I. Historical roots of medical education system
   a. Apprenticeships
   b. The rise of scientific medicine
   c. Hospital as laboratory for training doctors
   d. Classic 2+2 curriculum, followed by one year of internship
   e. Growing specialization and increase in postgraduate (residency training)

II. Requirements for Medical Licensure

The US medical education system can be seen as the model from which most Western medical education has emerged, however, there are many unique characteristics of the US system that differentiate it from medical education systems around the world. Most obvious is the general requirement for four years of College education prior to medical school. Most programs of medical education internationally begin after the equivalent of our high school and proceed for six to seven years, culminating in the in the MD degree. Of the 126 US medical schools, there exists only a couple of dozen who follow this combined B.A./M.D. degree format.

The source of the US requirement of a premedical college degree derives not only from the historical developments outlined above, but also from our American belief that a broad, liberal education will be of some benefit to individuals regardless of their profession. While this theory remains unproved, the education structure of College prior to graduate school is heavily ingrained into our culture, and not likely to be altered in the near future. The additional benefit of undergraduate training is that medical schools can insist on a series of premedical requirements for matriculation. So while formal medical education does not begin until medical school, foundational training in science begins many years prior.
Because admission requirements to the US medical schools are so stringent, on average 98% of all students admitted to medical school in the US graduate with the M.D. degree. In spite of our recent small decline in the number of students applying to medical school, only 50% of applicants are offered positions in US schools. (Ref JAMA Sept 2003) but graduation with the M.D. degree does not also confer the M.D. license. The licensing process occurs at the state (not national) level, and involves a combination of graduation from a school accredited by the national certification board, successful completion of a national exam, and a minimum of one year of supervised medical training beyond medical school. (See Figure 1) While the certification of schools and residency programs and the examination process are identical across the US, the actual license to practice medicine is provided by each state medical board. In the past, this led to substantial differences in state-level course and exam requirements, but with the uniformity of expectations for healthcare nationally, and the cooperation of the state medical boards and the national medical licensing examination board, these differences, in recent years, have become negligible.

The process of becoming a physician begins with acceptance to one of the 126 medical schools accredited by the liaison committee for medical education (L. C. M. E.). (See table one) The L. C. M. E. is an organization comprised of members nominated by the American Medical Association (A. M. A.), the Association of American Medical Colleges (A. A. M. C.), and public and medical student members nominated by these two organizations. This self regulatory structure is characteristic of the oversight of medicine, since, as a profession, it has long been recognized that only physicians can regulate other physicians’ training and practice quality. The L. C. M. E. has been designated by the US Department of Education has the sole source for certifying medical school quality in US. This certification brings with it not only the ability for students to apply for government-sponsored education loans, but also the recognition of state licensing boards that graduation from one of these certifying schools brings with it a minimum level of quality comparable from one school to another.

Graduation from one of these schools is necessary, but not sufficient, for application to a state medical board. All states now require successful completion of the US Medical Licensing Examination (USMLE). This examination is given in three parts, usually after the 2nd year of medical school, during the 4th year of medical school, and during the first year of residency. Part I of the USMLE is designed to determine whether students have a firm understanding of the basic science foundational to the practice of medicine. Part II is designed to evaluate the students’ ability to manage patients under supervision. Part III is designed to determine if resident physicians can manage a wide array of medical conditions independent of supervision. All three parts of this examination are graded on a pass/fail basis. Numerical scores are often used by residency programs to select the students with the largest knowledge-base, but only the passing score is required for a medical license.

