.

Competency goals 1-3 describe abilities that students may already possess to some extent before beginning their medical education experience. The preclerkship years of their clinical education should provide them with opportunities to further develop and apply these competencies within the context of the care of the patient.

1. The ability to understand the nature of, and demonstrate professional and ethical behavior in, the act of medical care. This includes respect, responsibility and accountability, excellence and scholarship, honor and integrity, altruism, leadership, cultural competency, caring and compassion, and confidentiality.

2. The ability to engage and communicate with a patient, develop a student-patient relationship, and communicate with others in the professional setting, using interpersonal skills to build relationships for the purpose of information gathering, guidance, education, support and collaboration.

3. The ability to apply scientific knowledge and method to clinical problem solving.

   Competency goals 4-8 represent specific individual clinical skills activities that are performed in any medical encounter.

4. The ability to take a clinical history, both focused and comprehensive.

5. The ability to perform a mental and physical examination;

6. The ability to select, justify and interpret selected clinical tests and imaging;

7. The ability to understand and perform a variety of basic clinical procedures;

8. The ability to record, present, research, critique and manage clinical information.

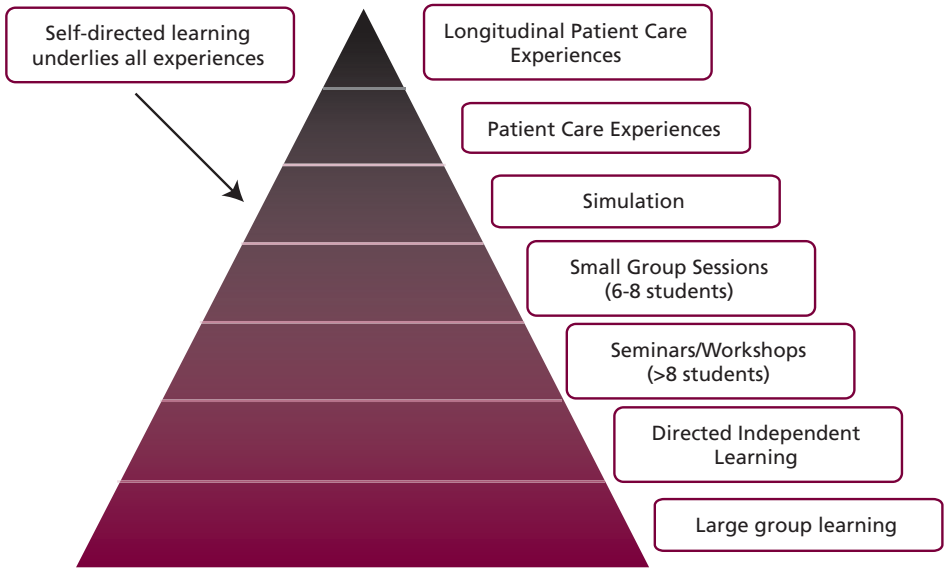
   Competency goals 9-11 reflect the three major tasks of individual patient care that involve the integration of competency goals 1-8: identifying and prioritizing clinical problems, understanding, selecting and implementing clinical interventions, and predicting the course of illness and anticipating future patient healthcare outcomes.

9. The ability to diagnose and explain clinical problems in terms of pathogenesis, to develop basic differential diagnosis, and to learn and demonstrate clinical reasoning and problem identification;

10. The ability to understand and select clinical interventions in the natural history of disease, including basic preventive, curative and palliative strategies

11. The ability to understand and to formulate a prognosis about the future events of an individual's health and illness based upon an understanding of the patient, the

Figure 2: Clinical Skill Learning Formats



Each level in the pyramid represents a step closer to the clinical practice setting of direct patient care. The size of each level reflects the number of students typically involved in the learning opportunity at any one time.

natural history of disease, and upon known intervention alternatives.

The preceding competency goals are the core elements of generic clinical method. The final competency goal reflects the fact that in providing patient care, the physician must also consider the practical context within which medical care is delivered from the perspective of both the individual patient and the environment in which they live.

12. The ability to provide clinical care within the practical context of a patient's age, gender, personal preferences, family, health literacy, culture, religious perspective, and their economic circumstances. This competency goal also includes consideration of relevant ethical, moral and legal perspectives including patient advocacy and public health concerns, and as well as the resources and limitations of the healthcare system.

The twelve appendices sections contain examples of specific skill objectives for each of these clincial method competency goals targeted to the preclerkship level.

Recommendation #4: Learning Opportunities

Medical schools should provide learning opportunities in a variety of healthcare settings that enable students to achieve specified preclerkship objectives.

The previous sections have emphasized that clinical skills curricula should be developmental in nature and that expected levels of skill performance should be defined for each stage of the curriculum. The objectives and expected outcomes should guide the selection of learning opportunities.

Medical schools should carefully select and design student learning opportunities with the following characteristics:

- Each individual learning opportunity should have clearly defined and articulated learning objectives.
- All learning opportunites should be chosen and designed to enable students to successfully meet the specific learning objectives of the curriculum.
- All skill learning opportunities should include observation, feedback, and opportunity for repetitive practice.
- All learning opportunities should promote self-directed learning.
- A **variety of formats** (Figure 2) should be used to facilitate preclerkship clinical skills learning. Benefits of using a range of instructional methods include: accommodating various learning styles, providing opportunities for repetitive practice with observation and feedback, encouraging progressive growth and development of the desired skills, promoting active learning by allowing students to apply and practice these skills in different settings, and introducing students to skills experiences in diverse specialty areas(15).

