

Guidebook for Undergraduate Medical Education Administration

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Note from the Editors

Why is this guidebook needed?

Medical education is continuously undergoing dramatic change. Successful undergraduate medical education administrators in the dean's office, basic science departments, and clinical departments must demonstrate multiple areas of expertise that extend their duties beyond scheduling students, student affairs, accreditation, mentoring, and curriculum oversight. As medical education administrators, we recognized the need for a guidebook to share resources across areas of specialty and increase collaboration between undergraduate medical education administration, basic sciences, clinical medicine, graduate medical education, and academic leadership.

How to use this guidebook

The chapters are targeted to medical education administrators new to the individual subject areas. The guidebook starts with a historical overview of allopathic and osteopathic medicine and walks through the services provided by the office of academic affairs, medical education, and the basic science and clinical departments. Each chapter discusses the current trends and considers where medical education is headed. A chapter of acronyms found in medical education is included as a reference guide for the content in the guidebook as well as a reference to general medical education terms and organizations.

While comprehensive, this resource is meant to be used as a guidebook. Each chapter provides references for further reading on the subject matter. The editors recognize that many schools have been innovative in the same or different ways as the ones that have been referenced. The schools and programs mentioned in the guidebook are offered as examples of curriculum; this book is not meant to be a comprehensive list of best practices.

You will not find a chapter on clinical medical education in this guidebook. You will find clinical education content woven into each topic area in the guidebook. While clinical medicine administration is absolutely crucial to medical education, we also felt that this area has been covered in the *Guidebook for Clerkship Administration* published by the Clerkship Directors in Internal Medicine (CDIM) in 2008 as well as the comprehensive *Guidebook for Clerkship Directors* published by the Alliance for Clinical Education in 2012. To learn more about material to be covered in a clinical clerkship, visit the CDIM-Society for General Internal Medicine core medicine clerkship curriculum guide online at:

<http://www.im.org/toolbox/curriculum/Students/Learning/Pages/CDIM-SGIMCoreMedicineClerkshipCurriculum.aspx>

The editors want to express our appreciation to everyone who contributed to this guidebook. In particular, the work of the 10 CDIM administrators who wrote chapters, recruited authors, and described their educational programs was invaluable. This guidebook would not be possible without the support of the Alliance for Academic Internal Medicine and the CDIM Clerkship Administrators group. A special thank you to the reviewers who provided excellent feedback on the content: Erica Brownfield, MD, Arthur Castro, Sara Clemons, Thomas M. DeFer, MD, Eric Goren, MD, Marguerite Infantino, John Myers, MD, and Julie Randall.

Wherever you are in the infrastructure of undergraduate medical education, our hope is that this guidebook will provide practical advice and contribute inspirational ideas to help pave the way for the next generation of physicians.

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Disclaimer – Any reference to a product in this book does not imply any endorsement of the product by the Alliance for Academic Internal Medicine (AAIM), the Clerkship Directors in Internal Medicine (CDIM), the editors, the authors, or their respective institutions. Product references are only included to provide examples of resources and are not meant to be exhaustive lists of available material.

Overview of Allopathic and Osteopathic Undergraduate Medical Education

Medical education is a rapidly changing enterprise composed of two areas: allopathic and osteopathic medicine. However, from the early years of medical education, there has been a large divide between allopathic and osteopathic medicine. To understand the differences, it is important to understand how both fields developed. In this chapter, we highlight the historical evolution of allopathic and osteopathic medical education as well as the current philosophy of medical education, which is focused on scientific curricula and geared toward progressive accumulation of knowledge and skills.

Allopathic Medicine

Allopathic medicine is based on observation and development of theories, followed by experimentation. Science was the foundation of treatment. Observation of how a certain food, therapy, or elixir would affect a disease process would lead to use of that substance for healing.

Traditionally, the route to a doctorate degree (MD) in allopathic medicine was a bachelor's degree, followed by two years of basic medical science, one year of required clinical clerkships and one year of elective clinical clerkships. In an effort to incorporate integrated coursework, flexibility, and allow students greater influence over their learning, many medical schools are developing curriculum models with an 18-month scientific foundation phase that incorporates clinical learning, integrated clinical clerkships, and career exploration phases.

The Historical Development of Allopathic Medicine

Medical education in the United States has evolved significantly over the last three centuries. Early educators and physicians, many of whom were trained in Europe, believed that medicine could be taught by observation and apprenticeship. Over the ensuing 200 years, master educators like Sir William Osler wanted to introduce more emphasis on physiology and pathophysiology as well as the importance of bedside teaching. Most learning experiences came from lectures, observations, and spending time with patients without a framework of a curriculum. It was only after the 1910 *Flexner Report* that the academic community began to understand the need for a more uniform learning experience.

University of Pennsylvania (Penn) then called College of Philadelphia, opened the first medical school during the colonial period in 1765 on the initiative of John Morgan, a young physician who was trained in Europe. The medical students were offered planned lectures with requirements of attendance following completion of courses such as Latin, mathematics, and philosophy. The new Penn model offered a two-year curriculum and included disciplines such as anatomy, botany, chemistry, and essentials of internal medicine plus courses in midwifery and surgical theory. The principal mode of learning was through lectures and textbooks. Supervised or structured laboratory experiences, practicum, or internships were offered. Apprenticeship opportunities were separate but enriched and complemented by the two-year curriculum.

Although the Penn medical school set some new standards, admission criteria and requirements for certification were still in disarray. A vast majority of students were receiving their medical degree following an apprenticeship and completion of a two-year study of courses. This model dominated medical schools until the start of the Civil War. During the 1860s, 1870s and 1880s, the medical curriculum was broadened to incorporate new scientific and medical discoveries. Joseph Lister's study of hygiene and morbid anatomy led to specialized knowledge and the addition of specific courses on the diseases of women and children, microscopic anatomy and pathology, and diseases of eye, ear and skin.

The Flexner Report

In 1910, Abraham Flexner examined the status of medical education at the leading medical institutions in the United States and reported that clinical learning was quite variable, unstructured, and was dominated by lectures and unsupervised apprenticeship. A wakeup call for educators, *The Flexner Report* pushed medical schools in North America to put together a learning experience for medical students based on scientific principles and integration of rigorous curricula, close supervision of learners, and bedside teaching.

Over the ensuing decades since 1910, medical curriculum has largely divided into two broad categories: basic science, such as anatomy, physiology, pathology, and biochemistry, and clinical disciplines, such as medicine, surgery, pediatrics, psychiatry, and obstetrics and gynecology. During the late 1970s and early 1980s, clinical clerkships were formally adopted to provide medical students an opportunity to learn clinical examination, medical knowledge, and patient care under the close supervision of a group of faculty. The inpatient setting has always been deemed appropriate for learning knowledge and procedures as well as for specialty training. Most educators now believe that medical students will be better prepared for residency training and subsequent clinical practice if they go through a balanced inpatient and outpatient exposure of learning as appropriate for the clinical clerkships.

Clinical training is introduced early in medical school through physician shadowing programs called preceptorships, service learning opportunities, and introduction to clinical medicine courses. Incorporating clinical training early in medical school cements the basic science concepts the students are learning and provides a framework to understand how the particular concept is relevant in clinical medicine. Today's preceptorship represents a union of academic medicine and the ongoing practice of medicine and serves to bring the medical school closer to the communities that support the school and consume its services and products. The integration of basic science and clinical curricula is a priority across many medical schools. Medical knowledge is now being taught across pathophysiologic blocks through the pre-clinical years and coordinated tightly by the basic scientists and practicing physicians as opposed to stand-alone courses such as anatomy, physiology, pathology, and pharmacology.

Osteopathic Medicine

Andrew Taylor Still developed the concept of osteopathic medicine in 1874. He encouraged preventive medicine and encouraged treatment of the whole patient, rather than just the disease or symptoms. Dr. Still believed that "manipulation of the spine could improve the flow of blood and other fluids throughout the body, and was the best means of treating almost any ailment"(1).

From Dr. Still's time until now, osteopathic medicine has morphed into a field designed around a holistic approach to patients concentrating on prevention.

Dr. Still believed that the body produced its own healing medications and was not a proponent of pharmaceuticals which he believed often caused more harm than good. The osteopathic treatment was primarily based on musculoskeletal manipulation or Osteopathic Manipulative Medicine (OMM), which aims to increase flow of the healing fluids. While all osteopathic schools still teach OMM, few doctors still use OMM in their practice. Only about 6% of DO physicians practice true "osteopathic" medicine with OMM on more than one-half of their patients (2). Examples of osteopathic manipulation include myofascial release treatment, which includes releasing tightened fascia to realign the muscles and fascia into place. Thrust techniques are a type of manipulation that applies a quick, low-pressure movement to a joint that often provides immediate relief. This technique is often used by chiropractors as well.

Osteopathic medicine is founded on four tenets, which are:

1. *The body is a unit; the person is a unit of body, mind, and spirit.*

Osteopathic physicians care not only about the symptoms the patient is having, but the effect the symptoms have on life. Bedside manner is sometimes perceived as better among osteopathic physicians because of their training to treat the body as a whole unit.

2. *The body is capable of self-regulation, self-healing, and health maintenance.*

A philosophy for osteopathic physicians is that the body's natural state is healthy and the body will always attempt to adjust to get back to a healthy state. An osteopathic physician will try to assist the body to get back to its normal state so it can heal and maintain health.

3. *Structure and function are reciprocally interrelated.*

If infrastructures in the body are misaligned, it can impede healing and cause other ailments. This tenet leads to the idea of manipulation to restore the normal alignment to the structures of the body, allowing it to heal on its own.

4. *Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function.*

Dr. Still developed osteopathic medicine to avoid the use of drugs or surgery. Although many osteopathics do not take this approach today, many still tend to use manipulation prior to drugs or surgery for many diseases.

The doctoral degree obtained from an osteopathic school is a doctor of osteopathy (DO). Essentially, these physicians can practice all medicine that an MD practices. Currently, 29 colleges of osteopathic medicine admit about 6,400 students per year. The total enrollment now for these colleges is about 20,000 and these schools account for more than 20 percent of new enrolled medical students. The fast growth within the last year is mostly due to three new osteopathic schools that opened in 2013 (3).

Once students graduate, they can either enter an osteopathic or allopathic accredited residency and then practice or go on to fellowship. In addition, osteopathic physicians can train for one year in osteopathic manipulation and then go into practice specializing in OMM.

In 2013, 20% of graduating physicians in the United States were osteopaths as were more than 6% of all practicing US physicians. Sixty percent of osteopathic physicians practice primary care (6). Today, osteopathic and allopathic medicine are working together in a more cohesive manner as the need to produce a greater number of primary care providers and diminishing clinical resources to train students put pressure on both education systems (7).

Medical School Expansion

Allopathic Expansion

In 2006, in response to concerns of a likely physician shortage, the Association of American Medical Colleges (AAMC) recommended a 30% increase in US medical school enrollment by the year 2015. US medical school enrollment is on target to reach the recommended 30 percent by the year 2017. Of the projected growth in medical school enrollment between 2002 and 2017, 62% will occur in the 125 medical schools that were accredited as of 2002, 31% will occur in schools accredited since 2002, and 7% will come from schools that are currently applicant or candidate schools with the Liaison Committee on Medical Education (LCME) (4). Financial needs and assessment of the quality and depth of applicants are two of the most cited reasons for medical schools to expand. The many challenges to expansion include adequacy and availability of clinical training sites and classroom/lab space. Graduate medical education is not expected to expand to sufficiently meet the rise in medical school enrollment which will put pressure on the GME pipeline and ability to meet national workforce needs.

Osteopathic Expansion

At current rates of expansion, by 2019 about 25 percent of all US medical school graduates produced annually will be doctors of osteopathic medicine compared to approximately seven percent in 2009 (8). In 2013 there are currently 29 colleges of osteopathic medicine (COM), offering instruction at 37 locations in 28 states. Twenty-four of the COMs are private; six are public. Students enroll for the first year of osteopathic medical education in increasing numbers. In 2012-13, first-year enrollment rose by approximately five percent, to 6,449 students (3).

The Current Pedagogy

For the last five decades educators in North American medical schools continue to refine pedagogic approaches and instructional strategies to teach basic science and clinical disciplines. While all medical schools embraced a curricular framework with an ever-increasing emphasis on teaching critical knowledge and skills, the instructional focus and methods to engage students in the learning process continue to evolve. In subsequent sections, we discuss some of the major instructional modalities, including the recent introduction of team-based learning. For a more detailed discussion of curriculum models, please see the chapter on curriculum management.

Teacher-Centered and Student-Centered Learning

The last 100 years of medical education has been dominated by the teacher-centered approach to

learning. The teacher chooses the topics, gauges what the student should learn and delivers a lecture, often in a large lecture hall. Lectures are easy to organize and convenient for faculty, but do not promote active learning amongst pupils. In a large group lecture, students typically play a passive role and do not learn by asking reflective questions and do not acquire the skill of determining what is worth learning. In teacher-centered learning, teachers do most of the reading, writing, talking and thinking while the students take notes and try to memorize content that is needed to pass examinations. The teacher is solely responsible for what the student is expected to learn. The teacher decides what information and skills the student should learn, how it is to be learned, in what sequence, and at what pace. The student is not responsible for their own education.

Increasingly educators are exploring ways to promote active learning by involving students in the curriculum. The premise is that students as adult learners will be best motivated and engaged in learning when faculty give them learning resources and allow flexibility and guidance through the learning process. The teacher recognizes the value of interpersonal interaction as the prime teaching modality and views the students as responsible for their own learning. The teacher plays a facilitative role. The curriculum often consists of small group sessions, student-led group work and problem-solving, as opposed to didactics primarily led by teaching faculty. Courses and curricula are adapted to individual learning styles and allow online learning and student-led discussion, when feasible. Faculty stimulate the students by moderating discussions, asking them essential questions, and offering them resources for fundamental knowledge and skills. The emphasis is on active acquisition of information and skills by students, depending on their abilities to identify educational needs, best manner of learning, and ability to evaluate their own learning. The teacher is available for guidance as needed until the student gains full independence. Thus, many courses in contemporary education offer web-based learning, student discussion, and group learning while maintaining faculty-led classroom type lectures and lab time.