For students hoping to be physicians who enroll in medical schools outside the United States, and they must submit their credentials to the examination commission for foreign
medical graduates (E. C. F. M. G.). The ECFMG was developed, in part, by the state medical boards, who lack the capacity to identify and evaluate the quality of medical graduates arriving in US from around the globe. As with the LCME, the ECFMG has a set of directors nominated from physician organizations. For non-US graduates to become practicing doctors in the United States, they must have attended a medical school recognized by the World Health Organization/ECFMG. This does not imply that the WHO or ECFMG actually certifies schools. Rather, they rely primarily on lists of schools and their curriculum submitted either by the school itself, or the governmental Ministry of Health. Upon verification that the student actually graduated from one of these schools, the student may apply for examination from the ECFMG. That process requires two steps uniquely different from the US medical student examination process. First, these individuals must pass an English language proficiency examination (TOEFL), and second, they must pass a clinical skills examination, in which they are required to interview and examine a series of standardized patients while being evaluated for competencies including communication skills, diagnostic skills, and physical examination skills.1

Upon successful completion of the ECFMG process (or graduation from a US medical school and passing the USMLE), all students must successfully complete at least one year of post-graduate training. As with medical schools, post-graduate training sites are monitored and regulated by a physician-run supervisory organization, the Accreditation Council for Graduate Medical Education (ACGME). The mandate for this organization comes from both the states (who recognize only those programs certified by the ACGME for new physician license applications), and from the federal government. Federal Medicare and Medicaid legislation allows for a supplemental payment to educational programs certified by the ACGME to account for the added cost of caring for patients in educational settings. (Knapp Acad med 2002) This federal funding has been cited as one of the leading causes of both the increase in the amount of post-graduate training for US physicians. It has also assured that elder and indigent care can be provided at high quality academic institutions despite the financial dis-incentives for charity care in the private practice setting.

After the usual four years of college, four years of medical school, one year of post-graduate training, and a three-stage national examination, individuals can apply to individual states for licensure. While most countries have a national physician license, the US continues this state-level process. This has allowed, in the past, some unscrupulous physicians whose licenses have been revoked in one state to apply for licensure in another. Such activity has led the U.S. Congress to pass Public Law 99-660, The Health Care Quality Improvement Act of 1986 (HCQIA), which led to the establishment of the National Practitioner Data Bank (NPDB). Licensure actions are submitted to this national data bank, so that prior to licensure (and license renewal), state medical boards can query the system to ensure that physicians have not been sanctioned.

1 Beginning in June, 2004, US medical students will also be required to successfully complete this clinical skills examination as part of the US Medical Licensing Process.
elsewhere. After verification of examinations, credentials, a query to the NPDB, and the usual licensing fees, a physician is licensed to practice medicine.

Although many physicians still practice with only an MD degree and one or two years of post graduate training, there are only very few graduates in the past 20 years who stop training at this point. Most proceed to further training in their specialty for three to seven years, to become “eligible” from a specialty board to take a “specialty examination.” There are currently about 50 different specialties recognized in the US. These specialty boards work under the umbrella of the ACGME, and certify each residency program as qualified to educate residents. Graduates of these programs are identified as “board-eligible.” If they subsequently complete a series of specialty examinations, these individuals are identified as “board certified,” the highest degree of recognition for medical expertise in the US. Physicians today complete this certification not only to garner the confidence of patients and secure hospital privileges, but also because, in recent years, managed care organizations have used this certification as an indication of physician quality, and, in some cases, refuse to include physician names in preferred provider listings without such certification. In addition, most specialty certificates are now time-limited, such that physicians must be re-examined periodically to retain the specialty certification.

This rich network of self-regulation, state certification, national examination and oversight, and commercial incentives has led to the assurance of high quality medical care in the US. Though the costs in terms of time spent by young physicians in training, the expense of education (the average US medical student debt is over $100,000)\(^2\), and the cost of care (with the US as a significant international outlier), the overall quality of physicians, and the ability of the profession to demonstrate that quality, is rarely questioned.

### III. How physicians learn medicine

**Pre-clinical education**

Most 4-year US medical schools require a college degree, and the successful completion of pre-medical courses including biology, chemistry, physics, biochemistry, and calculus. While many applicants will have majors in the sciences, medical schools now often encourage applications from students with degrees in the social sciences and liberal arts. Well-rounded students, with a broad range of knowledge and experience, as well as excellent communication skills, are ideal candidates in the view of admissions committees. Of course, all students are expected to excel on the Medical College Admissions Examination (MCAT), and scores from this examination have been shown to predict successful completion of school examinations and the national USMLE\(^3\).