A **variety of teachers may also participate** in preclerkship clinical skills education. While many medical schools rely on physician faculty to teach clinical

Table 4: Clinical Skill Teachers

Teacher	Unique Benefits/Attributes
Academic Physician faculty	Expertise in area of clinical exam, access to patients, can reinforce physiology of normal/ abnormal findings
Generalist	Access to breadth of presenting problems
	Broad range of clinical findings
	Continuity of patient care
	Experience with specialty and community referrals
Specialist	Access to organ-specific problems and related clinical findings
Emeritus	Established clinical expertise, time to teach, minimal to no cost
Community Physicians	Application of clinical skills and continuity of care in the private practice sector, "medical home" (16)
Residents	Mentorship opportunities
Fellows	Identification with students
Peers	Mentorship opportunities
	Identification with students
	Curriculum familiarity
	Low cost
Non-Physician Staff	Practice in protocoled environment
	Lower cost for teaching specific tasks

skills, others can complement physician faculty teaching in the preclerkship curriculum. When deciding on instructors, it is important to be mindful of what is being taught, the skills or knowledge that will be required of the teachers, as well as their experience and availability. For example, an instructor teaching basic physical examination skills should guide the learner in the mechanics of proper manual technique, such as where and how to place the stethoscope on the chest for cardiac examination. These tasks can be taught by well-trained non-physician staff. In addition to oversight, the optimal role for faculty physicians in teaching clinical skills could be reserved for more complex tasks – for example, observing the student's ability to perform a clinically appropriate detailed interview and examination, and providing mentored feedback. Teachers vary in terms of their unique benefits and attributes for a given learning opportunity. Table 4 lists some of these for different teachers that may be utilized in the teaching of clinical skills.

In the remainder of this section are reviewed each of the learning opportunities in Figure 2, emphasizing unique characteristics and the extent to which they may facilitate student skill learning during the preclerkship experience.

Patient Care Experiences

Since the ultimate goal of medical education is to enable students to perform skills with actual patients in the clinical setting, patient care experiences should be employed as early and as frequently as possible in the curriculum. Interactions with actual patients should emphasize the importance of the longitudinal nature of patient-physician relationships (17). It is within these relationships that students develop an appreciation for the challenge of providing clinical care within the individual patient's unique context, for learning to observe changes in the patient's circumstances and expectations over time, and for learning of the physician's role in partnering with the patient as their advocate in the health care system.

For example, during successive visits a preclerkship student can have the opportunity to participate in the care for a patient with chronic disease, advance core communication skills, learn the varied physical examination findings of the disease and witness the continuing impact of the disease on the patient's personal experience.

Medical schools should consider using a **variety of patient care settings**, including those that students will encounter during the clerkships. *The Task Force recommends that both inpatient and outpatient venues be used for preclerkship learning opportunities.* Whatever setting chosen, the student's learning objective when placed in that environment should be specific and explicit. For example, if a first year pre-clerkship student's faculty preceptor works in palliative care, the student's objective at this level should be to learn and receive feedback on basic communication skills, not necessarily to

Table 5: Healthcare Settings

Patient Care Settings	Learning Opportunity
Acute care (out or inpatient)	• Practice establishing rapport with new patients • Take problem-focused patient histories & phys exam • Observe & learn time-dependent encounter skills
Chronic care (out or inpatient, nursing home)	• Build relationships with patients • Learn about barriers to adherence • Practice taking a functional assessment • Observe changes over time
Critical Care	• Practice physical exam skills with patients with abnormal findings • Observe procedures • Observe healthcare teamwork
Emergency care	• Take problem focused histories • Practice focused physical exam skills • Practice diagnostic reasoning and test interpretation • Learn basic procedural skills
Palliative and end of life care	• Learn and practice basic communication skills • Build patient-student relationships
Population / Community-based health care	• Exposure to barriers to care • Learn about healthcare resources • Learn about limitations of the health care system
Primary care	• Take problem-focused patient histories • Practice establishing rapport with new patients • Build longitudinal patient-student relationships • Observe and learn wellness and preventive health care skills • Observe referred care management

be trained in more advanced, clerkship-level tasks such as facilitating a family conference or discussing the goals of care with a terminal patient. A list of contemporary healthcare settings and some examples of corresponding pre-clerkship learning opportunities for each are listed in Table 5.

Standardized Patient Experiences and Simulation

A simulated setting is optimal for beginning the attainment of selected clinical skills abilities (18-20). The level of fidelity and the physical setting needed for a simulated learning opportunity depends upon the intended learning objective. An advantage of simulated learning opportunities is that students can practice skills repetitively with no inconvenience to patients or risk to their safety. However, simulated experiences do not preclude experiences with actual patients. Once students have learned skills in this setting, they can be better prepared for performing them in the context of direct patient care. Samples of simulated learning opportunities are shown in Table 6.

Small Group Sessions, Seminars, and Workshops

With attention to teaching technique, clinical skills can also be learned in small group sessions, seminars, and workshops (21). These sessions should be interactive and include opportunities for skill practice and formative feedback. Cognitive, affective, and psychomotor skills can be practiced using common teaching approaches such as demonstration, modeling, observation and feedback, and engaging students in dialogue and performance critique. For example, in small groups (≤ 8 students per group) role-play can be used to teach verbal and nonverbal communication skills. In larger seminars or workshops, neurologic examination might be demonstrated with a student for the entire group. Students can then practice these skills in smaller breakout groups. Decisions about group size need to be guided by the learning objectives of the session and available resources. Lowest student to teacher ratios are preferred for situations where more time is needed for individual learning and practice and when the skills being taught are more complex.

Table 6: Simulated Clinical Learning Opportunities

Teaching Modality	Learning opportunity examples
Standardized Patients	• Teaching & assessment in selected clinical scenarios
	• Practice communication skills
	• Practice physical examination
	• Receive feedback on performance
Mannequins	• Perform cardiac, pulmonary, breast and pelvic examination techniques
	• Practice basic procedural skills
High Fidelity Simulators	• Practice teamwork & leadership
	• Perform cardiac and pulmonary care skills
	• Apply basic science understanding to clinical problem solving
Task Trainers	• Practice phlebotomy, lumbar puncture, breast exam, prostate examination

Directed Independent Learning

A number of excellent resources exist to help students prepare themselves for structured learning opportunities and for self-directed learning (Table 7). While these resources help instruct students how to perform specific skills, the curriculum must ultimately provide opportunities for direct observation of individual student performance and provision of feedback.