Problem-Based learning:

The problem-based learning (PBL) method uses the principles of student-centered learning. Many schools use this model to teach basic science courses such as physiology, pathology, biochemistry, and so forth. PBL was pioneered at McMaster University in Hamilton, Ontario, Canada in the late 1960s by Howard Barrows and his colleagues (9).

Team-Based Learning:

The introduction of team-based learning (TBL) has ushered in a new era in medical education. The tenets of team-based learning are as follows: understanding the complexities of care and roles of different providers; willingness to learn disease process and help others during care; and having an open mind to observe and understand how a system of providers impact patient care and learning.

There will be a more in-depth discussion on PBL and TBL in the Curriculum Management chapter.

Competency-Based Medical Education

The introduction of competency-based curriculum was first introduced in graduate medical education by the Accreditation Council on Graduate Medical Education (ACGME) through an initiative called the Outcome Project in 1998. The overarching goal was to standardize resident education by focusing on successful demonstration of six key competencies or skills.

Competencies are high-order, often complex tasks that require combination of cognitive and psychomotor abilities. The six ACGME core competencies are, patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills; professionalism; and systems-based practice. By the year 2003, specialty boards in medicine and surgery had adopted policies and assessment tools to implement these competencies. Most medical schools now require that content in basic science and clinical curricula match to that competency-based framework. With early introduction of clinical experience, it is of paramount importance that medical schools measure knowledge but also attitudes, behaviors, and professional attributes throughout the four years of school. There has been increasing emphasis on assessing professionalism and communication skills, and on providing curricular framework through the medical school to assess students' self-learning, understanding care processes, quality improvement and patient safety issues. Competency goals for undergraduate medical education (UME) should prepare students so that they can eventually accomplish the competencies expected at the graduate medical education (GME) level.

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Accreditation and Governance

All medical schools in the United States and Canada must be accredited by the Liaison Committee on Medical Education (LCME) in order to confer the MD degree. The LCME is a collaboration between the Association of American Medical Colleges (AAMC) and the American Medical Association (AMA). Details as to membership, mission and the accreditation process including a comprehensive collection of documents regarding the accreditation process as well as the annual survey accredited schools are required to submit can be found on the LCME website (1). Accredited schools are eligible to participate in federal grant application processes and students from accredited schools are eligible to sit for licensing exams via the National Board of Medical Examiners (NBME).

Osteopathic Schools

Osteopathic schools are accredited by the Commission on Osteopathic College Accreditation (COCA) as well as the American Osteopathic Association (AOA). Like the LCME, COCA is charged with serving the public in establishing, maintaining and applying accreditation standards and procedures to insure compliance by the College of Osteopathic Medicine (COM).

Allopathic Schools

The functions and structure of accreditation for COMs are very similar to those of the LCME for allopathic schools. Please see the AOA website for specific details as to the process for managing an accreditation site visit (2).

As of 2008, there were 131 (LCME-Allopathic) and 50 (COCA-DO) accreditation standards. The LCME expects schools to read and answer each standard as part of the accreditation process. It is also important to provide documentation on outcomes for each standard as appropriate. For example, if a school reports that students are being supervised on the clerkships, some sort of evidence to that effect will be required.

The LCME accreditation process is extraordinarily thorough. Established and accredited schools undergo a review by the LCME every eight years. This process includes a period of self-study as well as a three to five day site visit by members of the LCME accreditation team. The self-study typically takes 14 to 18 months. The LCME has written a guide to the self-study process which can be found on their website. The self-study guide is very helpful for administrators charged with supporting the review process.

The LCME's web site is easy to navigate and is a tremendous resource for administrators. Also, the LCME secretariats are available to answer questions as needed. The FAQ link contains the most commonly asked questions; individuals with questions about accreditation should start with this website before contacting the LCME Office.

New Schools, Increased Class Size or New Branches

Recently, the LCME has seen resurgence in the increase in requests to accredit new medical schools. To that end, there is a very detailed description of necessary actions to take to found a new MD accredited program. Schools interested in increasing enrollment by 10 percent or more

or adding new branch campuses must submit forms to the LCME as soon as this information is known.

While the LCME has done a masterful job regarding providing documentation for the accreditation process, there are a few helpful hints which can help in the process.

Communication with the LCME

The secretariat of the LCME will send update requests as well as notices of self-studies and site visits to the dean of the medical school. It will be important for the staff responsible for LCME activity to receive these communications. The LCME is very specific in terms of what is needed to maintain the school's accreditation.

Timing

The suggested time line for the self-study process is a good one. The LCME self-study process should begin 14-18 months before the actual site visit. While the process is long and intense, adhering to the time line is essential in assuring the self-study goes well and is properly documented.

Medical students

The LCME requires the schools' medical students to do their own survey as part of the self-study process. It is important for the students who take the leadership role in this process to be supported throughout the process. It is also important to have a mix of students across several years in order to assure continuity during the 14-18 month long process.

Participants

It is imperative that the self-study process include teaching faculty, students, administrators and leadership. While the actual work should be done by the administrator(s) assigned to the project, all individuals involved with medical education should be part of the process as appropriate. Also, all individuals involved in the process should be well aware of their roles and responsibilities. Administrators who manage or coordinate courses, clerkships or electives will be asked to provide information specific to those courses, clerkships or electives including outcome data.

Practice Site Visit

While not necessary, it can be helpful to undergo a practice site visit. There are several individuals who offer this service and their observations can be quite constructive.

Communication

It is IMPERATIVE that open lines of communication be established between whomever is managing the self-study and the many faculty, administrators, house staff and students involved in the self-study process. There are many ways to do this, and the administrator in charge should make use of multiple communication mechanisms including email, a weekly updated web site, etc.

Additionally, it is important for the school's leadership to be aware of the self-study process from the beginning including what their responsibilities will be. As soon as possible, the actual site visit should be scheduled with whomever the site visitors indicate they would like to meet.

The Site Visit Team and Site Visit

Do not underestimate how much work it is to perform a site visit from the team's perspective. These individuals, with the exception of the AAMC/AMA appointee, are volunteers. They are expected to read your institution's self-study and all appendices. They are expected to prepare a draft report before they leave the institution and to provide a formal documented report at some point in the future. They should be afforded any support that can be provided including quiet touchdown space so they can stay in contact with their own offices, restaurant reservations, transportation, etc. The more supported the team, the easier it is to focus on the task at hand.

The site visit should be seamless to the site visit team, which means administrators will need to confirm, reconfirm and sometimes escort invited participants to meet with the site visit team. The more organized the visit appears to be for the site visit team, the easier it is for them to do the work at hand.

Accreditation Status and Updates

The LCME will most likely identify findings or areas of transitions as part of the site visit. The dean and president will be informed what those updates will be at the end of the site visit, both verbally and in a formal letter. The LCME secretariat will ask for updates based on these concerns. To that end, the staff responsible for the LCME site visit should obtain a copy of the letter and maintain documentation as to the requested updates as needed from year to year. Typically, the LCME requires updates every three years for fully accredited schools. Currently, of the 146 US and 17 Canadian schools, seven have received preliminary accreditation, five have received provisional accreditation, and three are on probation. These schools are required to report on the areas of concern the LCME has identified annually.

There are several common concerns the LCME may identify. Some of these findings focus on governance or facilities and may help your school receive additional funding for much needed infrastructure, i.e., improved study space for students. Other findings may be linked to curricular issues, in particular supervision of students while on clinics. It will be imperative that all clinical instructors, be they faculty, house-staff or other, are well aware of the goals and objectives for the clerkships in which they teach. It will also be important to document evidence and/or outcomes for every accreditation standard as applicable.

Annual Questionnaire

Accredited schools are expected to participate in two annual surveys from the LCME, one on financial issues and the second focused on medical education. The surveys are a good way to maintain records for board scores, enrollment numbers, and changes to curricula or evaluation systems. The surveys are done via a web based interface and will be used to populate the new data collection inventory implemented by the LCME in spring 2014. The same individuals charged with staffing the LCME site visit should also be responsible for the completion of the annual survey.

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Dual Degree Programs

The goal of this chapter is to provide an introduction to programs during which students earn an MD and an additional degree, most commonly a PhD or a Master's degree. These programs are referred to as “combined degree programs” or “dual degree programs.” The first part of the section is dedicated to MD-PhD programs, and the second describes MD-Master's and other dual degree programs.

MD-PhD Programs

Brief Introduction

MD-PhD programs are designed to prepare students for careers as physician-scientists, in which they will conduct research relevant to human health. The training programs encompass both MD and PhD training, and are typically completed in approximately eight years. Most programs provide tuition remuneration and generous stipends for these particular students. The vast majority of students are enrolled in PhD programs in the biomedical sciences, but some are engaged in other relevant areas such as health care economics, law, medical anthropology, sociology, philosophy, and history of medicine and science. Candidates apply through a distinct MD-PhD application process, administered by the American Medical College Application Service (AMCAS - <https://www.aamc.org/students/applying/amcas/>). There are currently over 100 MD-PhD programs in the country (1). Some are relatively new, and others date back to the 1960s and even earlier (2). The development of these programs was made possible, in part, by the establishment of the Medical Scientist Training Program (MSTP) grants by the National Institute of General Medical Sciences (NIGMS) in 1964 (3). There are currently over 40 programs in the country which receive MSTP funding (1). American Association of Medical Colleges. Whether MSTP-supported or not, all MD-PhD programs share important goals, and there are many similarities across institutions. Despite shared features, there is also extensive variation in size, history and curriculum among the programs. The rest of this section will provide more details about MD-PhD curricula and training considerations.

MD-PhD Curricula

Overview

MD-PhD program curricula vary considerably, but in broad strokes: students typically move through several phases, and have a primary focus on either the MD or the PhD degree at any given time. In addition to being engaged in their primary degree program, the students are also often spending a smaller amount of time participating in activities related to the other degree program and/or to their over-arching training as physician-investigators. Many programs share the philosophy that students benefit greatly from maintaining a focus on their future career goals as physician investigators and that it is important to maintain connections to both aspects of their training throughout the program. The most common pattern of primary focus is two years of the MD, followed by three to five years of the PhD, and then the remainder of the MD. The average time to complete both degrees is eight years in total (4). Because the curricula are normally interweaved in this way, and because students do not typically focus exclusively on only one degree at a time, many MD-PhD programs describe themselves as having an integrated curriculum.

Sample Curriculum

- Years 1 and 2
 - A full time MD curriculum consists of preclinical, perhaps some clinical and the USMLE step 1 exam.
 - Part-time PhD work usually consists of at least one lab rotation/research experience and sometimes course work.
 - Enrichment activities may include MD-PhD event series, mentoring programs, and retreats, etc.
- Years 3 to 6
 - A full time PhD curriculum which consists of course work and dissertation research.
 - Part-time activities related to medical school may include clinical shadowing or volunteer activities, perhaps clinical courses and perhaps a clinical skills refresher course for students as their return to medical school approaches.
 - Enrichment activities may include MD-PhD event series, mentoring programs, and retreats, etc.
- Years 7 and 8
 - A full time MD curriculum consists of clinical courses, the residency application process and the USMLE Step 2 exam.
 - Additional research during elective time may be completed.

Variation Among Curricula

There is significant variation among MD-PhD program curricula, and naturally one source of this is differences among the MD curricula at various institutions. For instance, MD-PhD programs are shaped in part by whether the first two years of the MD are entirely pre-clinical or if this period also includes core clerkships. As another example, the number of hours and timing of required coursework during MS1 and MS2 may or may not make it feasible for MD-PhD students to begin their required graduate school course work with the first two years of the program. A third example is that at some medical schools, there are a range of possible dates when a MD-PhD student can re-enter the MD curriculum after completing graduate school, whereas at others there is only one possible date for transitioning back.

Another source of variation is the specific programming developed for combined degree students. MD-PhD programs typically offer a range of activities and mentorship opportunities for their students. In addition, in many schools, MD-PhD program leaders work closely with medical school leaders to provide additional or enhanced educational opportunities.

Some examples of special programming for MD-PhD students include:

- A research symposia featuring physician-investigator speakers and/or MD-PhD student talks.
- Talks or panel discussions on physician-investigator career paths and residency programs.
- Mentoring programs which pair students with faculty who have shared clinical and/or research interests; some of these take place in a clinical setting.

- Program retreats for MD-PhD students.
- Seminar courses or journal clubs designed specifically for MD-PhD students.
- Small group sections in the pre-clinical MD curriculum for MD-PhD students (and perhaps others) that have especially strong preparation in the basic sciences.
- Longitudinal clinical courses that allow students in the PhD phase of the program to simultaneously continue to complete MD courses.
- Specially developed clinical courses for students who have completed the PhD and are preparing to return to their clinical training or to enter clinical training for the first time.

In some schools there is also a diverse range of curricula among students within the MD-PhD program. This occurs if the administration is flexible and permits students to customize their course of study and/or admits internal transfer students from the MD only or PhD only programs. An external transfer is less common, but happens occasionally in some places. Some examples of such alternative curriculum plans include: starting the PhD earlier than a typical student (e.g. after only one year of the MD in a program where starting after two is standard), starting the PhD later than a typical student, beginning the PhD before the MD, and proceeding through the clinical curriculum (or graduate curriculum) in an unusual order.

Career Goals and Residency Program Considerations

MD-PhD programs are designed to provide training for a career that will combine research and clinical practice, and the vast majority of trainees go on to careers which make use of both their medical school and graduate school training. Most trainees will ultimately take positions in academic medicine, industry, or research institutes. Nearly all pursue residency training immediately following graduation (4).