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\(^2\) JAMA Sept 2003 Danoff

The goals of medical education have been outlined in a series of reports from the Association of American Medical Colleges (See Table 2). Because the nature of disease and the evidence for effective treatments are widely recognized, such lists, even when developed to represent the core of medical knowledge for medical schools around the globe\footnote{IIME Reference} are remarkably similar in content. These domains of competence usually include the domains of excellence in knowledge, communication skills, technical skills (examination, procedures), professional behavior, self-improvement, and information management.

Despite this similarity in the content of medical education, the process of education varies widely from school to school. The “classic” form of medical education, which derives from the Flexnerian view of medical training is the “2+2” curriculum, with two years of basic science education, followed by two years of clinical education. The basic science education comes in the form of lectures – five or six days each week in the mornings, followed by laboratory work in the afternoons. Courses are taught by disciplinary faculty, with each discipline responsible for a final grade in their area of expertise. Courses in anatomy, biochemistry, physiology, pathology, and pharmacology are emblematic. While no medical school still follows this rigid structure, remnants of this framework remain in most.

One of the earliest variations on this teaching structure is the move from discipline-based courses to organ-based courses. In an attempt to better apply the basic sciences to the practice of medicine, Case Western Reserve University Medical School structured courses around a single organ – with many disciplines teaching an element of their curriculum relevant to that organ. For example, students might spend an entire month studying the heart – its anatomy, physiology, pathology, and treatment for conditions of cardiac dysfunction.

In the mid-1970s, in part with reference to the process of legal education, McMaster University, the University of New Mexico, and Michigan State University converted their educational process to a case-based education, now known as “Problem-based learning.” Student groups, facilitated by faculty, are given a patient case to solve. In the process of coming to a solution, they generate a series of questions to which they must find the answer. For example, in a case of heart failure, the students realize they must learn the anatomy of the heart. They divide up assignments in the group, disperse to investigate answers, and return to the group to present their responses, with faculty assistance. This “pure” form of problem-based education exists at very few medical schools, but many have used adaptations of this format to enrich small group experiences, and engage students in self-directed learning.

A recent variation on this theme of student-directed learning comes from the University of Dundee, Scotland, where students are provided a large set of learning objectives. The role of faculty is to provide students with the opportunities to learn, but students can
educate themselves using many available means, including textbooks, online education, small groups, and lectures. Student performance is measured on examinations, and student promotion is based upon successful completion (and evidence of competence) on the prescribed learning objectives.

Very few medical schools work strictly within one of these pedagogical domains. Most are hybrids, including lectures, small group experiences, and case or organ-based curricula. With no evidence available to prove a difference in quality of students based on curricular format, none appears currently as the dominant method. Market forces, and some pressure from the AAMC, have ensured that pure lecture instruction is kept at a minimum in most schools.

The introduction of clinical experience

Although there is great variety in the form of preclinical medical education, recent years have seen greater uniformity in the introduction of clinical (patient care) experiences. Most schools now begin (on the first day or in the first few months) with an experience involving patients in their homes, at work, or in community settings. Students usually engage at this point in “health fair” type activities, including blood pressure monitoring and basic health promotion advice. After a brief introduction on how to interview patients, some schools send students to senior centers, and other sites to practice talking with individuals about health problems.

Since communication skills are fundamental to the good practice of medicine, an increasing amount of time is dedicated to communication skills in the modern medical school curriculum. Starting with relatively unstructured “conversations” with individuals in the community, these experiences rapidly move to teaching students how to obtain the complete medical history from patients in acute care settings.