Lecture

Lectures can be effective for delivering core knowledge content to large groups of students. While they can serve as an introduction to the learning of clinical skills through demonstration, it is recommended that *didactic lectures be kept to a minimum because of their limited ability to provide for interactive and individually observed skill learning.* For example, teaching faculty can model communication skills by interviewing a patient or demonstrating physical examination skills for a large class. However this should generally be linked to small group and individual practice sessions.

Ultimately, "one size doesn't fit all"

A successful clinical skills curriculum is one that uses a variety of formats and settings, has clearly defined objectives for each activity, and employs learning opportunities that are chosen based on their ability to help students achieve the clinical skills learning objectives. Attention to the learning opportunities provided in the preclerkship curriculum

will greatly enhance the likelihood that students acquire the desired skills necessary to prepare them for the clerkships and for continuing skill development.

Recommendation #5: Assessment of Student Performance

Medical schools should design and implement strategies to assess students' achievement of expected clinical skills outcomes.

Development of the plan to assess skill performance should be done at the same time that the curriculum and teaching methods are being determined.

When choosing a method of assessment it is vital to consider the expected performance outcome. The developmental models discussed in Recommendation 2 present a framework that can guide selection of assessment methods. The Task Force suggests that educators consider the following approach when selecting an assessment strategy for a particular skill objective:

Step 1: Identify a skill objective to be assessed

Step 2: Determine the students' clinical role (i.e. Pangaro's RIME schema)

Step 3: Determine level of demonstrated learning (i.e. Miller's Learning Pyramid)

Step 4: Determine level of expected performance (i.e. Dreyfus)

Step 5: Choose assessment method (see Table 8 for examples)

For example, using a preclerkship history-taking skill objective:

Step 1: Skill objective: Explore the cardinal elements of a patient's chief complaint.

Step 2: Student's clinical role: Reporter

Step 3: Demonstrated learning level: Shows how

Step 4: Performance level: Proficient

Step 5: Assessment method: an OSCE using an English-speaking patient presenting with chest pain. Supplement with an oral or written presentation if assessment at reporter level is desired. Direct observation of the encounter would allow for assessment of the students' ability to *show how* they take a history. The complexity of the clinical scenario, including the number of checklist items performed will determine the level of performance (Dreyfus).

Assessments should include both formative and summative methods.

Table 7: Independent Learning Resources

Modality	Skill Learning Utility	Examples
Written Resources	• Provide background knowledge for skill understanding	• Interviewing textbooks • Physical exam textbooks • Published literature
Video recordings	• Demonstrate desired skill techniques: - Interviewing - Physical examination - Procedures • Provide opportunity for self-assessment	• Textbook DVDs • Institutionally-developed recordings demonstrating techniques • Online resources (e.g., MedEdPortal) • Student OSCE performance recordings
Audio recordings	• Enable auscultation skill practice	• Cardiac and Pulmonary sounds in various formats (CD/ DVD, online, mp3) • Archived lectures/ podcasts
Online resources	• Demonstrate desired techniques • Provide alternative approaches to learning desired techniques • Diversity of resources	• Communication websites • Physical examination websites • Clinical education repositories (MedEdPortal)
Blogs and discussion boards	• Promote self-reflection	• Blog for ICM small groups
Electronic Learning Portfolios	• Promote feedback by mentors • Promote self-reflection • Track student progress related to clinical skills outcomes	• Examples available at select schools

Table 8. Sample Assessment Methods

Knows	Knows How	Shows How	Does
Multiple choice exam	Oral exam Written Essay	Standardized patient examination; Objective structured clinical examination (OSCE); Simulation with model	Direct observation and/or videotaped performance with actual or simulated patients; Portfolios with reflection, 360 evaluation with patient, peers, medical record review.

Progressive assessments throughout the preclerkship curriculum allow for feedback on developing performance. Repetitive assessments allow for more continuous improvement of skills. While some skills assessment should be a high-stakes summative examination, repeated formative experiences on a regular basis provide students with ongoing feedback. Information obtained from these assessments can also be used to guide the design of remediation experiences when needed.

Formal remediation should involve several elements:

- diagnosis and identification of specific learning needs
- provision of feedback,
- additional learning opportunites
- subsequent re-observation and feedback
- Reassessment

Summative evaluation with achievement of a designated level of skill performance is necessary to determine readiness to transition from preclerkship to clerkship education.

Recommendation #6: Essential Program Elements

Medical schools must provide the elements critical to the success of the preclerkship clinical skills curriculum: leadership, infrastructure, and resources for continuous curricular enhancement.

In order to be successful, there must be an overall mission for the curriculum. How will the school know if its curriculum is effective? What are the principles on which decisions will be made on behalf of the curriculum? By understanding this context, the leadership qualities, infrastructure requirements and budget choices will become more clear.

Implementing preclerkship clinical skills recommendations requires commitment on the part of each institution's administration, faculty, staff, and students. For such an effort to succeed, key programmatic elements are required to move from the theoretical phase of curriculum design to implementation and programmatic evaluation. Curricular change should involve all stakeholders to guarantee buy-in, and have clearly defined benchmarks to monitor progress. Using the experiences of other institutions as a guide can be valuable and save time in the process by avoiding common pitfalls (22,23).

Leadership

The medical school should provide deliberate and effective leadership for the clinical skills curriculum. This can be accomplished by addressing each of the following areas:

- **Faculty leadership:** Effective leadership is the key to success in any curriculum change (8,9). The institution must carefully choose the leaders and empower them to succeed. They should be provided with sufficient administrative support and resources (see Infrastructure).
- **Funding:** Medical schools should commit to ongoing financial support of the clinical skills curriculum by designating specific funds for the educational programs previously described, as well as support for faculty time. It is the medical school's responsibility to ensure adequate resources, whether funding for the curriculum comes from medical school administration or through a sponsoring clinical department. The budgetary process should be explicit and transparent. A continuing dialogue between the clinical skills curriculum leadership and medical school administration will help anticipate and address changes regarding support and resource needs, as well as allow for future innovations as needs arise.
- **Clinical skills curriculum committee:** If not already in existence, the medical school should establish and support a dedicated clinical skills curriculum committee composed of key stakeholders such as clinical skills course directors, clerkship directors, residency directors, education deans and interested stu-

dents. Such membership promotes dialogue and collaboration among faculty involved in delivering a four-year longitudinal clinical skills curriculum.