Students will often consider their long term career goals as physician-investigators as they make clinical field and residency program choices. Career advising for them should encompass these issues. In some fields “research residency programs,” which are specially designed to support the training of future physician-investigators, are becoming increasingly popular (1). Many MD-PhD programs provide special career advising events and mentorship programs. Likewise, many clinical departments who are interested in attracting MD-PhD students as residents will include information about physician-investigator career paths in their advising efforts.

Conclusion

MD-PhD programs share some common goals, features and complexities, but ultimately each program is unique. Close working relationships among central medical school administration, individual departments, and MD-PhD program offices is beneficial for the programs and students.

For those who would like more information, the National Association of MD-PhD Program Directors and Administrators and the AAMC Graduate Research and Education (GREAT) MD-PhD section (<https://www.aamc.org/students/research/mdphd/>) provide opportunities for MD-PhD program leaders to work together on national issues and to interact at their annual conference.

MD-Masters' and Other Dual Degree Programs

Brief Introduction

There are many different types of MD-Master's programs and their number and range has increased in recent years. The three most common types of programs are the MD-MBA, the MD-MPH, and programs combining a research-oriented Master of Science or Master of Arts program with the MD. Beyond these three types, there are many others. It is difficult to generalize about the programs, because of their diversity, but there are some commonalities. Many of the programs begin with full time MD work, transition to master's work, and end with returning to the MD curriculum. The programs often take five years to complete. However, some are possible within only four years, and others may take six years or longer, at least for some students. In some cases the curriculum and time frame are very clearly defined, and the MD administration and master's program administration have worked closely to develop an efficient course of study which saves time and tuition as compared to completing the two degrees sequentially. Other programs are arranged on an *ad hoc* basis. In yet other cases, a program may be carefully coordinated, but variable in time to degree because of a master's thesis project. In contrast to MD-PhD programs, where there is a clearly defined application process through AMCAS, the admissions process for MD-Master's program is more varied. Some programs require or encourage application during the initial MD application process. Others limit (or recommend) application only from matriculated MD students in their own school. The level of financial support also varies greatly, with some programs providing fellowship packages of various levels and some requiring that students be self-funded. The section below will provide more detail on several program types.

Program Types

MD-MBA programs

There are currently over 50 MD-MBA programs around the country (5) and within some institutions these are the oldest and most well-established programs. There is considerable variation in curriculum, but many programs take five years, shortening the time it would take to complete the two degrees sequentially by a year. There are many possible career paths for MD-MBA graduates, including those that focus on: economic health care policy, hospital administration, and administration in other health care environments, consulting, global health, biotechnology, and drug development.

MD-MPH programs

Over 80 schools have an MD-MPH (or equivalent) program (6). Most programs take five years to complete, but there is some variation. Many programs include a research or capstone project. Students in these programs have a range of interests and career goals, and some of the sub-fields available include: public health administration/policy, epidemiology, environmental health, behavioral health, global health, health education, and biostatistics.

Programs Combining the MD with a Research-Oriented Master's Degree

There is a wide range of MD-Master's programs geared toward those who are interested in medically related research. Some programs focus on a particular type of research, and may specify a focus of one or more of the following: basic science research, clinical research (broadly), translational research, epidemiology, health outcomes research, patient oriented

research, and health science. Others are so flexible that they can encompass any type of research. Some of the programs feature a highly structured curriculum with a number of required and elective courses, along with a master's thesis or capstone project. In some cases, the course work load is fairly light, and in others it is a full-time load for a year or more. In more rare cases, a program may confer a master's degree based on a year-long research project and publication quality manuscript, without any required course work. It is worth noting that an MD and master's degree are also sometimes conferred if an MD-PhD student begins but does not complete the PhD portion of the program.

Less Common Program Types

MD-Master's programs are not limited to the fields above. New programs appear regularly in many fields relevant to medicine. In some cases, these alternative MD-Master's programs are carefully designed, and in others arrangements are more informal. A few examples include: bioethics, health policy, education, biostatistics, medical humanism, health law and bioengineering. Some schools go beyond MD-Master's and MD-PhD programs and provide yet other options for completing a second degree, such as an MD-JD or MD-D.MD. There have been occasional examples of a student completing three degrees, such as an MD-PhD-MBA, or MD-JD-Master's in ethics.

Conclusion

Administration of MD-Master's programs shares some common themes with MD-PhD programs with regard to the value of communication among offices and careful monitoring of student progress. But in some ways, because of the much shorter duration, these programs are more analogous to "year out" or certificate programs. The students have a wide variety of interests and goals, and the Master's program allows them to complement their medical training with a focus in a related area, whether it is business, public health, research, or another area.

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Preclinical Medicine

Medical education in the basic sciences is in a period of rapid change. Roles and expectations of teachers of basic science are evolving. This chapter explores developments in basic science teaching that, if implemented, are likely to positively impact clinical competencies of our graduates. We focus upon the competencies initiative because those goals define the likely future of medical education. We note that both changing philosophy – basic science education must be clinically relevant – and changing methodology – the traditional lecture is at an end point in the educational process – are profound forces shaping this movement.

The American College of Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA) share six competencies that broadly describe the goals of medical education: 1) patient care; 2) medical knowledge; 3) interpersonal and communication skills; 4) professionalism; 5) practice-based learning and improvement, and 6) systems-based practice. Given the dispersal of students that occurs in the clinical years, it is likely that training in these areas may in fact rely heavily on the preclinical curriculum. With the onus of meeting these competencies shifting into the preclinical arena, the preclinical curriculum must be ready to deliver training and assess competency in these domains. We note below the historical evolution of basic science teaching and some innovative approaches to these activities that are impacting preclinical medical teaching.

This chapter will discuss how a preclinical curriculum is structured, delivered, evaluated and integrated with clinical sciences to translate science knowledge to clinical practice and highlight the importance of fundamental science in clinical decision making.

Historical Overview

Historically, there has been a slow evolution of philosophy concerning how best to approach the teaching of preclinical material. Near the start of the 20th century, the impact of the Flexner report (1910) profoundly influenced educators to adopt a German model in which medical students were educated alongside graduate students emphasizing scientific methodology and information as it applied to the disciplines of the basic sciences (1). By the 1950's, that model changed to repackage basic science information into a systems approach (2). Twenty years later a significant shift in philosophy occurred with acknowledgement that physicians organize their knowledge around clinical problems, resulting in popularity of problem-based learning (PBL). With another 20 year gap, the presentation curriculum was introduced which retained the philosophy of clinical problems as the defining feature that organizes medical knowledge, but provided significantly different methodology from traditional PBL curricula (3-4). It has now been just over 20 years since this most recent philosophical approach to medical education in the preclinical curriculum was introduced, and we can only wonder if another philosophically distinct approach to basic sciences is in the wings (5). Whether a new curriculum emerges or not, what can be noted is that the philosophy of preclinical education is moving from the model of training as a scientist within a discipline to training for the task that physicians will perform (6). That shift has profound consequences for how basic sciences are delivered and evaluated. One recurring theme arising from these shifts in philosophy is that decision making about medical

education no longer resides within departments. Unlike graduate education, where departments maintain strict control of both content and sequence, medical education requires flexibility from participants concerning their role in the educational process. Faculty involved in preclinical teaching are likely to be part of a multi-department effort in which clinical problems are a defining organizational theme. A central message is that individual faculty control of curriculum content will be far less autonomous in coming years.

Shifts in philosophy typically occur only with significant gaps in time; in contrast, we are now experiencing acceleration of change with regard to teaching methodology, and the speed with which these new methods are impacting education can be difficult to grasp. The pace of change is deeply impacting education in general, as well as medical education specifically. These changes are well reported in the popular press, and several appear to be gaining rapid momentum. For example, Kahn has popularized video teaching, with short snippets of instruction coupled to student-centered problem-solving activities (7). An extension of this video-instruction methodology has been the development of massive open online courses. Perhaps more challenging in terms of classroom implications for medical school is the rise of interest in flipped-classrooms, in which students are charged with studying material outside of class, and then the classroom experience focuses on application of knowledge (8). As we ponder the role of traditional basic sciences departments in the delivery of medical education, these methodologies are likely to present challenges that will dramatically change the landscape and funding of preclinical education. Put simply, lectures were wonderful modes of communicating information when knowledge was confined to experts, when textbooks were expensive and/or almost always badly out of date, and when information was difficult to disseminate. In a modern world of electronic communication where extremely high quality, up-to-date material is readily available for students to acquire outside of traditional lectures, the emphasis will be much less on what we tell students in a classroom and much more on what students can do in a classroom (whatever size that environment manifests) with the information we provide.

The driver for this rapid shift in teaching methodology is in large measure the confluence of these new approaches to education coupled with the arrival of competencies as the defining aspect of educational outcomes. The competencies initiative is concerned with measuring the ability of learners to perform tasks. Originally introduced for assessing outcome of graduate medical education (GME) in 1998, the competencies initiative stressed the necessity for GME programs to define measures by which they would verify that residents were competent to perform various tasks (9). Subsequently, in 2005, the competencies initiative was suggested as a rubric for evaluating the clinical component of medical school training and finally, in 2009, the Howard Hughes Foundation recommended that competencies should be the measure of preclinical curriculum effectiveness (6,10). The easiest way to understand the profound impact of this initiative is to realize that from the perspective of competency what we say as educators is of much less importance than what students can do – specifically, what tasks can students perform within the context of the profession they will enter? Thus, our methods of instruction and our methods of assessment must focus more critically on both the tasks that physicians perform and the use that physicians make of the content of basic sciences in performing those tasks.

The basic sciences component of preclinical teaching is most heavily focused on the first two AGME and AOA competencies: patient care and medical knowledge, with the domain of medical knowledge stressed most deeply. In terms of assessment, medical licensing boards require that this knowledge must be expressed within the context of solving patient problems (11-12). The National Board of Osteopathic Medical Examiners (NBOME) provides a guide to the number of patient problems (more than 120) that a general practitioner is expected to encounter. Each of these problems is caused by common and/or important diseases, and it is this domain of problems/diseases that defines where basic sciences information must be applied. Licensing board examinations focus almost entirely on abnormal function (disease states). Many, if not most, of the examination items that students encounter begin with the description of a patient with a clinical problem, usually with no diagnosis provided. The task germane to basic sciences education is for the student to use information of anatomy, biochemistry, etc. to explain why particular features of the case (history, physical examination findings, laboratory data, etc.) have occurred. To do so correctly, the student must be able to develop a differential diagnosis to determine which disease is most likely causing the presenting clinical problem, and then information from basic sciences must be applied to the disease representing the most likely diagnosis to explain particular features of the case. Consequently, from the standpoint of licensing board preparation, preclinical education should provide students with sufficient opportunities to apply their knowledge to diseases, particularly within the context of patient presentation of a new onset problem. Any conversation about licensing boards often brings a dismissive proclamation that “board preparation is not my responsibility as a faculty.” Because modern licensing board items are intended to be representations of the activities that students will perform in clinics, a reasonable argument can be made that they in fact are assessing competencies that students should possess.

With regard to the first two competencies, the preclinical curriculum faces a further challenge of developing clinical reasoning skills of students. When students are presented with typical examination questions based upon licensing board models, they encounter complete vignettes in which every bit of information is pertinent to solving the problem and may perform at a very high level. In reality, medical practitioners must elicit history and physical findings sufficient to generate a reasonable differential diagnosis. The skills required to do so are at the heart of medical reasoning, and they are surprisingly difficult to acquire. Kahneman and others provide insights into why this is so, including the critical necessity for deliberate practice as a critical component of the learning process (13-15). Again, as with the other competencies discussed below, the message that keeps being repeated is what we say is much less important than what they can do, and high fidelity practice is the best teacher. Medical educators in the basic sciences are likely to encounter a world in which team work with other educators is requisite, where content is important but delivered in novel fashion, and where the highest quality of training is associated with numerous opportunities for the learner to apply their developing base of knowledge to problems with high fidelity to those they will encounter in practice.

Preclinical Curriculum

Three medical school curriculum models will be briefly discussed in this section. This small sample of preclinical curriculum models from Brown University, University of Central Florida and Perelman School of Medicine at the University of Pennsylvania were chosen as examples because the authors of the chapter and editors of the guidebook are familiar with these curricula and they offer three different organizational approaches to preclinical education.

Alpert Medical School at Brown University

The interdisciplinary preclinical curriculum at Alpert Medical School is comprised of a two year integrated basic science course, integrated medical sciences and a two-year clinical skills doctoring course to teach the knowledge, skills, and attitudes of a competent, ethical and humane physician. Integrated Medical Sciences I provides foundations of cell biology, cell physiology, biochemistry, nutrition sciences, immunology and genetics, and general pathology, all of which are integrated with gross and microscopic anatomy. Integrated Medical Sciences II, III and IV, covers brain sciences which integrates head and neck anatomy with neurobiology, brain and behavior, neurologic pathology, neurophysiology and neuropharmacology, microbiology and endocrine sciences. Integrated Medical Sciences II and IV finish with a systems-based approach to seven course sections: cardiovascular, renal, pulmonary, supporting structures, hematology, gastroenterology and human reproduction (16).

University of Central Florida College of Medicine

The University of Central Florida curriculum fully integrates basic and clinical sciences across all four years. The first two years are structured into modules, with the first year focusing on a fundamental understanding of how the various basic science disciplines relate to the normal human body. The second year takes an organ-system approach and applies the basic knowledge of the first year to the study of clinical disease, pathological processes, and treatment. In concert with these aspects of medicine, the curriculum also covers psychosocial issues, cultural differences, communication skills, and physical diagnosis skills as they relate to the different topics in medicine (17).