Practice sessions for “real-world” experiences are increasingly common, with the use of “standardized patients.” The technology of standardized patients was developed in the mid-1970s in response to an assessment problem. Faculty often used the oral examination as a method for evaluating student performance. A student would interview and examine a patient in the presence of a faculty physician, and the faculty would then query the student about the reasons for asking the patient certain questions, the findings on examination, and the nature of the disease diagnosed in the case. The flaws in this testing method generally fall in two categories: variability in the patient case, and variability in the examiner. To minimize one source of error, individuals were trained to “portray” a case in a very standardized fashion – always responding in the same manner to the same question, with the same physical complaints, and body language throughout the interview. While this technology has made the assessment of clinical skills much more reliable, it has also provided an excellent opportunity for students to practice communication and examination skills in a controlled setting prior to examining real patients with real conditions. Most medical schools have some standardized patient experiences for students, either as an educational or as an assessment program.
Through the first two years of medical school, students are required to practice interviews and examinations on gradually more patients, in more realistic contexts. Each examination is either observed by a faculty member, or the written form of the history and physical examination is reviewed for accuracy and level of detail. Ultimately, as students prepare to complete the pre-clinical years of medical training, they are expected to make a relatively smooth transition from mostly classroom work to mostly hospital and clinic-based work.

Clinical Medical Education

While some medical schools have condensed the pre-clinical phase of medical education to 18 or even 12 months, most continue to follow the “2+2” curricular structure. At the beginning of the 3rd year, students make the transition to full-time clinical care, under the supervision of individual clinical departments. Students rotate through a series of required “clerkships” in internal medicine, surgery, pediatrics, Obstetrics and gynecology, and psychiatry. Most schools also have required clerkships in neurology, family medicine, and emergency medicine. These rotations are usually 1-3 months in length, and may involve experiences at a single hospital or outpatient clinic for many weeks at a time, engaged in clinical care as the most junior member of the health care team. Unlike pre-clinical education, the process of clinical education is nearly identical at every western-style medical school around the globe. The first year of these experiences is usually spent in a series of required clerkships, and the second is spent in a series of electives or “selectives,” where students must select from a limited set of options (e.g., choose one Intensive care unit rotation, one outpatient care rotation).

The daily life of a clinical clerk begins with assignment to a specific patient or set of patients, usually limited to no more than 2-4 at a time. The student is expected to obtain a full medical history, perform a complete examination, and report these findings, and possible diagnoses and treatment plans, to the healthcare team. The team itself consists (in the hospital setting) of an attending (faculty) physician, a senior resident, a junior resident, and additional health-care personnel depending on the setting (nurses, respiratory therapists, etc.). The student is expected to obtain the most detailed and complete information from the patient, and is seen as the primary contact between the patient and the healthcare team. While the students is not ultimately accountable for healthcare, they spend more time with patients than any other healthcare team member, and often form a close bond with patients under their care.

After presenting the patient case to the faculty or resident physicians, the student is expected to propose a set of diagnoses and treatment options. In this setting, the faculty and residents will often quiz students, in Socratic fashion, about the rationale for their ideas, their understanding of the underlying disease, and their choices for treatment. When many students are present (the majority of the time), any student in the group is fair game for these questions, and it is common for faculty to take a single case presented by one student, and use it as the medium for a broader inquiry of the entire group about a specific medical condition afflicting this patient. At times, this conversation happens at
the bedside of the patient or in the hallway. Some faculty prefer to move the conversation to small ward-based conference rooms, where short structured didactic lectures on a topic may have been prepared.

Ultimately, the plan of care for the patient is decided by the resident and faculty physicians, but with good students, the team simply agrees with the plan laid out by the students in their presentations. Students have no authority to order hospital activity or prescriptions, but are encouraged to write these orders or prescriptions, which residents and faculty then review, and a system of co-signature provides the assurance that an accountable individual agrees with the plan of action. Students, in these settings, are physically performing all the activities of patient care (examination, diagnosis, treatment), but under very strict supervision. No action of a medical student leads to changes in patient care plans without the signature and authorization of a licensed physician.

Each clerkship has both clinical care activity and didactic components. Advanced lectures on disciplinary topics relevant to patient care are often a daily occurrence, taking from one to four hours of each day. Along with patient care expectations, these lectures constitute the “formal curriculum” of clinical training. Much of the experience, however, is informal in nature – happening not during any pre-determined curricular time, but, instead, during meals, in the hallways, and late in the evenings when students and resident physicians are living and working in close proximity for long hours over many days. While much of the knowledge and skills of medicine is learned in the formal time of the curriculum, the professional behaviors (and lack thereof) are predominantly taught in this informal, or “hidden” curriculum. Through jokes, anecdotes, and informal conversation, the values of being a physician, or of being a particular specialist, are evoked and reinforced. In a form of cultural transmission, students learn not only to think like doctors, but also (for better or worse) to act like doctors.