- **Curricular time and integration:** Teaching and learning clinical method is central to the mission of the medical school. Adequate curricular time must be dedicated for the preclerkship clinical skills curriculum. This should include integration of clinical skills learning into basic science courses. Collaboration between all preclerkship course leaders and curriculum leaders is critical.

Infrastructure

A successful clinical skills curriculum requires an infrastructure. Each institution will need to capitalize on existing resources and identify and pursue new ones to ensure that learning opportunities enable students to meet the objectives of the curriculum. Medical schools should consider the following when creating the infrastructure to support the clinical skills curriculum:

- **Administrative support:** appropriate management staff and operational policies and procedures are required to support the clinical skills curriculum.

- **Teachers:** The following are important considerations when choosing the teachers for the clinical skills curriculum:

  1. **All who teach should have dedicated time to participate in the curriculum.** Teaching RVUs or direct compensation for faculty time have been employed successfully at some institutions (24). Other incentives should be considered for clinicians who participate from outside the medical center such as access to library services and continuing professional education credits..

  2. **A successful clinical skills curriculum will encourage and support faculty participation.** Financial remuneration should be considered to encourage faculty participation, but it is not the only tool to consider. Teaching awards, assistance with professional promotion and creating an infrastructure to promote faculty-student interaction can be used to engage and support faculty. At some schools, society/college systems have emerged that align students with faculty who will follow, teach and mentor a cadre of students throughout their four years (25).

  3. **Faculty Development.** Participating faculty should be provided with ongoing opportunities to develop and enhance their teaching. This includes an understanding of the goals and objectives of the preclerkship clinical skills curriculum. Workshops that provide venues for teachers to practice and receive feedback on their teaching of clinical skills promote the use of such skills (21). Student evaluations foster improvement in teacher performance.

- **Patients:** infrastructure is required that enables patients, both actual and simulated, to participate in the teaching of clinical skills. This includes:

  1. Compensation: stipends encourage patient participation and commitment to the teaching enterprise

  2. Patient training: patients must be trained for teaching activities

  3. Patient Trainers: individuals with expertise in the recruitment and training of standardized patients

  4. Logistical support: this includes scheduling management, and the parking and/or transportation needs of patients

  5. Tracking: maintainence of a database of available patients with contact information, demographics and any pertinent medical problems/clinical findings

  6. Skills laboratories: This involves dedicated space designed for clinical skills training; dedicated staff to maintain the space and coordination of scheduled activities to maximize facility utilization; faculty and staff that are trained to utilize simulation tools; mannequins/simulators/task trainers/standardized patients; and, faculty with expertise in clinical skills teaching and assessment.

- **Information Technology (IT) resources:** Medical schools should support the use of information technology in their clinical skills curriculum including:

  1. Software and web-based programs, such as electronic learn-

ing portfolios and standardized patient tracking software

2. Web-based clinical skills materials and curricula
3. Infrastructure to podcast lectures and demonstrations.
4. Modeling the use of IT in patient care (i.e. the electronic medical record)
5. Digital recording of clinical performance

Clinical Skills Curriculum Enhancement

Evaluation of the curriculum must not be overlooked, as it is a crucial component of successful curriculum implementation and efforts for continuous quality improvement of a curriculum over time. Done well, it provides essential information to guide learners, curriculum planners, faculty, and other stakeholders such as those who allocate resources (8, 9, 26).

Evaluation should begin with a needs assessment to identify discrepancies between the school's current approach and components described in these recommendations. Expertise is necessary to guide this effort, as is administrative support for ongoing review. Oversight membership should include a committee of stakeholders who would participate in the design of the evaluation process including individuals with educational outcome measurement expertise. Sound evaluation methodology depends upon a variety of information sources. These should be collected using appropriate methods and address clearly specified questions. The evaluation plan must assess both the performance of the learners and evaluate the overall curriculum.

The ultimate success of a preclerkship skills curriculum depends upon commitment to quality improvement using educational outcome data to drive continuous curricular enhancement.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APPENDICES

The following appendices are intended as a guide for course directors as they develop preclerkship clinical skills curricula. The twelve appendices correspond directly to each of the broad competency domains that comprise generic clinical method. Each section begins with a brief overview followed by a table. The left column in each table lists, in general terms, competency goals that help define the focus of that particular domain for the preclerkship student. The right column in the table lists important examples of specific preclerkship-level skill objectives that will facilitate meeting that competency goal. The Task Force recommends that each school build from this foundation of skills objectives when deciding what students should learn and be able to demonstrate by the start of the clerkship year.

Each school should choose the methods by which they will teach and assess these objectives. Recommendation #4 of this monograph outlines the various learning opportunities that can be employed, such as direct experiences with patients, simulated settings with standardized patients and/or web-based skill learning resources. Recommendation #5 describes methods for assessing whether the student has met the specific curricular objective. Each of the skills below will require assessment tools that ask the student to demonstrate that they "know how", can "show how" or can "do" (Miller).

Performance standards for student achievement should be established from the beginning of their clinical education period. In general terms, by the end of the preclerkship period students should be at least efficient reporters (Pangaro) and at the advanced beginner level (Dreyfus) for most of the skill objectives listed. While the Task Force gives general guidelines for the expected developmental level in the introduction to most of the Appendices (using the RIME and Dreyfus models), it also encourages each school to establish its own explicit performance standards in these specific domains and at each level of the student's training. Only through repeated practice and assessment throughout the undergraduate medical school experience will basically competent clinicians develop.

The preclerkship student will be well prepared for the clerkships if each of the objectives in the tables below is accomplished. It is the role of the clerkship years, to enable students to advance their proficiency in performing these particular skill objectives as well as to learn and develop new ones. A more thorough list of skill objectives for undergraduate medical education can be found in the initial Clinical Skills Task Force monograph (1).