UCF COLLEGE OF MEDICINE M.D. EDUCATIONAL PROGRAM

July	August	September	October	November	December	January	February	March	April	May	June					
M1	Cellular Function and Medical Genetics (8 weeks)		Structure and Function (17 weeks)				Psychosocial Issues in Healthcare (11 weeks)									
							Health and Disease (8 weeks)		Hematology/Oncology (4 weeks)							
	Practice of Medicine including Community of Practice I															
Focused Inquiry and Research Experience I																
M2	Focused Inquiry and Research Experience II										M3	Int./Fam. Medicine Neurology Ob/Gyn Pediatrics Psychiatry Surgery				
	Practice of Medicine including Community of Practice II															
	Cardiovascular and Pulmonary Systems (6 weeks)		Endocrine and Reproductive Systems (6 weeks)		Gastrointestinal and Renal Systems (6 weeks)		Skin and Musculoskeletal Systems (4 weeks)		Brain and Behavior (7 weeks)				USMLE STEP 1			
Internal/Family Medicine (12 weeks)											Capstone	M4	USMLE STEP 2 CK/CS by December			
Neurology (6 weeks)																
Ob/Gyn (6 weeks)																
Pediatrics (6 weeks)																
Psychiatry (6 weeks)																
Surgery (12 weeks)																
Emergency Medicine (4 weeks)											Capstone Evaluation	Graduates begin Residency Training as M.D.				
Core - AI (4 weeks)																
Core - AI (4 weeks)																
Electives (20 weeks)																
Optional (12 weeks)																
Longitudinal Curricular Themes:			Culture, Health & Society		Ethics & Medical Humanities		Gender Based Medicine		Geriatrics & Principles of Palliative Care		Medical Informatics		Medical Nutrition		Patient Safety	

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University of Central Florida College of Medicine. Integrated curriculum.

<http://med.ucf.edu/academics/md-program/integrated-curriculum/>. Accessed January 16,

Perelman School of Medicine at the University of Pennsylvania

The Perelman School of Medicine (PSOM) pre-clinical curriculum contains four modules: modules one, two, three, and portions of six. Module one is devoted to basic sciences, while module two focuses on integrative systems and disease. These two modules are taken in consecutive order, but are presented in tandem with modules three and six.

As demonstrated in Figure 2, module one runs through the first semester of medical school. Module two follows, running from January through December, which comprises the second and third semesters. During all three of these semesters, students also take courses in modules three and six. The clinical curriculum begins in the fourth semester.

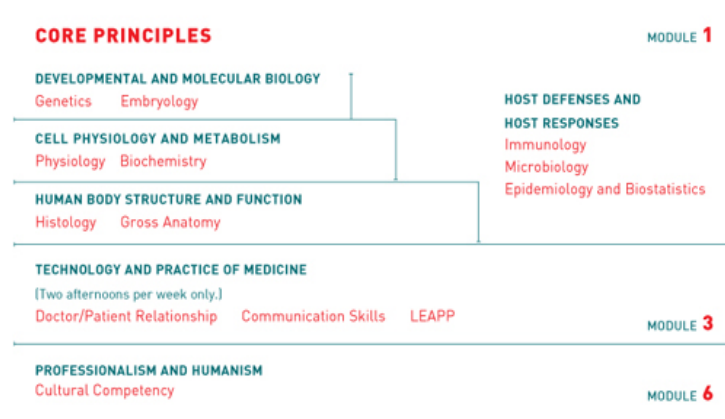


Figure 2: *Core Principles*. Office of Admissions and Financial Aid. *Curriculum*. Online. www.med.upenn.edu/admiss/curriculum2.html. Accessed April 15, 2013.

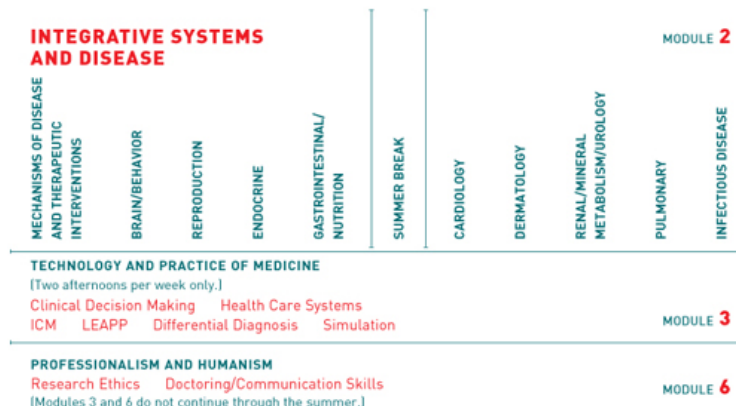


Figure 3: *Integrative Systems and Disease*. Office of Admissions and Financial Aid. *Curriculum*. Online. <http://www.med.upenn.edu/admiss/curriculum3.html>. Accessed April 15, 2013.

Each module has a distinct set of learning objectives and guidelines, as described below which are taught across disciplines. Faculty from various disciplines work together to create a comprehensive and cohesive teaching structure. For example, the brain and behavior course in module two is taught by faculty from the departments of neurology, anatomy, neuropathology, and psychiatry, among others.

This interdisciplinary teaching structure is continued into module six, which promotes humanism, multiculturalism, and idealism. To this end, this module draws on and promotes interprofessional education. Communication and cultural components are integrated into one course, and content is interwoven into other courses. Faculty and guest lecturers deliver talks on a diverse list of topics, including chronic care, communication with deaf and non-English speaking patients, and community outreach.

Similarly, module three, titled the technology and practice of medicine, is structured to allow students to explore interdisciplinary studies in the academic community. The module offers three intensive interdisciplinary courses, introduction to clinical medicine, differential diagnosis, and health care systems. Students also have the opportunity to pursue other experiences in laboratory or community medicine through built-in flex time.

Concurrently, the year-long interprofessional team assessment program (ITAP) allows students from different schools in the university to gain a deeper understanding of team dynamics. To accomplish this, pre-clinical learning teams join nursing and pharmacy students. Their combined work includes observation and analysis of a functioning, professional clinical team that provides patient care. Students use this analysis to reflect upon their own team dynamics, particularly in the context of the additional interdisciplinary members. ITAP opens lines of dialogue between students from different schools, and allows them to learn about each other's training.

Various components of modules one and two also incorporate interdisciplinary studies and interprofessional training. For example, the anatomy course presents cell biology interfaced with radiology, diagnostics, and the physical exam. Similarly, organ blocks in module two are organized in a standard structure which includes epidemiology and evidence-based medicine as well as prevention and nutrition. Some module two courses integrate with module three to incorporate clinical learning components to the integrative systems and disease curriculum. Examples include a neurological exam session in the brain and behavior course and a transgender symposium in the endocrinology block. The school also offers students elective courses in various multi-disciplinary topics such as global health, community service, medical Spanish, and bioethics.

Courses in modules three and six in the first semester bolster the theme of interdisciplinary learning. Doctoring and introduction to clinical medicine: the doctor-patient relationship, introduce the student to the complex and practical relationship between doctor-patient communication and cultural competency and awareness. This interdisciplinary teaching objective is achieved through large and small group discussion, including sessions which debrief the student's experiences in other courses. For example, one session debriefs the students' experience with cadavers in the anatomy labs in a spiritual context.

Additionally, the pre-clinical Longitudinal Experience to Appreciate Patient Perspectives (LEAPP) program pairs students with chronically ill patients for eighteen months. The goal of this exercise is to allow the student to learn the effects of disease on family and quality of life.

Preclinical Evaluation

Preclinical learning is evaluated through multi-faceted and comprehensive examinations. Various assessment methods can be used, including traditional examinations, standardized patient assessments, clinical skills assessments, presentations, evaluated simulations, Objective Structured Clinical Examination (OSCE), projects and papers which measure individual knowledge and team ability.

Preclinical exams are designed by the faculty to test recall and, to a greater extent, problem-solving ability. The most heavily weighted exam portion is usually multiple-choice. The questions are drawn from each lecture in the course, and developed by the course directors and lecturers. These questions follow the National Board of Medical Examiners (NBME) guidelines for the ‘one-best-answer’ family of questions. The academic programs office provides data on the mean and reliability of each answered question to ensure validity and ability to discriminate between high and low-scoring students, and unreliable questions are removed from the final score tabulation. Alternate forms of evaluation include in-class case presentations, practice patient write-ups, and actual patient interviews. For example, at one school, the psychiatry component of the brain and behavior course evaluates students, in part, through patient interviews.

Many final exams also feature a learning team component, which mixes components of the pathophysiological ‘one-best-answer’ component and the pathological image component with some form of application of processes. Faculty design this problem-based group component of the exam to be evaluative and informative. As Michaelsen, et al writes, “...students who had to explain the information to their peers, a process that forced them to reconcile inconsistencies in their understanding to answer their classmates’ questions, increased their learning” (18).

Delivering Preclinical Curriculum with Technology

Online discussions, blogs, and pre-developed modules are all ideas currently being used and developed in medical education curricula today. These technologies are being guided by subject and specialty experts, and are enhanced as professionals share their opinions and experience with using real-life technology in their profession (19).

The vast majority of online communities help foster higher cognitive functioning and with guidance students become self-directed learners. Online communities may be useful tools for engaging students, while learning material, finding deeper information, and other viewpoints from minds just as involved (20). Students using web-based, interactive modules which include multiple choice and text-based questions have been shown to have better outcomes than students who did not have access to the interactive additions (21).

Professors at University of North Carolina Medical School conducted a study of two randomized groups of medical students; all fourth year medical students, in a month long study. The principal investigators were blinded, and the students in each group had no idea the other group had different online materials. Students viewed PowerPoint modules which covered key portions of their learning materials. There was little difference between the two, for the exception of the 11 case examples with multiple choice questions, including answers and explanations. The study found that computer-based learning is an effective platform for students to learn when including such items like case-based questions to further reinforce their knowledge (21).

Incorporating technology in medical education poses challenges. Technology can take ideas in many directions, and include several platforms to deliver content. Medical programs may be asking, what is the best platform for what we are trying to accomplish? Keeping abreast of the latest technology such as blogs, podcasts, streaming videos, and Twitter is key to understanding how current learners enjoy interfacing with content (22).

Students have cited that at times technology can have its limitations. Students may find technology less engaging, and even feel detached from the group studying the same materials. In some cases, socioeconomic status can play a role in how frequent students can access information to participate in online portions of course material (20).

Online communities, blogs, and other tools can increase interaction and benefit in-depth discussion when time is short, but also pose their share of constraints. In a survey provided to first year pharmacy students who attended Nova Southeastern University College of Pharmacy, 74 percent of respondents found that social media could impact their ability to learn in a positive manner. However, students at satellite campuses of the same medical school were found to be at greater risk for feeling detached from classes, find it more difficult to concentrate, and experience levels of anxiety with learning processes. Such cases are the minority, but an important point to take away is that branch campuses need attention to further development of engaging their students within all technology platforms. Specifically targeting platforms such as social media for integration into useful and professional tools for teaching are keys to making the technology useful to students (23).

Computer based learning modules with multiple choice questions and video presentations are well suited for adult education, since students at this point are more likely to be more independent and self-guided (21). Some modules use case-based formats and questions to follow up with the determinations of the case mentioned. Other universities are using video E-Learning programs, while testing the usefulness of high or low level user control. Low level control in this case only allows learners to view and progress through the program in a specific order, while high level control allows the learner to have more of a choice; completing option quiz items, viewing videos in their choice of order (24).

Students are able to access medical resources through mobile devices like smart phones, iPad or even the now less popular PDA devices no matter where they are. Smart phones are slowly becoming more widely accepted in the clinical setting, but at times can be considered an interruption (25).

Incorporating media which we use for personal use, such as YouTube, can be a vehicle to get viewers to their instructional information. Medical professionals in Canada post online videos for clinical procedures and found that YouTube could help secure an increased audience to their website. This helps pave the direction for where higher education could be directed in the future, and whether the stigma of these platforms could be overcome (26). Facebook and Twitter, though beginning as social networking sites, are becoming outlets for universities and programs to advertise their ideas and curriculums, hoping to attract future graduates (27).

Incorporating e-learning into a curriculum takes careful planning and organization. Leiden University is one example of a medical school which took several detailed steps to carefully integrate the use of e-learning into its basic sciences program. Leiden liked the idea of how flexible and versatile e-learning could be as a mode to get important medical curricula to a rising number of students. Their focus was to give a practical guide with what students should do and not do; and they accomplished this by compiling a committee to help build, plan, and implement their ideas. They found it crucial to mesh existing materials with new items which were more

electronic, for proper adherence into their curriculum. Their database taught dynamics, kinetics and mechanisms of drug action as seen in the ideas of physiology and pathophysiology (28).

Beyond the Classroom

Introduction of Early Clinical Training in Medical School

Beyond the competencies of patient care and medical knowledge, early clinical experience is particularly important for developing other competencies. For example, Whipple, et al., found that students who had a greater clinical exposure in year two of medical school had a greater degree of comfort in the initial portion of their rotations. Particularly interesting was that their comfort in interacting with patients was significantly greater, which likely reflects an early, more extensive development of the competency of communication (29). The programming of early clinical experiences to supplement traditional basic sciences is likely to be a significant focus in the training and assessment of competencies such as communication, professionalism, and systems-based practice. In this section we will discuss some ways medical schools are incorporating early clinical training in the preclinical curriculum through service learning, one example of a geriatric medicine curriculum at the University of North Texas Health Science Center and interprofessional education.

Service Learning in Medical Education: What is Service Learning?

Service learning is also known as community service learning, academic service learning, community based learning, community learning, and experiential learning. Ultimately, the goal of these types of learning is to involve students in a wide range of activities that are of benefit to others and use the experience generated in communities to advance curriculum and career goals. These goals include, gaining a deeper understanding of the course/curricular content, a broader appreciation of medicine as a discipline, and an enhanced sense of civic responsibility.

Service learning opportunities address concerns that are identified and articulated by the community. Service learning combines these community based service activities with structured preparation and reflection opportunities. Reflection is “sometimes described as the hyphen in service-learning; it is the link that ties student experience in the community to academic learning” (30). Proponents of academic service-learning feel that the real-world application of classroom knowledge in a community setting allows students to synthesize course material in more meaningful ways and offers direct application of theoretical models.

Models for Service Learning in Medical Education

Service learning is becoming an increasing priority in medical education as many schools begin to move away from lecture based curricula in favor of more hands on, experiential opportunities for student learning. Many medical schools across the country highlight the need to train a generation of doctors prepared to meet the health care needs of all individuals in their regions, especially those who are underserved or who lack adequate access to health care.