Clinical Education for Residents

Residency (post-graduate) education begins upon graduation from medical school. While resident physicians are often licensed physicians, they have not yet completed their training, and remain under the supervision of individual faculty physicians. Residents can order and prescribe treatments for patients, without the co-signature of faculty – so their decisions can go unsupervised for a period of hours before a faculty member reviews the case. In most settings, all critical decisions (intensive care unit, emergency department, operating rooms) are staffed with faculty present, so there is no delay between resident decision and faculty review. In other less acute settings, or with minor decisions, the review is frequently delayed for hours – up to a day. As residents gain more experience, and prove their abilities, they are provided more flexibility and more responsibility.

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5 Stern, Hafferty
6 Stern Stanford
The content of residency education varies widely, as these medical school graduates have now entered specialty training in areas as divergent as radiology, pediatrics, and surgery. There are, however, core competencies expected of all residents, regardless of specialty, outlined by the Accreditation Council for Graduate Medical Education (See Table 3). In addition to these general competencies, specific outcomes are expected by each of the approximately fifty approved residency programs. Most also have procedural requirements for individual residents to have successfully, and independently (under supervision) completed a set of procedures ranging from minor (e.g., placement of feeding tubes) to major (e.g., hip replacement surgery). Residency programs range from 3 to 7 years to account for the varying time required to achieve competence in each specialty. Upon completion of post-graduate training, these individuals (after 23-30 years of education from primary school through residency) are allowed to practice independently.

**Education in the Setting of Patient Care**

From the above discussion, a general outline of increased responsibility for patient care is seen to follow with a decrease in direct oversight. Medical students begin their careers interviewing patients who are well, and for whom no interventions are required. In subsequent years, they examine and plan treatments for ill patients, but make no decisions without authorization of licensed physicians. In the residency years, they are given increasing latitude in their care of patients, still ultimately under the supervision of faculty. First year residents usually report to both a senior resident and a faculty member, more senior residents supervise teams of junior doctors, and report only to the faculty physician.

This practice of having junior doctors in training work with ill patients leads to natural potential conflicts between our desire to provide optimal care and our desire to train high quality students. This is a daily balancing act performed by faculty and residents, with clear limits for risky procedures (certain procedures only performed by faculty and the most senior residents). Less risky procedures (drawing blood, placing an intravenous catheter) are often the subject of negotiation between patients and student doctors. Most patients allow student to engage in care with limits on participation – letting a medical student try one or two times to draw blood before insisting on a more experienced phlebotomist.

So why do patients choose to participate in this education process? For some, there is little choice. Indigent care is often only available at academic healthcare centers, and students are an integral part of these centers. Patients are initially met by student doctors, who request their participation, and faculty encourage patients to be seen first by the students, then by more senior physicians. Similarly, these academic healthcare centers are often the only place for certain highly specialized services (e.g., transplantation, experimental chemotherapy), and students again are necessarily part of that environment.
In recent years, there has been growing evidence that academic medical centers actually provide higher quality care. Arguments for participation in academic healthcare have included the fact that each patient has 3-5 physicians, rather than one, decreasing the risk for error, and increasing the likelihood that an accurate diagnosis will be found. In addition, students and residents have more available time, and patients feel that the system as a whole is more open and responsive when students spend this extra time. Many believe in medical education itself, and view themselves as participants in a process of medical education that will benefit future patients. This theme is particularly common among patients with terminal illness, who often agree to work with medical students as an altruistic gift to future patients who might suffer from a similar disease.