Finally, these skills are not intended to be taught, learned and assessed within a single course. Rather, their learning should be placed in whatever courses and clinical learning experiences that best integrates them continuously into a developmental clinical skills curriculum.

Appendix 1: Professionalism

The ability to understand the nature of, and demonstrate professional and ethical behavior in, the act of medical care. This includes respect, responsibility and accountability, excellence and scholarship, honor and integrity, altruism, leadership, cultural competency, caring & compassion, and confidentiality.

For each of the professionalism objectives below, students should be at a proficient level by the time they enter the clerkships. Patient experiences in the clerkship will then enable further skill development, such as providing opportunities for students to advocate for the individual needs of the patient.

By the end of the preclerkship curriculum, the student should be able to demonstrate:

*Competency Goals	Skill Objectives
Respect	Define respect Demonstrate respect by exhibiting behaviors such as: 1. Defending patients' dignity by using the patient's proper form of address and by paying attention to the patient's comfort and modesty in every encounter 2. Choosing to appropriately groom and dress oneself whenever working in a professional environment 3. Identifying and supporting all individuals' choices.
Responsibility & Accountability	Define responsibility Define accountability Demonstrate responsibility and accountability by exhibiting behaviors such as: 1. Managing emotions in order to maintain personal control amidst adverse and trying circumstances 2. Recognizing impairments in peers and reporting them to the appropriate entities 3. Intervening on behalf of patients, colleagues, or co-workers when others behave unprofessionally; confronting all unprofessional behavior 4. Attending and being punctual at all required educational sessions
Excellence & Scholarship	Define excellence Define scholarship Demonstrate excellence and scholarship by exhibiting behaviors such as: 1. Choosing to be thorough in all assignments, including reading about patients' problems 2. Recognizing and managing uncertainty 3. Practicing self-reflection as a tool for life-long learning
Honor & Integrity	Define honor Define integrity Demonstrate honor and integrity by exhibiting behaviors such as: 1. Being honest about student identity/role and experience level in all encounters with patients, colleagues and co-workers 2. Recognizing and respecting personal, emotional, and physical boundaries with patients, teachers, and peers 3. Accurately reporting only data that has been personally verified 4. Making appropriate attribution to sources of ideas and data 5. Admitting mistakes and errors 6. Evaluating own performance and being honest about shortcomings
Altruism	Define altruism Demonstrate altruism by exhibiting behaviors such as: 1. Identifying when patients' needs supersede the student's 2. Advocating for the individual patient's needs when they arise 3. Recognizing the social issues that impact the health of patients 4. Know the importance of patient advocacy

Leadership	Define leadership Demonstrate leadership by exhibiting behaviors such as: 1. Sharing responsibility for group learning, feedback, and discussion 2. Supporting colleagues by creating a collegial learning environment 3. Allowing others to demonstrate excellence when appropriate
Cultural Comptency	Demonstrates cultural competency through: 1. the ability to adapt communication style to the patient's language and cultural background 2. the ability to recognize and respond to culturally-based challenges during the clinical encounter
Caring & Compassion	Define caring Define compassion Demonstrates caring and compassion by exhibiting behaviors such as: 1. Expressing sensitivity to others' circumstances such as emotional state, care expectations and socioeconomic perspective 2. Recognizing when to listen, when to talk, and when to be silently present
Confidentiality	Define confidentiality Protect patient confidentiality at all times Demonstrate awareness of mandated privacy regulations, e.g., HIPPA

*Adapted from: [1]Embedding Professionalism in Medical Education: Assessment as a Tool for Implementation. Report from an Invitational Conference Cosponsored by the Association of American Medical Colleges and the National Board of Medical Examiners. © 2002.
[2]University of Washington SOM College Faculty Professionalism Benchmarks – Early Clinical Stage (2007-08) http://courses.washington.edu/icmweb/icm2/benchmarks/. Accessed January 15, 2008.

Appendix 2: Patient Engagement and Communication Skill

The ability to *engage and communicate* with a patient, develop a student-patient relationship, and communicate with others in the professional setting, using interpersonal skills to build relationships for the purposes of information gathering, guidance, education, support and collaboration.

By the end of the preclerkship curriculum, students should be able to demonstrate the skill objectives stated in the table when dealing with patients who are willing, competent, and appropriate at an advanced beginner level. Appropriately engaging patients who are more difficult (e.g. emotionally labile, angry, seductive, severely psychiatrically ill, demented) is a more advanced skill that should be developed during the clerkship and subsequent years.

By the end of the preclerkship period, the student should be able to:

*Competency Goals	Skill Objectives
Build and maintain effective rapport with patients	• Greet the patient warmly • Open the discussion using open-ended questions • Ensure patient readiness, privacy and comfort • Maintain eye contact at comfortable intervals throughout the interview • Maintain open body posture • Use plain language: avoid medical jargon, complex words and compound sentences • Maintain a respectful tone • Listen and observe carefully • Respond appropriately to patients' needs, expectations, and concerns during the interview / encounter • Close the patient encounter appropriately • Effectively elicit questions from the patient if appropriate
Demonstrate patient-centered communication	• Elicit the patient's story without bias • Elicit the patient's entire agenda • Elicit the patient's perspective of his/her health problem(s) • Elicit socio-cultural, economic, and spiritual beliefs that could influence patients' choices and access to care • Elicit physical, psychological, financial, and other quality of life consequences of living with a chronic condition when appropriate • Elicit and validate patient's feelings about his/her illness • Summarize and check for accuracy of content
Communicate with culturally diverse patients	• Give examples of the impact of cultural and language barriers on patient-physician communication • Identify cultural variations in patient's explanatory model of illness • Know when and how to access appropriate interpretation services • Know how to properly use an interpreter
Establish, build, and mainta in proper relationships with patients' families	• Identify situations when a family interview is appropriate • Clarify the identity of visitors in a patient's room • Clarify whether the patient wishes for family members to be present during the interview • Conduct an interview with a patient's family member(s) present • Ask family members to leave the room during sensitive parts of the interview
Establish proper communication and collaboration with others in all professional settings	• Communicate effectively with peers, medical school staff and faculty, and other members of the health care team (nurses, hospital/clinic staff, allied health professionals, etc.)