The Liaison Committee on Medical Education (LCME) mandates that medical schools “make available sufficient opportunities for medical students to participate in service learning activities,” and that schools encourage and support medical student participation in service-learning (31).

Medical schools across the country are integrating service learning into their programs to meet the LCME's mandate in different ways. Many are incorporating service-learning into their curricula, especially Introduction to Clinical Medicine courses, or elective courses focused on underserved communities. Clerkship rotations offer unique experiences for students to practice their clinical skills in both hospital and community based settings. Some medical schools provide service 'tracks' where students are supported and recognized for their work with underserved communities through mentorship, opportunities for reflection, and connections to longitudinal service learning projects. Finally, student run service learning allows for extracurricular community involvement, complementing students' academic careers without explicit integration into the curriculum or formal programs of the medical school.

Building a Preclinical Geriatric Medicine Curriculum

Geriatric medicine curriculum development should center on exposing learners to the uniqueness of the elderly population. The old adage from pediatrics, "children are not just little adults", can be modified and applied here, "geriatric patients are not just wrinkled adults". Exploring what makes older patients unique in the context of well covered topics such as pathophysiology, pharmacology, and chronic disease management is the key to building a successful geriatric medicine curriculum.

The setting for this educational experience can include the ambulatory clinic, geriatric consult service (outpatient or inpatient), inpatient all inclusive care of the elderly units, inpatient rehabilitation hospitals, long term care facilities (skilled nursing, assisted living), home based care, or all of the above. Regardless of level of training, all learners appreciate and learn best from hands on experiences with the appropriate balance of autonomy and supervision. Long term care facilities offer the most flexibility in achieving this goal while maintaining the preceptor's productivity, but each setting yields unique opportunities. Selection of encounters for student visits will largely depend on medical necessity. Because geriatric patients often have several co-morbid diseases, many with positive physical exam findings, students stand to learn as much from routine follow-up visits in the ambulatory setting as they learn from visits of higher acuity. Students should be assigned one or two patients per half day (depending on patient load and level of training) with an opportunity to present each encounter to the preceptor and review any pertinent physical exam findings at the bedside. If more than one learner is present, having these discussions in a traditional rounding format will give the students the chance to learn from each other and see more cases.

Bedside teaching should be mixed with case-based interactive learning sessions that focus on "bread and butter" geriatric topics. For example, atypical presentation of disease, the pitfalls of polypharmacy, and geriatric syndromes all provide rich subject matter for these types of learning activities. Organization of the overall geriatric curriculum will depend on how much time is allotted and what types of experiences are available. Rotations may range from short intensive three day immersion courses to four week clerkships. If time allows, instruction can be extended beyond medical management to systems based practice, health care financing, health care delivery systems, and health care reform, all of which have a significant impact on elderly patients.

Evaluation of students, preceptors, and the program itself, are all key components of curriculum development and improvement. Learning objectives should be based on core competencies. Learning activities should be structured in a way that allows the preceptor to measure the

student's achievement of those objectives. Examples of assessment tools include, but are not limited to, patient presentations, standardized patient encounters, narrative writing assignments, formal mini-lectures developed and presented by the students, and written or oral examinations. Likewise, students should be given an opportunity to offer constructive feedback to the preceptor about the content, structure, and usefulness of the course. This feedback is very useful for achieving quality improvement and fine tuning the curriculum.

Geriatrics Curriculum at the University of North Texas Health Science Center

In 2009, the University of North Texas Health Science Center (UNTHSC)/Texas College of Osteopathic Medicine (TCOM) with funding from the Donald W. Reynolds Foundation developed the Reynolds Geriatrics Education and Training in Texas (GET-IT) Program to meet the growing need to train physicians in the care of the geriatric population (32). One of the major innovations of this program includes Seniors Assisting in Geriatric Education (SAGE), a senior mentoring program, which provides a unique learning environment that provides a hands on experience while increasing student opportunities for early exposure to older adults and the issues they experience beginning in year one and into year two of undergraduate medical education. The SAGE Program is a mandatory experience for all TCOM medical students. Two osteopathic medical students are paired with community dwelling senior volunteers with over 60 percent of them referred from the local Meals on Wheels program and the others recruited from the UNTHSC geriatrics clinic, community churches and nondenominational organizations. Each visit requires an assignment allowing the students to practice and demonstrate competency in basic clinical skills, history taking, patient interviewing, physician exam skills, nutritional assessment, home safety, cognitive assessments, discussion of community resources and advanced care planning. Assignments are in alignment with the TCOM clinical medicine course curriculum giving students an opportunity to apply the skills they have learned in class and receive a pass/fail grade that is part of this course. An extensive orientation process occurs during an hour of the TCOM clinical medicine course where the SAGE Education program coordinator provides an overview of the program, guidelines for scheduling visits with the senior mentor, lessons learned from prior students and campus police providing safety considerations when making home visits. The SAGE education program coordinator also sends reminders to all students when the upcoming SAGE visit will be due for completion. The SAGE program coordinator also keeps in close touch with the senior mentor if the student is having difficulty in setting up the home visit or if the senior mentor has personal or health issues that may preclude them from participating in the program. Faculty mentors are chosen from a variety of backgrounds including geriatricians, family medicine physicians, gerontologic nurse practitioners, geriatric social workers, ethicists, pharmacologists and gerontologists are assigned 10-20 pairs of students with their senior mentors that constitute a pod to review and grade assignments and provide feedback to the students on-line via the Blackboard Learning System. Faculty mentors spend approximately two hours each visit grading their pods. The SAGE mentor provides feedback to the student and the course director on the attitudes, knowledge and skills demonstrated during the in home visits. At the completion of each semester, a focus group meets to solicit student feedback regarding the program which has been utilized to continue to revise and improve the student learning experience. The majority of the medical students and senior mentors have spoken highly about the program. The medical students' approach the experience

as having their first “real” patient and the senior mentors are happy to contribute in a small way to the training of future physicians.

Home Visits

By 2050, one in five Americans will be older than age 65. There were 14 million people older than age 65 with some kind of disability in 2000, according to United States Census data. Only slightly more than 10 percent of these people reside in nursing homes. All of these statistics point to an increased need for home care in the coming years. Despite this increased need and the legal, clinical, and ethical obligations for physicians to participate, little training is available to physicians in the area of home care (33).

Home visits are an increasingly important delivery of medical care to persons who cannot travel to see their physicians in an office. In addition, home visits allow the physician to learn useful information about a patient’s environment (e.g. a refrigerator with little to no food, lack of support system, clutter / trip hazards, medication management issues). It is an excellent learning opportunity for medical students, and, depending upon the year in which the experience is implemented, may serve as a student’s first real patient care experience.

When organizing a home visit experience for medical students, planning for the initial experience should begin at least twelve months in advance of the start of the medical school year. Planning for subsequent years should begin six to nine months in advance of the start of the medical school year. See Table 1 for a list of home visit logistics.

Initial planning will involve the development of learning objectives, development or selection of assessment tool(s) and an evaluation process, selection of reading materials, identification of necessary resources for the experience (i.e. preceptors for the visits, administrative personnel to organize and monitor the schedule), identification of the year in which the experience will take place and when during that year, and submission of an application to your Institutional Review Board (IRB) office if necessary. Once this process is complete, scheduling can begin.

Since the scheduling of the visits will depend upon preceptor and student availability, it is best to start working on scheduling as early as possible to match the two. Schedule planning in the beginning will involve internal planning among the home care team who will serve as preceptors, and communication between the home care team and scheduling personnel within the medical school.

If possible, one person on each side should serve as the point person for communications regarding scheduling and problem solving, to reduce confusion and staff burden. A system of communication should be worked out regarding who will be the main point of contact for the students regarding schedule changes and other problems that may arise, and how to address scheduling conflicts that arise for students. It is suggested that the person working closest to the home care team be the main point of contact.

Preceptors may opt to select two or three days of a week that will be designated as student days, and provide these days to the medical school scheduler, who can then produce a list of potential dates on which students can go out and assign students once the dates have been approved by the home care team. This list should include extra dates for students who miss their scheduled visits

or have a conflict at the time of their assignment and cannot successfully swap dates with another student. Once the dates have been approved and students have been assigned, preceptor names should be assigned to the dates, creating a master schedule for the experience.

Once the schedule is complete, the dates should be communicated to all appropriate preceptors and students, with a reminder system in place to alert both the preceptor and students to the upcoming visit. The reminder should include, date of visit, time, initial meeting location, name of preceptor and contact information (pager or cell phone, and email address), any pre-reading for the visit, and any other useful information regarding the visit.

Prior to the start of the visits, holding an orientation session for all students who will go out on visits is a great way to communicate learning objectives and expectations for the experience, and other educational information related to the visits and patient population. An orientation for preceptors is useful as well to communicate learning objectives and expectations, and teaching techniques. The patients being visited should also be notified well in advance about the medical students impending arrival.

Once all of the visits are complete, it is valuable for preceptors and other relevant faculty and staff to meet as a group to debrief and review what worked, what did not, review evaluation data, and briefly plan for the next year of home visits.

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Table 1

Logistics: Nursing Home Visits

Planning - Initial

- 1) Begin at least twelve months in advance of the start of the medical school year
- 2) Site selection – which nursing home(s) will students visit
- 3) Discussion of the learning activity with the medical director
- 4) Development of learning objectives
- 5) Development or selection of assessment tool(s) and an evaluation process
- 6) Selection of reading materials,
- 7) Identification of necessary resources for the experience (i.e. preceptors for the visits, administrative personnel to organize and monitor the schedule)
- 8) Identification of the year in which the experience will take place and when during that year
- 9) Submission of an application to the Institutional Review Board (IRB) office, if necessary.

Planning - Subsequent

- 1) Begin six to nine months in advance of the start of the medical school year.

Scheduling

- 1) Scheduling the visits will depend upon preceptor and student availability. It is best to start working on scheduling as early as possible to match the two.
- 2) Schedule planning will involve coordination amongst the learning activity director, nursing home administration, and scheduling personnel.
 - a. The nursing home sites will need to identify the days that they are able to accommodate trainees.
 - b. These days must be provided to the preceptors to verify their availability, and provided to the medical school scheduler, who will produce a list of potential dates on which students can visit the nursing home and assign students once the dates have been approved by the nursing home administration and preceptors.
 - c. The list of dates should include extra slots for students who miss their scheduled visits or have a conflict at the time of their assignment and cannot successfully swap dates with another student.
 - d. Once the dates have been approved and students have been assigned, preceptor names should be assigned to the dates, creating a master schedule for the experience.

Communication

- 1) A system of communication should be worked out regarding who will be the main point of contact for the students regarding schedule changes and other problems that may arise, and how to address scheduling conflicts that arise for students.
 - a. It is suggested that a person familiar with the nursing home administration and preceptors be the main point of contact.
- 2) The finalized dates should be communicated to all appropriate preceptors and students, with a reminder system in place to alert both the preceptor and students to the upcoming visit. The reminder should include, date of visit, time, name of nursing home host the students, initial meeting location if different from the nursing home, name of preceptor and contact information

(pager or cell phone, and email address), any pre-reading for the visit, and any other useful information regarding the visit.

Orientation & Debriefing

- 1) Prior to the start of the visits, holding an orientation session for all students who will visit a nursing home is a great way to communicate learning objectives and expectations for the experience, and other educational information related to the visits and patient population.\
- 2) An orientation for preceptors is useful to communicate learning objectives and expectations, and teaching techniques.

Once all of the visits are complete, it is valuable for preceptors and other relevant faculty and staff to meet as a group to debrief, review what worked, what did not, review evaluation data, and briefly plan for the next year of nursing home visits.

Curriculum Management

Curriculum is the backbone of the educational process for students. Curriculum management includes producing the academic program of educational experiences, including the courses and other academic requirements in a given year, mapping content across courses and the planning for changes and future program needs. The curriculum must be considered from many angles and levels and ideally is designed and maintained to function smoothly from individual lessons through courses and phases all the way to the entire MD program. Keeping the curriculum on track is a complex task with many moving parts. Any changes must be accounted for across all years and in some cases several sites.

The goal of this chapter is to describe the complexity and interrelated nature of the many aspects of curriculum. This begins with the institutional mission, and includes the educational philosophy of the school and the individual faculty, models for curriculum, governance arrangements, and students and faculty.

What to Teach?

History and Context for Curriculum Change

In 1910, Abraham Flexner published the Flexner Report, a study of medical education in the United States and Canada. It informed the American medical education system, which has been largely dichotomous between basic sciences and clinical fields (1). More recent curriculum reform efforts have also trended toward integration of basic and clinical sciences (2). Professional and funding organizations have joined this effort, including the American Association of Medical Colleges (AAMC), which pointed out the unwanted dichotomy in traditional medical education, and the Robert Wood Johnson Foundation (RWJF), which established a program in 1991 called “Preparing Physicians For the Future” to encourage integrated, clinically relevant medical school teaching (3, 4).

The Liaison Committee on Medical Education (LCME), which reviews and accredits all medical schools in the United States and Canada, has also called for curricular integration. In its most recent edition of Standards for Accreditation of Medical Education Programs Leading to the M. D. Degree, ED-33 reads: “There must be integrated institutional responsibility for the overall design, management, and evaluation of a coherent and coordinated curriculum” (5). The LCME mandate for curricular integration is quite specific, as this sentence is then deconstructed, with definitions provided for each phrase. For example, evidence of coherence and coordination includes logical sequencing of various segments of curriculum, content that is both integrated and coordinated within and across academic periods of study (horizontal and vertical integration), and pedagogical methods and student assessment methods that are appropriate for achieving the medical education program’s educational objectives.

Changes in licensure requirements for medical school graduates have also led to a re-examination of basic and clinical science integration in medical schools. The three-step United States Medical Licensure Examination (USMLE) was first implemented in 1992. In 2004, the

exam's governing committee performed a review of its design, format, and structure in the context of contemporary academics, regulatory guidelines, and practice environments. The most prominent recommendation that arose in a final report was for integration of fundamental science into clinically relevant contexts (6).