The Veterans Affairs Medical Centers play a central role in US medical education. Many of them are closely affiliated (and physically proximate) to university medical centers. In cost-sharing agreements, the VA medical centers support the salaries of some academic faculty and residents in return for having these individuals provide care in the VA system. A common arrangement is for an academic physician expert to have clinics at both the university and VA hospitals, providing a uniformly high quality of care at both sites. Along with the provision of care, medical students and residents learn from faculty and patients in these hospitals. As the largest health provision and health insurance organization in the US, the VA health care system provides free or low cost care to eligible Veterans. These individuals are, in general, enormously generous with a personal experience of sacrifice for the good of others. They freely engage in the educational process as another benefit to society at large.

IV. Evaluation of Clinical Competence

For the purposes of evaluation, competency to practice medicine can be divided into knowledge, skills, and professional behaviors. At the same time that medical educators have developed a clear set of expected outcomes in education, they have also developed a clear set of measures with which to document those outcomes. Knowledge of the science of medicine is fundamental to the practice of medicine, and over the past 30 years, the reliable and valid measure of knowledge has been perfected. Reliability, in this context, refers to the degree to which one measurement of knowledge can be expected to be duplicated exactly upon the next measure of knowledge. Validity refers to the degree to which the assessment actually measures the domain of interest. One can easily imagine a highly reliable measure (What is the sum of 3 + 3) that is an invalid measure of ones ability to solve a problem in geometry.

Testing for knowledge in medicine has become both reliable and valid through an intensive program, directed primarily by the National Board of Medical Examiners to

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7 JAMA/NEJM refs
8 Refs from Fletcher
9 VA/AM relationships from acad med
10 JAMA Hundert
11 Case/Swanson Book
generate questions built in the context of clinical cases, and without many of the biasing effects of specific question types and question formats. The reliability and validity of these examinations have been demonstrated in research\textsuperscript{12}, and buttressed by general acceptance of these examinations for use in passing disciplinary courses, conferring the MD degree, and granting state medical licenses. Medical educators have a high degree of confidence that those students who perform well on these written examinations have the knowledge base necessary to practice medicine.

A foundation of knowledge, however, is not sufficient for the high quality practice of medicine. For that reason, clinical skills examinations have been developed to measure communication skills, moral reasoning skills, counseling skills, and technical skills (both minor and major procedures). In addition to the standardized patient assessment programs outlined earlier in this manuscript, there are developing programs of surgical skills assessment which ensure that students and residents who perform surgery for the first time have had ample opportunity to practice and prove their competence prior to actual practice.

The assessment issues with clinical skills exams have little to do with validity (as the cases presented are patterned precisely after real clinical scenarios). More challenging is ensuring that the sample of cases is representative of the domain of interest, and that the measures have a high degree of reliability. Because of differences in student familiarity and experience with specific topics, clinical skills examinations are known to be highly case-dependent. For that reason, no fewer than 12–15 clinical skills content cases are used for high stakes examinations\textsuperscript{13}.

The measurement of professional behaviors is one of the greatest challenges in medical education today. Professional behaviors are very difficult to measure with paper-and-pencil tests because of the likelihood that students will respond with socially desirable, as opposed to personally realistic choices. For that reason, the best measures of professional behavior are located in the context of clinical activity, and involve a conflict that must be resolved by the student or resident under supervision\textsuperscript{14}. These events do not naturally occur with great frequency, so systems of evaluation have been developed to describe the professional behaviors of medical students.

The most common form of professionalism evaluation used in clinical education is the faculty performance evaluation. During clinical experiences, faculty observe student performance and rate them on dimensions of professionalism including compassion, respect, inter-professional relationships, and conscientiousness. While valid, these ratings lack reliability for three reasons. First, any single faculty may see only a fraction of all student behavior, in a limited set of contexts. For that reason, most clinical performance evaluations use a combination of at least 6–8 faculty ratings for a more

\textsuperscript{12} Norcini study
\textsuperscript{13} Van der Vleuten, Swanson
\textsuperscript{14} Ginsberg et al.
reliable (stable) measure\textsuperscript{15}. Additional reliability can be achieved through convening meetings of supervisory faculty for the purpose of rating student performance. Second, faculty have a tendency to rate students with greater stringency on knowledge and skills domains, providing higher average scores in domains of professional behavior. This so-called ceiling effect can be minimized through the use of high quality rating scales and education of faculty on how to rate student performance\textsuperscript{16}.