Appendix 3: Biomedical Knowledge Application Skills

The ability to *apply scientific knowledge and method* to clinical problem solving.

For each of the skill objectives below, students should be at an advanced beginner in the interpreter role by the time they enter the clerkships. At the preclerkship level it is expected that students will learn to apply pathophysiological understanding to common clinical problems utilizing proscribed and independent resources such as textbooks, course materials, web-based resources and the published literature.

By the end of the preclerkship curriculum, every medical student should be able to:

*Competency Goals	Skill Objectives
Interpret items from the patient history	Explain common patient symptoms using an anatomic and/or physiologic approach
Interpret physical findings	Explain normal and common abnormal physical findings using an anatomic and/or physiologic approach
Formulate a relevant patient problem list	Use an anatomic and/or physiologic approach when developing a problem list
Formulate a differential diagnosis	Use an anatomic and/or physiologic approach when formulating a differential diagnosis
Generate and test pathophysiological hypotheses about the nature of patient's problem(s)	Begin to generate hypotheses that explain the nature of the patient's problem(s) and use additional information to test the hypotheses

see also Appendix #9

Appendix 4: History-Taking

The ability to take a clinical history, both focused and comprehensive.

As students develop basic science knowledge and understanding of disease, the process of competent history taking becomes more reasoned. It is expected that students at the preclerkship level will learn to become advanced beginners in the reporter role, gathering accurate information in a systematic fashion. Greater achievement is expected for common and more familiar complaints (e.g. history of upper respiratory infection, bladder infection, cardiac chest pain, conjunctivitis) compared to those of more complex illnesses (e.g. lung abcess, pyelonephritis, thoracic aneurysm, diplopia).

By the end of the preclerkship curriculum the medical student should be able to:

*Competency Goals	Skill Objectives
Gather a relevant patient history systematically	• Gather information in an organized and systematic fashion appropriate to the chief complaint and patient presentation • Obtain an accurate chief complaint from a patient • Thoroughly explore the cardinal elements (location, quality, quantity, setting, aggravating and alleviating factors, and associated manifestations) of the chief complaint(s) • Develop chronologically the history of the present illness • Conduct a thorough review of systems using a prepared list • Obtain an accurate and complete medical history including: ◆ Current health problems with year of diagnosis, status and complications ◆ Past medical, surgical, psychiatric, obstetric/gynecologic (when appropriate) history ◆ Medication list including dose, route and frequency ◆ Complementary and alternative medicine used ◆ Allergies including type of reaction ◆ Immunization history ◆ Birth and developmental history, when appropriate • Obtain a thorough family history from a patient, including age of death of all 1st degree relatives and major illnesses • Obtain a thorough social history including diet/exercise, alcohol, recreational drugs, tobacco, home life, education, occupation/school/daycare, safety (guns, seat belts, smoke alarms) and sexual history • Obtain selected age and gender appropriate health care screening information

Appendix 5: Patient Examination

The ability to perform a mental and physical examination.

The student entering the clerkships should be at least at the advanced beginner level in the reporter role not only in performing the steps of the mental and physical examination, but also in describing and explaining their findings. By the end of the pre-clerkship curriculum, the medical student should be able to perform:

*Competency Goals	Skill Objectives
Body touch and handling	Wash/sanitize hands before and after encounter Touch patient in a gentle manner accommodating to cultural variation in appropriateness of touch
Touch patient in a gentle manner accommodating to cultural variation in appropriateness of touch	Appropriately explain the examination to the patient while doing it
Appropriate draping	Demonstrate proper draping to maintain patient modesty
Examinations	Properly measure blood pressure, pulse and respiratory rate, and obtain height and weight to plot on growth chart, when appropriate, and calculate BMI
	Describes key features of the general appearance using specific terms including any apparent distress
	Perform head exam including eyes, ears, nose, and oral pharynx
	Properly identify and measure the jugular venous pulsation Describe jugular venous pattern and changes with respiratory cycle Describe location and intensity of carotid artery pulsation Auscultate and describe bruits Describe location and intensity of peripheral artery pulsations Know the importance of palpating for differences between pulsations
	Palpate and describe thyroid cartilage and gland, cricothyroid membrane, cricoid cartilage, and trachea
	Palpate and describe regional lymph nodes
	Assess for neck range of motion and nuchal rigidity
	Systematically inspect, percuss and auscultate lungs Identify and describe normal and abnormal breath sounds
	Inspect and palpate the precordium Palpate and describe the PMI Describe cardiac rhythm and rate
	Auscultate the heart in the standard locations Demonstrate distinguishing auscultatory use of the diaphragm and bell Describe S1 and S2 with respect to intensity and splitting Demonstrate expected location of an S3 or S4 Describe location, timing and intensity of common systolic and diastolic heart murmurs

	Describe abdominal findings Perform light and deep palpation Demonstrate tests for peritoneal irritation
	Describe the liver span Palpate for liver and spleen Show how to detect ascites Show how to detect hernias
	Identify secondary sexual characteristics, including sexual maturity rating Perform testicular exam and describe examination process and findings
	Perform pelvic and breast exam and describe examination process and findings
	Perform rectal exam, including prostate, and describe examination process and findings

	Perform skin exam and describe findings using standard terminology
	Describe presence or absence of peripheral edema Distinguish between pitting and nonpitting edema
	Perform and describe systematic examination of major joints including inspection, palpation, range of motion, and identification of important anatomical landmarks
	Perform neurologic exam including cranial nerves, sensation modalities, reflexes, motor strength, cerebellar and autonomic function Knows how to differentiate between upper and lower motor neuron lesions
	Determine visual field and acuity, extraocular range of motion Perform ophthalmoscopic examination and describe observations
	Perform basic otoscopic examination and describe observations
Performs mental status exam	Perform mental status exam including mood (anxiety, depression), affect, judgment, behavior, thought content (suicidality, homicidality, hallucination, delusion, etc.) thought process, and cognitive assessment Examine and interpret levels of consciousness
	Identify psychiatric mental states including anxiety, depression, suicidal risk, hallucination, delusion and potential for violent behavior

Appendix 6: Clinical Testing

The ability to select, justify and interpret selected clinical tests and imaging

Generally, the preclerkship student should perform the following skill objectives at an advanced beginner or proficient level in the interpreter role.