Concurrent with national changes and general trends in higher education, many medical schools have become interested in physical space in relation to learning. They are recognizing that different instructional strategies require different kinds of classrooms. Thus, the opportunity and desire to re-conceptualize and redesign space in some medical schools has occurred in tandem with curriculum change. Newer medical education buildings are often constructed with curriculum design and implementation in mind. Examples include the University of Virginia School of Medicine's Claude Moore Medical Education Building (2010), Johns Hopkins University's Armstrong Medical Education Building (2009), Emory University's medical education building (2007), Oregon Health Sciences University (building currently in progress for fall 2014), and George Washington University (space re-design and renovation and curriculum change currently in progress for fall 2014). These buildings are characterized by varied spaces which enable integration of different curricular components and inter-professional health education under one roof. These buildings typically include: clinical skills assessment facilities, simulation centers, technologically enhanced laboratories, abundant open space, technologically enhanced lecture halls for large groups, location to promote inter-professional education, and flexibly designed small-or medium-sized rooms for problem-based or team-based learning in small groups.

Trends in Medical Education Curriculum and Instructional Design

Medical education has moved away from a dichotomous, teacher-driven approach, towards a student-centered approach. A Flexnerian teacher organized what was to be taught and learned in a discipline-driven, hospital-oriented, opportunistic, apprenticeship model of teaching.

Institutional Mission

A school of medicine is like a federation of departments whose work extends in many directions besides undergraduate medical education. Sometimes it may seem challenging to keep the institutional mission front and center within the context of the medical school when departments sometimes have competing interests. But ultimately every aspect of medical education, from orientation to hooding should stand in support of the institutional mission.

Curricular Goals and Effectiveness

In the largest sense, the goal of the curriculum is to prepare students to work as physicians. However, a tension exists within the curriculum as each step must not only prepare students for the ultimate goal of a career as a doctor, but also for the next phase of the process. For example, the foundational years must simultaneously prepare students for Step 1 of the United States Medical Licensing Exam (USMLE) board examinations, prepare them for entering the clinical phase, and ultimately prepare them for residency. Each phase must build on the preceding one and look to the following one, but no phase can entirely ignore the final product.

Basic Science, Clinical Science and Clerkship Preparedness

In considering how best to prepare students for clerkships, faculty often debate the order of topics or activities students should experience. Traditionally, schools of medicine presented all the “basic science” in the first two years with few clinical activities. The thinking was that students could not work with patients or apply skills until they had mastered biochemistry, microbiology and other scientific foundations of medicine. Some schools have provided clinical experiences to students from the very beginning, arguing that such exposure gives students a taste of their chosen career and allows them to connect theoretical and practical knowledge. Integrated learning is more and more frequently the norm, and is supported by research on learning. Schools provide integrated learning experiences for students by incorporating early clinical experience along-side classroom learning. Providing a clinical immersive experience at the very beginning of the first year and ongoing patient panels in which students follow several of their “own” patients over a long period of time, from day one of medical school are two examples (7). It is now common for foundational courses to be integrated across disciplines and incorporate clinical cases and actual patients who attend classes and meet students.

Content into Courses

There is considerable debate nationally about how to identify content for each course, especially in the foundational years. Specific objectives, specific topics, depth of coverage and amount of content per course are all areas of concern for individual instructors and the faculty committees that oversee courses. Medical students do not need the same level of coverage in basic sciences as doctoral students in those departments, but they do need to understand the foundations of science for medical education. Some of the national organizations representing basic sciences have developed lists of topics and/or objectives for medical education, but not all have, and not all faculty agree with those that have been developed. Science changes over time, and there is also discussion of how to eliminate or reduce older content when new science needs to be included.

Learning Objectives

Learning objectives are often called performance objectives. They are brief, clear, specific statements of what learners will be able to perform at the end of instructional activities. They stem from course objectives, which are broad statements of overarching course goals and outcomes. Learning objectives, in comparison, are more targeted and granular statements about expected student performance. They are generally competency-based, given that they designate exactly what students need to do to demonstrate mastery of material. Learning objectives serve many purposes: they facilitate overall course development in a goal-directed plan, they inform students of expectations, they provide information for developing assessments because they identify the type of things students have to produce to demonstrate their understanding of material, they clarify the intent of instruction, they guide formation of instructional activities in a course within a curriculum, and they provide a framework for evaluating student performance and progress. Learning objectives may furthermore be a contract between students and faculty because it sets the tone for accountability. Learning objectives drive curriculum planning, and create a framework for overall program evaluation within a UME curriculum. Learning objectives also help provide evidence of student learning, which can be utilized for accreditation

purposes, or to meet criteria and standards of important external bodies. Learning objectives should address the behaviors students need to demonstrate mastery with, the conditions under which students must perform, and criteria against which students will be judged. There are ways to write good learning objectives or improve existing ones. It is important to use action verbs to describe specific desired student performance that matches specific course content targets. Learning objectives should be concise in that they should focus on a single outcome. They should not be multi-pronged, with multiple parts. Learning objectives should steer clear of vague wording and things that cannot be objectively assessed.

SMART: Learning objectives should be **S**pecific, **M**easurable, **A**cceptable to the instructor, **R**ealistic to achieve, and **T**ime-bound with a deadline.

Curriculum Mapping

Curriculum mapping is concerned with documenting and diagramming the curriculum in order to avoid creating gaps and unintended redundancies in the content and as a way of monitoring all aspects of the curriculum as a whole. Mapping is typically concerned with both what is taught (content, specialties/areas of expertise addressed, and learning outcomes), how it is taught (learning resources and opportunities), when it is taught (timetable and chronology or sequence of the curriculum) and measuring whether students have achieved expected learning outcomes (assessment). Curriculum maps serve two main functions. The first is to make a curriculum more transparent to all interested parties (e.g., faculty, students, curriculum developers/instructional designers, program evaluators, administrators, professional bodies, and the public). The second function is to demonstrate links between different parts of the curriculum, and show how separate pieces, or elements, of the curriculum thread together.

Standards ED-33 and ED-37 require that the institution take responsibility for design, management, and evaluation of a curriculum and monitor content so that the educational objectives are achieved (5). Curriculum mapping can, and should be, a medical schools response to meet the above standards. Mapping components generally include an event log (lectures, small groups, self-study, and other designations), learning and course objectives (knowledge, skills, behaviors, disciplines) and assessment (formative and summative methods, exams, and questions). Possible challenges to curriculum mapping include resistance to change by faculty, administrators, and/or students, precisely defining ACGME competencies, performance standards for each discipline, faculty/administrator training, time constraints (data entry into a mapping program/system is time consuming), and keeping the system of choice at an institution current and ensuring that the system changes concurrently with evolution of the curriculum in place. A curriculum map can be explored via many avenues, or windows. These may include the following:

- Expected learning outcomes.
- Curriculum content or areas of expertise covered.
- Student assessment.
- Learning opportunities.
- Learning location.
- Learning resources.

- Timetable.
 - Staff.
 - Curriculum management.
 - Students.
- Examples of curriculum mapping systems include Achieving Competence Today, One45.
 - It is important that curricular alignment occur across within courses so that in an integrated curriculum, all of the courses string together with material linking
 - Together between courses, and between pre-clerkship and clerkship, and again across sites, if there are multiple sites involved in training for clinical rotations, or multiple campuses of the medical school who must coordinate and align the curriculum.

Course Management

Course management for teaching generally occurs through software called a learning management system (LMS). LMS software enables faculty to upload course materials and course administrative information (schedules, grading procedures, and course policies) and publish the information to students. Faculty can organize their courses and use the LMS to help guide instruction. Some systems allow faculty to embed external links to podcasts, online quizzes, or other interactive technology.

Course management at the curricular level occurs through governing committees and curriculum staff. There may be advisory committees assigned to courses, and these may take on annual or biennial reviews of courses for appropriateness of content and fit within the academic program of study. Staff within the school of medicine may also support course management by providing technological and pedagogical expertise to faculty as they plan and deliver their courses.

How To Teach?

Pedagogy

Pedagogy refers to the method and practice of teaching, or means and ways instructors teach material to students. The choice of instructional methods depends on content (what we want to teach, who we are teaching, and the level of competence expected of students. Content can be divided into three domains of knowledge - skills, attitudes, and values. When teaching knowledge, instructors can use a variety of methods all with the goal of getting the learner to actively engage in the process of learning the material. When teaching skills, it is important to demonstrate, and to point out key aspects, and to supervise the student while practicing the skill, or talk the student through the steps, while acquiring a particular skill. When teaching about attitudes, instructional methods that involve application of the attitude in specific situations are appropriate.

Instructional Design

Instructional design, sometimes also referred to as curriculum design, or curriculum development, refers to the practice of creating instructional experiences that make acquiring knowledge and skills more effective, efficient, and appealing to learners. As a field, instructional design traditionally has been heavily rooted in cognitive psychology, educational psychology, and behavioral psychology. Instructional design is a process that in general terms, consists of determining the learner's current needs and state, and defining the end goal of instruction, and then creating an intervention to assist in the transition from the current state, to a new state of knowledge/learning/skill (8-10). The intervention, in this case, is informed by pedagogically (process of teaching), and andragogically (adult learning) tested theories of learning. Outcomes may be observable, and measurable, or may be implicit, tacit, and hidden. See the Appendix for a short description of current instructional methods.

Oversight

Administrative Design

Administrative design is the organizational structure of the curriculum which includes how the curriculum is governed and managed. This includes both faculty and staff, often with input from students as well. Administrative design should complement the program design so that systems are responsive and efficient.

Governance

Clear governance is critical to effective functioning of the curriculum. Without a clear chain of command and oversight accountability, there is no way to maintain the health of the curriculum or adapt to new needs. The governance structure should allow for politically unpopular decisions to occur when needed and provide a way to enforce them. At the same time, the governance should provide trusted mechanisms for input from a variety of stakeholders. Ultimately, the faculty governs the curriculum, which means the faculty will also need to understand the complexities of the program and have methods to learn about what is taking place. Most schools of medicine employ a tiered governance approach to curriculum in which several committees that focus on aspects of the curriculum report to a more generally focused curriculum committee, which in turn may report to a larger faculty committee within the school of medicine. The lower level committees include students, faculty and staff. There may also be a mechanism for ad hoc committees to convene to address particular short-term or one-time concerns.

Staffing Structures

A school of medicine consists of a set of clinical and foundational science departments that contribute to the program as a whole, but do not exist solely for the MD degree. Staffing to support the program, therefore, exists both within individual departments and within the school of medicine administration. It can be challenging to coordinate efforts across so many units, especially when most departmental staff have responsibilities beyond the school of medicine's needs. Centralizing most of the administrative work within the school of medicine can alleviate this tension to a degree, but it will always be necessary to coordinate with busy departmental staff at some level.

Dispersed Sites

The need for effective communication and collaboration is even more pronounced when schools consist of a number of geographically dispersed sites. Dispersed sites may provide instruction in the foundational courses or in clinical clerkships (or both) and must align with the institutional mission of the academic center as well as responding to specific site expectations or needs.

It is essential, and challenging, to ensure congruence across sites and schools may use a variety of strategies to achieve this. Annual course meetings allow faculty teaching the same course across sites to come together to discuss objectives, assessments, site-specific vs. common topics, and remediation plans for struggling students. Common exams provide a way to evaluate how well students are learning across sites and help to ensure that common material is covered. Podcasts and other recorded materials are often available so that students can share learning resources regardless of their geographic location. Likewise, using live teleconferences for some didactic sessions can help to assure congruence and alignment.

Policies Relating to Curriculum

Policies relating to curriculum typically include such concerns as attendance, absences, passing and remediation, expectations for examinations, academic special circumstances, and graduation requirements. Policies may be driven by institutional expectations or by USMLE requirements, and are set through the governance structures for each school.

Remediation

Students are generally identified as being in need of remediation upon failing a course or clerkship. At that point, a system is activated in which faculty (either the individual instructor or a committee) decide how and when the student will attempt to pass on a second try. Policies may dictate the circumstances under which students can retake examinations, the time allowed to prepare for a reexamination, and the types of examinations that qualify for the student to pass the course or clerkship. In some cases students may be expected to retake the entire course or clerkship.

LCME Compliance

Medical schools pay very close attention to the expectations of their accrediting body, the Liaison Committee on Medical Education (LCME), sponsored by the Association of American Medical Colleges (AAMC) and the American Medical Association (AMA).

The LCME publishes accreditation standards and procedures and holds schools accountable through an extensive process of self-study and site visits every eight years. The “Functions and Structure of a Medical School, Standards for Accreditation of Medical Education Programs Leading to the MD Degree” is developed and published by the LCME. Schools use this document to remain compliant and prepare for their reaccreditation visits. The standards cover all aspects of the program, including curriculum. Curriculum-related standards mostly fall into Section II: Educational Program for the MD Degree (known as “ED”). ED standards

cover issues such as objectives, weeks of instruction, content focus, teaching and assessment, curriculum management, and evaluation of the program.

The LCME also requires schools to respond to annual questionnaires about structure and operations, which are used for continuous monitoring between reaccreditation visits. The results of this data collection are produced in reports for the AAMC.

USMLE Changes

The United States Medical Licensing Exam is a series of examinations leading to medical licensure in the United States. Students take Step 1 and Step 2 during medical school, while Step 3 occurs during residency. In recent years the USMLE has revised the question format for Step 1 to better reflect the practice of medicine. Questions are integrated across disciplines and draw upon both basic science and clinical knowledge. Step 2 consists of two parts, Clinical Skills (CS) and Clinical Knowledge (CK), and students must pass both parts. Passing scores for all steps are adjusted periodically.