In addition, the performance of an individual student in the setting of a faculty member may be markedly different from their behavior outside of direct supervision. The addition of peer, resident, and nursing ratings of professionalism to the overall picture may provide added validity to these ratings.\textsuperscript{17} Documentation of critical incidents of either outstanding or extremely poor judgment has been used as an additional method with which to indicate levels of student performance on behavioral domains.\textsuperscript{18}

Ultimately, the grading of performance for clinical medical students usually includes data from a number of sources. Knowledge-based multiple choice examinations, pattern-recognition examinations (of radiographs or electrocardiograms), clinical skills examinations (for communication and technical skills), and faculty and resident reported knowledge, skills, and behaviors all culminate in an overall grade for these students in each clerkship. The multi-dimensionality of these assessments makes it challenging to provide a specific ranking of students compared with one another, since one student may excel in one dimension, and not in others – but this process of ranking is rarely needed in a field where excellence is desired, but competence is the essential characteristic. By using multiple raters in multiple settings with a diverse array of measurement instruments, educators have a great deal of confidence about whether students meet a standard for competence in their field.

\textsuperscript{15} Ref Stern/Frohna/Gruppen reliability of faculty performance
\textsuperscript{16} Ref Stern/Frohna Gruppen 5 vs 7 point scale
\textsuperscript{17} Stern multimodal, Woolliscroft, Arnold/Stern
\textsuperscript{18} Papadakis
V. Figure 1. The Paths To Medical Licensure

Graduation from LCME Accredited US School

Graduation from WHO/ECFMG Recognized International Medical School

TOEFL Examination

ECFMG Clinical Skills Examination

US Medical Licensing Examination
Parts I, II, and III*

Completion of 1-2 years of ACGME Accredited Post-graduate (Residency) Education

Application for license and review of National Practitioner Data Bank

State Medical License

Legend:
LCME: Liaison Committee for Medical Education
WHO: World Health Organization
ECFMG: Examination Commission for Foreign Medical Graduates
ACGME: Accreditation Council for Graduate Medical Education
TOEFL: Test of English as a foreign language
* Beginning in June 2004, all US Medical School graduates will also be required to pass the ECFMG Clinical Skills Examination, with a new designation as the US Medical Licensing Examination, Part IIB.
# Table 1. Certification Bodies in US Medical Education

<table>
<thead>
<tr>
<th>Organization</th>
<th>Authority</th>
<th>Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCME (Liaison Committee for Medical Education)</td>
<td>Department of Education. Required for federal student loan programs. Most state medical boards require graduation from LCME certified school to allow individual student licensure.</td>
<td>6 members from the Association of American Medical Colleges 6 members from the American Medical Association 2 Student members (one appointed from each organization) 2 public members (one appointed from each organization)</td>
</tr>
<tr>
<td>ACGME (Accreditation Council for Graduate Medical Education)</td>
<td>Private organization recognized by Medicare/Medicaid in the payment of educational supplements for academic centers providing Medicare/Medicaid service. Recognized by states as the authority for providing guarantee of quality graduate medical education.</td>
<td>4 members from the American Board of Medical Specialties 4 members from the Association of American Medical Colleges 4 members from the Council of Medical Specialty Societies 4 members from the American Hospital Association 3 members from the American Medical Association 3 members from the public 1 member from the Federal Government 1 residency program director 1 Chair of the Residency Review Committee Council</td>
</tr>
<tr>
<td>ECFMG (Examination Commission for Foreign Medical Graduates)</td>
<td>Recognized by state medical boards as the sole source for certification of international medical graduates.</td>
<td>2 members from the American Board of Medical Specialties 2 members from the Association of American Medical College 2 members from the American Medical Association 2 members from the Association for Hospital Medical Education 2 members from the Federation of State Medical Boards 2 members from the National Medical Association 1 President of the ECFMG 7 At-Large members</td>
</tr>
</tbody>
</table>