By the end of the preclerkship curriculum, the medical student should be able to:

*Competency Goals	Skill Objectives
Select & justify clinical testing	Describes the components and clinical relevance of the following basic tests: • complete blood count and differential, • electrolyte panel • renal function tests • liver function tests • calcium & phosphorous • pancreatic enzyme tests • clotting function tests • thyroid function tests • lipid profile • cardiac enzyme panel Demonstrates proper use of test ordering in common case-based scenarios
Interpret selected clinical tests and imaging	Uses acceptable references to determine whether the results are normal or abnormal Identifies common disorders that are associated with abnormalities in these tests using references. Identifies the components of routine urinalysis and lists normal findings Describes normal and selected abnormal finding on a blood smear Describes observations of a specimen gram stain Interpret pulse oximetry Interpret a normal electrocardiogram (rate, rhythm, intervals, axes and wave forms) Demonstrate an organized approach to interpreting: • a normal chest xray • an abdominal xray including identification of normal bony, soft tissue and solid organ structures • normal limb xrays

Appendix 7: Clinical Procedures

The ability to understand and perform a variety of basic clinical procedures.

Achieving an advanced beginner level in the performance of basic procedural skills can be achieved initially in simulated settings, followed by experiences in the clinical setting. The added benefit of an actual clinical setting is that it allows for procedure performance within clinical context including observation of student professionalism, and their ability to communicate with and provide comfort for the patient. Learning to perform basic and common clinical procedures enables the student not only to better understand and perform selected procedures, but also to begin to develop confidence and competence at a more advanced level of patient-clinician interaction (27).

The following is the foundation list of basic clinical procedures for the preclerkship student. Each school is encouraged to consider adding to this list from the comprehensive list found in the appendix of Recommendations for Clinical Skills Education in the Undergrduate Medical Curriculum (1).

By the end of the preclerkship curriculum, the medical student should be able to:

*Competency Goals	Skill Objectives
Maintain aseptic technique	Demonstrates strict adherence to aseptic technique in selected settings: • Bedside procedures • Outpatient procedures • Preparation for participation in surgery
Correctly perform a Venipuncture	• Insert needle at proper angle • Withdraw appropriate amount of blood • Withdraw needle and checks for bleeding • Dress area appropriately • Dispose of neddle appropriately
Correctly perform an electrocardiogram	• position patient or model • place leads • Use machine correctly • Obtain ECG tracing
Correctly perform stool guaiac testing	• Obtain appropriate supplies • Perform rectal exam • place specimen on guaiac card • identify positive or negative test
Correctly adhere to universal precaution technique	• dispose of biohazards and sharps • use gowns, gloves, appropriate masks, and safety goggles when indicated
Correctly perform wet mount and KOH prep	• obtain the specimen • place and prepare specimen on slide • perform microscopic examination
Correctly perform pap smear	• position the patient or model • insert the speculum and identifies the cervix • demonstrate the proper technique for obtaining the specimen

Correctly obtain a clean catch urine	• The student explains proper technique for obtaining a clean catch urine to a patient that results in observed uncontaminated urine analysis specimen
Correctly perform subcutaneous and intramuscular injection	• Maintains aseptic technique, the proper angle and depth of needle insertion. Performs the process of injection, and proper disposal of the needle.
Correctly perform bacterial culture technique	• Demonstrates proper specimen technique (e.g., swab, aspiration) • Demonstrates proper selection of specimen container • Demonstrates proper specimen deposition technique • Demonstrates proper specimen labeling

Appendix 8: Clinical Information Management

The ability to record, present, research, critique and manage clinical information. Recording and presenting patient information is a core preclerkship competency that students should be able to demonstrate at least at the advanced beginner level. The other information management skills in the table should be developed to a similar extent in order to prepare the student for direct patient care experiences.

By the end of the preclerkship curriculum, the medical student should be able to:

*Competency Goals	Skill Objectives
Record clinical information	• Records pertinent clinical information accurately, chronologically, comprehensively, and free of extraneous information • Uses standard format for documenting problem-oriented visits, comprehensive examinations and visits for chronic health issues (e.g. SOAP notes, full admission H & P)
Present clinical information	• Communicates oral case presentations accurately, chronologically, comprehensively, and free of extraneous information • Uses a standard format for presenting problem-oriented visits, comprehensive examinations and visits for chronic health issues both with and without direct reference to written notes
Appropriately research medical literature	• Uses reliable information sources to enhance knowledge about a patient's health issues, evaluation and treatment options and/or prognosis.
Appraise and critique medical literature	• Knows the steps to appropriately appraise the medical literature • Explains essential terms and principles of epidemiology and biostatistics (e.g. prevalence, incidence, risk ratio, sensitivity, specificity)
Manage clinical information	• Demonstrates how to obtain patient information from the medical record including common medical record resources • Demonstrates ability to search, review and interact with an electronic medical record

Appendix 9. Diagnosis

The ability to diagnose and explain clinical problems in terms of pathogenesis, to develop basic differential diagnosis, and to learn and demonstrate clinical reasoning and problem identification.

The ability to formulate a differential diagnosis based on the information obtained from a patient's history and physical exam is a basic skill that encompasses a range of associated skills such as those addressed in Appendix 3. In addition to developing the student's ability to understand generally the pathophysiological mechanisms of disease (competency #3), the preclerkship curriculum should introduce them to the skill of applying differential diagnosis formulation and prioritization to the care of an individual patient. Through practice and feedback involving students' interactions with case studies, standardized patients and actual patients, students should acquire advanced beginner interpreter ability in these skills prior to the start of the clerkship experience.