Faculty Development

In K-12 education faculty are expected to earn a certification or degree in teaching and learning in order to qualify to teach. However in higher education expertise in a given field has usually been considered enough. Therefore, individuals with MD and/or PhD degrees and no training in education find themselves in front of students and expected to teach. To ensure that faculty have the skills needed to help students learn many schools provide faculty development opportunities. With recent advances in research on learning and evidence-based best practices for teaching there is even more reason for anyone to be leading a class to have proper training and experience.

Faculty development opportunities can range from very brief one-time workshops designed to expose faculty to a variety of approaches to teaching and/or assessing students to year-long certificate programs or master's degrees in medical education. Many schools employ a train-the-trainer model as a cost-effective and efficient way to disseminate information and skills across a large academic center. A cadre of faculty members becomes trained in certain areas of medical education and is then expected to lead training for others at their site or in their department.

Curriculum Models

Curriculum refers to the learning that is expected to occur during a given program of study. Curriculum encompasses knowledge, skills, and attitudes, and specifies the main teaching, learning, and assessment methods to be used. It also indicates what required learning resources are needed to support effective course/program delivery. While a syllabus describes the content of an educational program, it is only one part of the curriculum; curriculum refers to more than the syllabus—it refers to the overall educational program of study, such as sequence of learning within educational programs and courses leading to a degree.

Curriculum is typically not developed from scratch. Educational sociologists recognize that a curriculum operates within the structure of an organization, or within the constraints of a society within which it functions. Formal curriculum, or official curriculum, is that which is written and published, e.g., course documentation. In contrast, hidden curriculum refers to unofficial aspects of the educational environment and student learning which are not explicit, or are not formally elaborated on, but which tie in to the learning culture of an organization, discipline or field of study. These tacit aspects may relate to students' unstated, non-explicit values and expectations. Understanding this dichotomy is important because it highlights that the learning process is just as important as the end product of a curriculum. Therefore, those who teach must be aware of the official and implicit factors that impact student learning. A major goal of curriculum development should be to ensure that the functional curriculum (i.e., that which is being delivered) is, indeed, the official curriculum.

Curriculum development is a dynamic, cyclical, four-stage process involving needs assessment, design, implementation, evaluation (11).

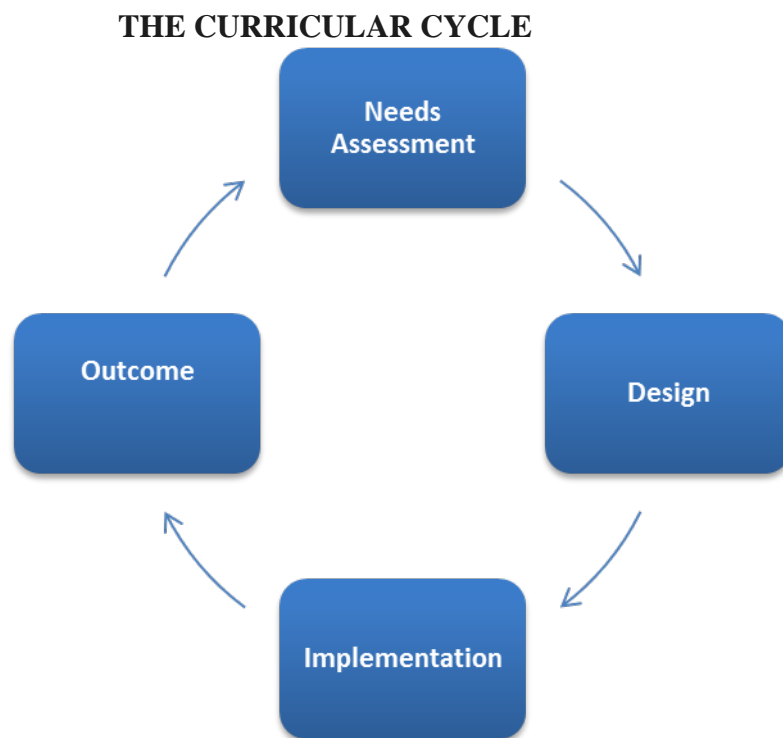


Figure 1: The Curricular Cycle

- Needs Assessment:
 - Identify possibilities, ideas, and constraints.
 - Identify educational or professional contexts behind proposed curriculum.
 - Define learners' needs according to educational and/or professional standards.
 - Articulate broad curricular aims.
 - State desired outcomes.

- Design:
 - Establish and agree upon a broad, structured framework.
 - Identify areas of teaching and learning, topic sequence, and assessment timing.
 - Delegate details to individuals or teams, who in turn develop programs of study.
 - Build programs of study by creating:
 - learning objectives and outcomes
 - time frames,
 - learning materials and content
 - teaching strategies
 - assessment materials.

- Implementation:
 - Unveil and incorporate a newly created curriculum.
 - Continuously monitor for areas of the curriculum to improve.
 - Tweaking and further refine the curriculum, even after it has been rolled out.

- Outcomes:
 - Implement appropriate, realistic program evaluation strategies to monitor ongoing quality, with a goal of continuous improvement.

It is important to see the curricular cycle as fluid and dynamic, not static and one-way. It is common to re-cycle through stages, allowing for continuous improvements informed by evaluation data.

Undergraduate Medical Education Curriculum Models

In the traditional pre-clinical/clinical curriculum, pre-clinical knowledge and skills are conceptually and temporally separate from clinical knowledge and skills. In an integrated curriculum, various subject disciplines and sub-disciplines are fused around meaningful and organized themes or concepts, such as body organ systems, or the concept of community medicine. Vertical integration involves blurring the demarcation between pre-clinical and clinical courses is blurred. Horizontal integration involves the clustering of knowledge and skills from many specialties.

In medical education, vertical integration blurs the boundaries between pre-clinical and clinical courses, and horizontal integration describes the clustering of knowledge and skills from many disciplines around different themes, such as body systems. For example, a cardiovascular systems based courses could include anatomy and physiology, but also sociology, epidemiology, pathology, clinical medicine, radiology, and biochemistry, among many other possibilities. Integrated approaches' strengths are that they illustrate the multi-disciplinary nature of medicine and the sub-areas within them, enabling students to learn meaningful information in chunks. This in turn makes information-retention easier and more applicable. Integration encourages higher level learning, and its interdisciplinary nature, can foster faculty cooperation, collaboration, and team-teaching. The main drawback is omission or over-teaching of some subjects, which is avoidable with proper curriculum management and oversight. Another drawback is when an institution's organizational structure or funding mechanisms, create invisible yet distinct political lines, forming a barrier to education. Examples of integrated curriculums might include University of Virginia School of Medicine's Next Generation "Cells to Society" curriculum, or the Uniformed Services University of the Health Science (USUHS) newly implemented "Molecules to Military Medicine" curriculum.

PBL based curriculum is another popular model, based on problem based learning (Appendix A-Learning Methods and Strategies). Problem-based curriculum's advantages are that it enhances student skill development in problem solving in a health care context, and it encourages self-directed learning, curiosity and inquiry (12). These in turn can lead to better critical reasoning and thinking skills, and better knowledge retention and application - a necessary skill in clinical contexts throughout one's medical career. Knowledge acquired in a PBL curriculum has the potential to be integrated, and based on real and common, problems. PBL curriculum drawbacks are that it is very demanding on students and instructors, especially those new to this method of teaching and learning. It calls for students' and teachers' flexibility and responsibility. Instructors may not be happy strictly facilitating, rather than being expert imparters of special knowledge. Students may also doubt their instructors' expertise because of their mere facilitator role. PBL is resource-intensive, and requires good interpersonal dynamics between teams, and staff/faculty, and their students. Furthermore, PBL curriculums may not be conducive to traditional assessment methods. The difficulty applying standardized assessments stems from the fact that students in PBL curriculum medical schools define their own learning goals which means there may not be a uniformly accepted body of knowledge.

Competency based curriculum is systematic and based on learning outcomes or competencies deemed essential in medicine once training is complete. It should provide students with high quality learning activities, aim for task mastery, and entail feedback that gives students a chance to practice, or if needed, correct performance mid-course. Students are assessed against stated competencies and rated as either competent, or not yet competent. Curriculum planners in this type of curriculum need to think carefully about how to define competence. Assessments such as objectives structured clinical examinations are widely used in measuring competence in clinical skills. Competency models require trainees to perform tasks to high levels of competence, as would occur in an actual work (medical/health care) setting. This model calls for rigorous needs analysis, a task analysis, close alignment of learning objectives with specific competencies, and well-designed teaching, learning, and assessment methods.

Measurable Outcomes

In evaluating the success of the curriculum leaders must match outcomes to goals, and the outcomes selected must be measurable in some way. The most obvious measure is a students' ability to complete the curriculum and graduate. In addition, schools may use students' scores on board exams and the extent to which students are able to match into the residencies of their choice as measures of the program's success. To comply with accreditation requirements, schools may also need to measure internal features of their programs such as consistency across several sites or equity of opportunity for all students.

Assessment

Learning objectives should map on to assessments in medical education. When we think of assessment, we think of tests or measures of how to see what students have learned and how well they have learned what is expected of them. Assessment may be *informal* (such as probes and informal quizzes in class), or *formal* (midterm or final examinations in a course). It may be *formative* (occurring while instruction is occurring to monitor how much and how well students are learning), or *summative* (occurring at the conclusion of a course or a segment of the curriculum where there is a clear ending demarcation, to see how much and how well students have learned). Formative assessment is more diagnostic, used by instructors during the learning process to modify teaching and learning activities to improve student attainment. In addition to informal quizzes and assignments or knowledge probes during course activities, formative assessment may occur through the use of OSCE's (Objective Structured Clinical Examinations), or Standardized Patient Examinations (SPE). It may involve qualitative feedback in lieu of scores or in addition to scores, so that the focus is on content and performance.

Summative assessments, on the other hand, often seek to monitor outcomes, and sometimes are externally driven, for accountability purposes. Summative assessments look at summarizing development of learners at a particular point in time, e. g., after a period of time.

Perhaps the most succinct way to describe the difference between formative and summative assessments is that formative assessments are FOR learning, while summative assessments are OF learning.

Grading systems in medical schools is typically in the form of either letter grades (e.g. A, B, C, etc., or some variant of it, or a pass-fail system. In recent years, there has been a shift at many schools away from letter-grade systems, to pass-fail systems, which may be two-point (pass or fail), or three-point (high pass, pass, fail, or honors, pass, fail, or another similar variant, such as a four-point system with honors, high pass, pass, fail). Some schools have pass-fail systems in their pre-clerkship curriculum, but letter grading during clerkships (13, 14).

Curriculum Review

There is a tendency to undertake a major curriculum overhaul, implement new ideas and then stand back and let it run, without planning. Over time the curriculum may fall out of date or lose focus as scientific knowledge advances but changes don't occur within courses. Faculty may come and go and may not be trained in the curriculum intent. Leadership changes and new leaders may have different philosophies about the curriculum and so on. When accreditation is looming schools have an incentive to look closely at what they are doing and consider refreshing or overhauling curriculum. However, many schools are now trying to adopt continuous improvement processes that attempt to combat the tendency for curricular entropy and keep the curriculum robust at all times.

Good governance structures are one way to ensure continuous improvement, as are faculty development opportunities and institutional cultural support to take advantage of them. Recently, the American Association of Medical Colleges (AAMC) has been increasing its expectation of data collection from schools of medicine and providing resources to ensure commonality of data across schools. Schools will be required to submit extensive data using a common system and specific terminology. This effort will help schools compare their programs and may serve to provide the impetus for continued improvement.

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Appendix. Instructional Methods and Design

Active Learning

It is important to mention active learning in any discussion of instructional methods. Instructional methods or teaching strategies can be active or passive. The concept of student engagement is an important one. Active learning is learner-centered, whereas passive learning is teacher-centered. Active learning promotes engagement, analytical reasoning, and critical thinking. It is built around well-defined learning objectives, and fosters not only integration of separate pieces of knowledge, but also its application (1, 2). When students learn actively, they engage in problem solving, idea sharing, giving and receiving feedback, and teaching and learning from one another. Active learning calls upon faculty to facilitate students' skill and knowledge development (1). Active learning is collaborative on the instructor's part (e.g., it often features team-teaching, and close collaboration with instructional designers, curriculum developers and educational technologists to deliver a package of engaging learning experiences. Active learning is collaborative on the students' end, because it may require students to work in small groups, and to interact with peers as they grapple with new class material. Active learning incorporates assessment into the curriculum and into instructional sessions such that there is coherence and consistency throughout a teaching session or learning experience. Research on active learning links it to enhanced academic achievement, better retention, more facile application of knowledge, higher levels of understanding and mastery of course content, development of critical thinking and problem solving skills, improved clinical competencies, enhanced interpersonal and teamwork skills, better classroom engagement, positive attitudes, academic satisfaction, and self-directed, lifelong learning (1,3-7).

Below are some commonly used instructional strategies used during the pre-clerkship years, i.e., in undergraduate medical education (UME).

Audience Response Systems (ARS)

An Audience Response System (ARS) is an educational technology that gives instructors and learners additional, novel ways to interact during a class session. It is considered an active learning method, and promotes attention to task, by requesting that learners respond to questions that are embedded in a presentation, such as a Power Point talk. It is typically conceptualized for use in large lecture settings (100 students or more), although it has been used with smaller groups, such as during clerkships (8-9). ARS involves an individual input device, such as a PDA or phone, a laptop with appropriate software, proprietary keyboards, or clickers. Students can communicate anonymous responses, typically using wireless technology, to a central lecture computer (such as the instructor's machine at the podium). The ARS can then quickly display pooled results, in poll format onto a projected screen for the whole class to see. So the instructor poses a question, the audience responds via ARS, and results show up on a screen for teacher and students alike to discuss or examine (10-11). ARS questions, if designed well, can be used as an immediate assessment of how student learning is progressing (9). Based on how students are learning, the instructor has a chance to clarify or modify points in his/her presentation as it is being given. In this way, instruction is personalized to the group of students during instruction. ARS promotes problem solving by

extending lectures beyond basic transmission of information (9). ARS does require investment on the part of the medical school, in the specific technology required to make these systems work, along with a faculty commitment to and investment in learning how to use the system and on-site technical support during classes (10-11).