Sources:
- [www.lcme.org](http://www.lcme.org)
- [www.acgme.org](http://www.acgme.org)
- [www.ecfmg.org](http://www.ecfmg.org)
| Physicians must be Altruistic | ◦ Knowledgeable of theories and principles that govern ethical decision making and major ethical dilemmas in medicine.  
|                           | ◦ Compassionate and respectful for patients privacy and dignity.  
|                           | ◦ Honesty and integrity in all interactions (patients, families, and others).  
|                           | ◦ Understanding and respect for other health care professionals.  
|                           | ◦ Understanding of the threats to medical professionalism posed by the conflicts of interest in the actual practice of medicine.  
|                           | ◦ Capacity to accept limitations and commitment to improve knowledge and abilities.  
| Physicians must be Knowledgable | ◦ Normal structure and function of the body and each of its major organ systems.  
|                           | ◦ Molecular, biochemical, and cellular mechanisms that maintain body’s homeostasis.  
|                           | ◦ The various causes of maladies and the ways in which they operate in the body (pathogenesis).  
|                           | ◦ Knowledge of structure and function (pathology and pathophysiology) of the body and its major organ systems.  
|                           | ◦ An understanding of the need to engage in lifelong learning to stay abreast of relevant scientific advances, especially in the disciplines of genetics and molecular biology.  
| Physicians must be Skillful | ◦ Obtain an accurate medical history.  
|                           | ◦ Perform both a complete and an organ specific examination.  
|                           | ◦ Perform routine technical procedures.  
|                           | ◦ Ability to interpret results of commonly used diagnostics procedures.  

Table 2. AAMC Medical Schools Objectives Project – Characteristics of Medical School Graduates
Ability to reason deductively in solving clinical problems.

Ability to construct appropriate management strategies for acute and chronic conditions...

Ability to recognize emergencies and institute appropriate therapy.

Knowledge about relieving pain and ameliorating suffering of patients.

Ability to communicate effectively, orally and in writing, with patients, relatives, colleagues and others.

Physicians must be Dutiful

Knowledge of the important non-biological determinants of poor health and of the economic, psychosocial, social, and cultural factors that contributes to the development and/or continuation of maladies.

Ability to identify factors that place individuals at risk for disease or injury, to select appropriate tests for early detecting of...

Ability to retrieve, manage and utilize biomedical information for solving problems and making decisions that are relevant to the care of individuals and populations.

Commitment to provide care to patients who are unable to pay and to advocate for access to health for members of underserved populations.

Table 3. Accreditation Council for Graduate Medical Education Competencies

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<thead>
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<tbody>
<tr>
<td>1.</td>
<td><strong>Patient Care</strong> that is compassionate, appropriate, and effective for the</td>
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<td>treatment of health problems and the promotion of health</td>
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<td>2.</td>
<td><strong>Medical Knowledge</strong> about established and evolving biomedical, clinical,</td>
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<td></td>
<td>and cognate (e.g. epidemiological and social-behavioral) sciences and the</td>
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<td></td>
<td>application of this knowledge to patient care</td>
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<td>3.</td>
<td><strong>Practice-Based Learning and Improvement</strong> that involves investigation and</td>
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<td>evaluation of their own patient care, appraisal and assimilation of scientific</td>
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<td></td>
<td>evidence, and improvements in patient care</td>
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<td>4.</td>
<td><strong>Interpersonal and Communication Skills</strong> that result in effective information</td>
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<td>exchange and teaming with patients, their families, and other health professionals</td>
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<td>5.</td>
<td><strong>Professionalism</strong>, as manifested through a commitment to carrying out professional</td>
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<td>responsibilities, adherence to ethical principles, and sensitivity to a diverse</td>
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<td>6.</td>
<td><strong>Systems-Based Practice</strong>, as manifested by actions that demonstrate an awareness</td>
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<td>of and responsiveness to the larger context and system of health care and the</td>
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<td>ability to effectively call on system resources to provide care that is of optimal</td>
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<td>value</td>
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