In teaching these skills to the preclerkship student in the simulated or clinical context, clinical conditions should be selected that represent those with which the student may already have some familiarity such as common conditions in children and adolescents, commonly self-managed illnesses (infections, athletic injuries and trauma, behavioral concerns, personal stresses), and conditions that are commonly appreciated in the community setting (e.g., pneumonia, diabetes, obesity, epidemic infections, arthritis, migraine headache).

By the end of the preclerkship curriculum, the medical student should be able to:

*Competency Goals	Skill Objectives
Formulate a differential diagnosis	Use an anatomic and/or physiologic approach, with the support of references, to list possible diagnoses that explain common problems identified by a patient's presenting symptoms
	Use information obtained in the history and physical examination, biomedical knowledge and references to weigh competing possibilities for common diagnoses and attempt to prioritize differential diagnosis alternatives, providing some justification for the order of priority
Create a relevant and comprehensive patient problem list	Use an anatomic and/or physiologic approach to develop a complete patient problem list that incorporates information obtained from the patient's history; physical examination, medical record, and ancillary studies such as tests, imaging and procedures.

Appendix 10. Clinical Intervention

The ability to understand and select clinical interventions in the natural history of disease, including basic preventive, curative and palliative strategies.

Students entering clerkships should have advanced beginner reporter and interpreter skills in considering how to identify and select interventions that favorably alter the natural history of common diseases (see Appendix #9). They should also achieve advanced beginner manager skills in discussing common preventive, curative and palliative strategies.

By the end of the preclerkship curriculum, the medical student should be able to:

*Competency Goals	Skill Objectives
Understand and apply preventative, curative, and palliative strategies for common diseases	Describe the natural history of common diseases Identify preventive, curative, and palliative strategies for selected common conditions Demonstrate through case discussion and clinical study the potential impact of selected interventions upon the natural history of common diseases
	Apply and explain common clinical intervention methods: • Preventive ◆ Vaccination ◆ Lifestyle alterations • Curative ◆ Medication ◆ Surgery ◆ Natural healing • Palliative ◆ Medication ◆ Family and community support ◆ Healthcare resources

Appendix 11: Prognosis

The ability to understand and formulate a prognosis about the future events of an individual's health and illness based upon an understanding of the patient, the natural history of disease, and upon known intervention alternatives.

The ability to prognose the future of an illness or the health of an individual is one of the main reasons patients seek clinical care. Accurate formulation of a prognosis guides consideration of interventional choices, patient's personal healthcare decision-making, utilization of appropriate healthcare resources, clinical risk-benefit analysis, and planning for future and follow-up healthcare needs.

For each of the example skill objectives below, students should demonstrate an advanced beginner level in the interpreter role by the time they enter the clerkships. Direct patient care experiences will further a deeper understanding and skill in formulating clinical prognoses.

By the end of the preclerkship curriculum, the student should be able to:

*Competency Goals	Skill Objectives
Understand the importance of formulating and communicating a prognosis	• List the reasons for communicating a prognosis to the patient and family and to members of the health care team
Formulate realistic prognoses for common diseases	• Describe potential illness outcomes for common diseases. • Identify prognostic indicators for common diseases • Practice prognosis formulation utilizing prepared case-based scenarios and actual patient care experiences for selected common clinical conditions

Appendix 12: Personalizing Clinical Care

The ability to provide clinical care within the practical context of a patient's age, gender, personal preferences, family, health literacy, culture, religious perspective, and their economic circumstances. This competency goal also includes consideration of relevant ethical, moral and legal perspectives including patient advocacy and public health concerns, and as well as the resources and limitations of the healthcare system.

In providing personal care to an individual patient, the physician must adapt specific care management elements not only to the biomedical circumstances of the person's condition but also to the patient's personal desires and available resources within the capability of the patient, their family, the healthcare system, and society.

For each of the contextual competency goal categories below, students should be competent in the interpreter role with their knowledge base so that they can learn how to apply these perspectives at the beginning manager level during the clerkship year. Sample skill objectives suggest how students may demonstrate a practical understanding of how each of these perspectives contributes to the quality and effectiveness of clinical method (knows and knows how).

By the end of the preclerkship period, the student should be able to demonstrate a practical understanding of:

*Competency Goals	Skill Objectives
Age	Communicate, develop a relationship with and take a clinical history from a child; a parent, an adolescent; an adult; an elderly patient
Gender	Communicate with both male and female patients; Demonstrate the ability to appropriately apply knowledge of selected gender-specific health risks to the care of a patient
Personal Preferences	Communicate with a patient: 1. in a manner which elicits selected personal health preferences (e.g., religious preferences, DNR, end of life care); 2. in a manner which elicits patient understanding of selected disease or health risk (e.g., smoking, alcohol or substance abuse, sexual practice)
Culture	Demonstrate the ability to communicate through an interpreter; access and apply information regarding selected social, cultural and ethnic practices
Health Literacy	Knows how to identify literary needs Knows how to facilitate teach-back from patient
Personal economic status	Elicit a personal economic history; Communicate with a patient about their personal economic circumstance; Interpret administrative information in the medical record pertaining to the patients pay status
Family	Knows how to document communication from a family encounter; Knows how to appropriately adhere to age-related patient confidentiality rules Knows how to determine and apply health care proxy information
Healthcare system resources	Knows how to access selected health care costs (drugs, tests, procedures, hospitalization); Knows how to access pharmaceutical formularies Knows how to identify healthcare resources in selected cases for the purpose of information gathering, referral and care follow-up

Ethical system	Knows how to identify common and selected case-based ethical conflicts in health care delivery including those inherent in the patient-student and patient-physician relationship
Legal constraints	Can apply HIPPA regulations in selected case-based circumstances; Can apply health care proxy regulations in selected case-based circumstances
Public health advocacy	Knows how to access public health disease reporting information; Knows about how to properly report selected conditions to the public health system;
Patient advocacy	Knows how to advocate for patient's optimal health and healthcare through selective involvement in related clinical care and healthsystem activities

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