Clinical Case Discussions

Clinical case discussions are focused discussions where a faculty member will present a case or problem and lead a discussion with the group. Cases should be relevant to learners, and linked with learning objectives, and must contain teaching points that can be applied to other situations. The cases are typically prepared in advance by faculty members to capture realistic situations where a physician (representing medical students) confronts a dilemma common to the discipline. Cases may also be prepared by students, based on a particular type of event or experience. The discussion is usually led by the instructor, but can be assigned to the student. Videos and handouts may be incorporated to stimulate further deep discussion and reflection.

Demonstrations

Classroom demonstrations are another valuable instructional method. Demonstrations are valuable in teaching many different skills, or helping students to examine attitudes and values. This may take the form of videos or pictures that show various pathologies, including rashes, or murmurs, or deformities or other intonation that cannot be described verbally, only taken in through the eyes and ears. Demonstrations bring about a shift in classroom dynamics that draws students' attention. For example, a patient who describes his or her condition or experiences to a group of medical students enhances learning in a way that a lecture by the instructor cannot. Watching and critiquing a live patient interview demonstration may in fact help medical students develop or improve their own mental flexibility and interviewing skills. (12).

Flipped Classrooms

This is a new model of education informed largely by ongoing work at the K-12 level. In "flipped" classrooms, which often utilize such computer technology as pre-recorded lectures, among many others, students acquire basic knowledge and facts about a subject through videos or lectures that are available to them online. Students watch them on their own time, and as many times as they need to watch or listen to them. This is followed by subsequent classroom instructional sessions, where students dive into higher level learning with the instructor, through more active learning approaches, including problem solving, or clinical scenarios. The classroom then is essentially "flipped" in that lessons that would previously have been taught in class are now learned at home, and the "homework" assignments are instead transformed into in-class activities that are done collaboratively with peers, and guided by teachers. It is self-paced, and relevant to real world issues and problems (13). Prober & Khan (2013) lay out a new model for medical education, in which students access pre-recorded videos before class and learn new concepts on their own time. They then go to class where expert faculty lead dynamic and interactive sessions, where students work to apply new knowledge at a higher level. The instructor is a facilitator, rather than a lecturer, in a properly executed flipped classroom (13).

Lecture

Lecture is and has long been one of the most commonly used formal teaching methods in the world. Lecturing involves expositions by a speaker who wants an audience to learn something (14). Lectures can be a good way to provide a broad overview, or to introduce a new topic, particularly where the goal is to have students acquire background familiarity with a subject area, rather than a working knowledge. It can provide students a cognitive framework to help organize material or restructure it to make it more relevant. But lectures are less effective at helping foster such learning skills as analysis, evaluation, teamwork, or application to real-life scenarios. Lectures also are ineffective at teaching or changing student attitudes. So lectures offer an opportunity to deliver a large volume of information to learners, using the instructor's time efficiently. Instructors can prepare and practice content and delivery and organize their presentation in a way that helps students synthesize information. However, the major criticism of lectures is that it is passive listening, which does not promote learning.

Online Learning

Many schools are starting to experiment with online courses or distance learning classes offered online. Known as MOOCs, or Massive Open Online Courses, these courses are designed to handle large volumes of students simultaneously in many different locations (15). They are, at present, typically being offered by schools through a partnership with companies such as Coursera, edX, Edutopia, and Futurelearn. Another big name that includes some offerings in medical education is the Khan Academy, a non-profit educational website created in 2006 by Salman Khan, an MIT and Harvard Business School graduate, whose mission was to provide free, world-class education for anyone regardless of where they are located. Offerings include more than 4,500 micro lectures in video tutorial and YouTube format, in numerous subjects that include medicine, and sciences such as biochemistry, and organic chemistry, which form the foundations upon which students prepare for MCAT's and for medical school, and again encounter once matriculated in UME curriculum.

Pre-Recorded Lectures

These are lectures, sometimes with video clips, which a faculty member records beforehand, using software such as Camtasia. They are then made available to students via podcasts or similar technology, so that students may listen to them on their own, often typically expected prior to class, in order to make way for more active learning. This is consistent with the growing movement in education, called the "flipped classroom".

Problem-Based Learning (PBL)

Problem-based learning (PBL) is similar to focused case discussions. However, PBL specifically encourages increased learner independence. PBL is ideally used in small groups, typically of 4-6 students. Students are first presented with a clinical problem that unfolds over two or three class sessions. There is progressive disclosure of patient history/historical information, physical examination information, laboratory results, and other data. Students define the facts, develop a hypothesis based on those facts, and then develop their own

learning objectives and plan for solving the clinical problem at hand. At the beginning of each session, students self-assign roles as leader or moderator, reader, scribe, or participant. Roles rotate in subsequent sessions to ensure maximum active participation from all group members. Between sessions, students research learning objectives. Then, they present their information back to the group for discussion. PBL is meant to foster self-directed learning, as well as teamwork. The role of the instructor in PBL is as a facilitator, rather than leader or director. PBL fosters focused learning and encourages students to think of the clinical context and usefulness of the information that they find and report to their peers. PBL helps students work independently and autonomously, focusing on self-directed learning. At the same time, PBL involves teamwork. Instructors, however, have less control over the PBL learning environment than they do in clinical case discussions or lectures, because they function more as facilitators, guiding from the side rather than leading from the front (16).

Simulation

Simulation teaching is an increasingly common and popular method of teaching in medical education. In UME (undergraduate medical education), it allows students to experience the responsibility, as well as realistic stress, of caring for acutely ill or injured patients, but without compromising patient safety. It is particularly useful for students in the later part of their UME curriculum, who are getting ready for more hands-on training, and embarking on work as physicians. Evidence shows that simulated learning should feature effective feedback embedded in the experience (17). Research shows that new, young physicians often feel unprepared for clinical practice. One particular barrier cited in this early-career/transitional period is performance under stress. While conventional views say simulation should occur in a controlled learning environment, there is a school of thought that simulated high stress scenarios could help prepare students for actual real-life situations to be encountered in medical practice (18).

Small-Group Teaching

Small group teaching is defined by the size of the group of students, usually 6 to 10 participants, and its focus on active learning between and among group members. Small group learning may take place in small seminar classrooms, in an office, or even at a patient's bedside. Students must be able to sit and make eye contact with one another. Examples of small group learning may include tutorials, seminars, journal club discussion of article(s), or rounds with attending physicians. Small groups are especially effective when an instructor wants to accomplish such tasks as: introducing new materials or concepts (clinical or scientific), reviewing material, applying material, discussing material, or working on case-based formats of material. They also are effective for patient-centered discussions, like bedside or ambulatory teaching, and small groups are also ideal for team projects. Students in small groups have an opportunity to discuss material and refine their understanding of complex issues, to problem solve, and to apply knowledge to something new. Small groups may give them a chance to explore attitudes, feelings, or values. Ideal situations for small group learning in medical school include those where the topics of professionalism, humanism, communication skills, or self-directed learning weave into the formal curriculum. By virtue of size, small group teaching allows for close contact between faculty and medical students—something that traditional lectures do not provide.

Team Based Learning (TBL)

Team Based Learning is an educational method that bridges large-group, or whole-classroom, approaches, with small-group approaches. Many medical schools have implemented TBL or are thinking of adopting it for its learning benefits, including content knowledge acquisition, the development of professionalism and interpersonal skills through emphasis on teamwork that is reflective of modern health care settings, and the need to meet accreditation standards. TBL promotes active learning in large-group settings. TBL combines in-class activity with out-of-class preparation. Large classes are divided into smaller student teams, with preparatory homework assignments given. The subsequent sessions are then conducted with all of the students in the large classroom. Students apply conceptual knowledge through sequenced activities that include individual work, teamwork, and immediate feedback. The three key components of TBL are advance individual preparation through textbook readings, lectures, or videos). This is followed by individual and group Readiness Assurance Tests (RATs), and then decision-based application exercises which students work on in teams for the majority of in-class TBL time. Individual and group quizzes are immediately scored in order to foster accountability. Quiz results are discussed, and application questions or problems are presented so that students can work in teams during class to solve simultaneously. This is followed by an open discussion of these application exercises or problems, including a discussion of different teams' separate solutions. TBL can be used for an entire course, or it can be used for multiple class sessions (19, 20).

Maximizing Active Learning in the Classroom:

It should be noted that active learning is most likely to occur when instructors set up an exercise for students, conduct the exercise, and then close the loop by asking students “how” or “why” questions about that exercise. When instructors do not ask those questions, and fail to close the loop, students may be less likely to engage with the material in class, making learning passive, not active. While many of the above instructional methods and strategies are being increasingly experimented with and becoming staple teaching methods in medical education (e.g., TBL, PBL, and cases), many instructors still utilize lectures, and lectures can have a place in teaching at the pre-clerkship level). If lecture is used, it is important for instructors to consider ways to incorporate active learning into their session. One method is having students watch a video of a patient. Before the video, ask students to pay attention to specific things in the video, or take notes on a particular aspect of the video, ask that students prepare to describe what they see after watching it, or ask students to look for certain characteristics in the patient featured in the video. Afterwards, close the loop by asking students questions once the video has ended. For example, ask if they saw examples of a certain symptom or condition. Ask them how they would characterize something that they saw in the video. Ask them what they might have wanted to ask the patient had they been the interviewer. Audience Response System is another way to incorporate active learning into lectures (8-9, 11). The question asked via the ARS is a set up for active learning. The instructor can easily close the loop by not letting the question be the end point, but rather, asking students to explain the right answer, or to articulate why certain answers are wrong.

ARS can promote active learning if there is a back-and-forth exchange, or dialogue between instructor and students, and instructor explanations are minimal, relative to the two-way exchange. Another easy way to engage students in a large lecture setting is to answer students who ask questions in class. When students ask questions, there is an opportunity to move from passive to active learning. While an instructor may choose to provide a succinct, brief answer and move forward, there is also an opportunity to pause in delivering information, and to use the student's question as a chance to go deeper in content, and go in at a higher level, asking students questions that force them to ponder, and think, and reflect on material, or discuss with the instructor and their classmates.

The following instructional activities or strategies can be incorporated into teaching to make it more active and interactive (21):

- Question and Answer
- One-Minute Paper
- Think-Pair-Share
- Brain-Dump/Free Write
- Muddiest Point .
- Misconception/Preconception Check
- Application Activity
- Student-Generated Questions
- Formative Quizzes/Surveys
- Computer-Based Interaction Systems
- Self/Peer Formative Assessment
- Small Group Presentations/Small Group Discussions
- Role Playing/Simulations/Games
- Categorizing Grid/Pro-Con Grid
- Defining Features Matrix
- Debates
- Peer Teaching
- Concept Maps
- Cases
- Jigsaw
- Cooperative Learning

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Program Evaluation

Evaluation

Program evaluation is the process used to determine the extent to which a program achieved its goals (1).

According to Patton, the primary uses of evaluation findings are to judge overall value of a program (in this case, medical school curriculum), for learning, for accountability, to monitor, to develop, to generate knowledge. Evaluation involves gathering information, for improvement purposes, and to make decisions. In medical education, it can often be decision-oriented, outcomes- oriented, expertise-oriented (2, 3).

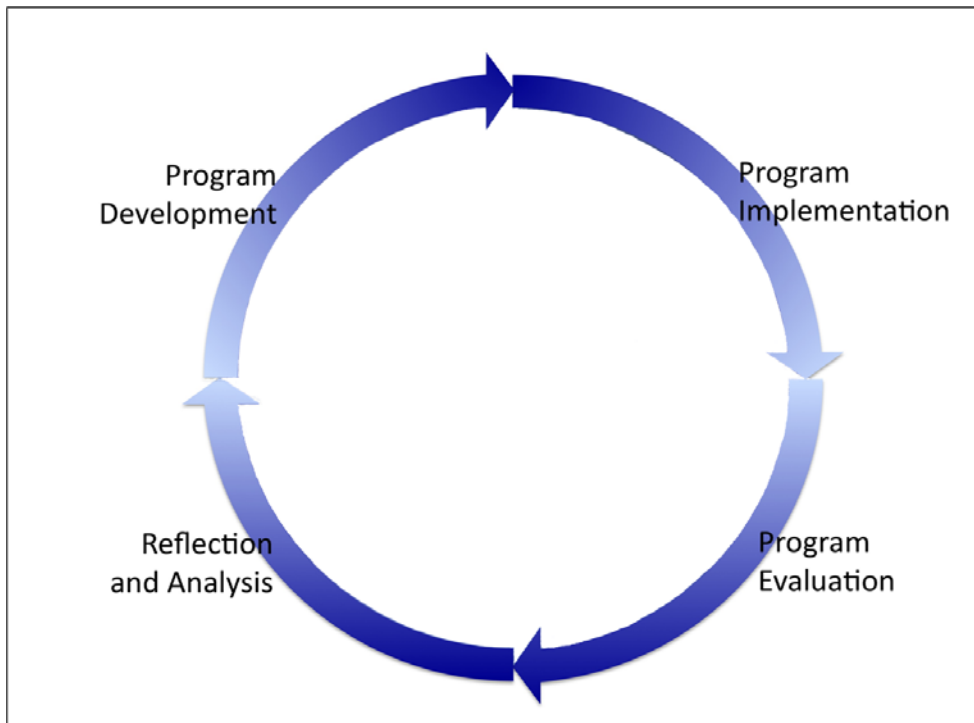


Figure: Program Evaluation Cycle: A birds-eye view



Adapted from work of Dr. Karen Mann, Ph.D. at the Harvard Macy Institute and the Social Research Methods website.

Figure: Program Evaluation Cycle Up-Close

As noted in the figures above, program evaluation is a process by which a developed program is implemented (e.g., a new medical school curriculum). Faculty, staff, and administrators (and students) want to know how the new program of study is working. So they evaluate it, analyze the evaluative data that comes back to see what it is telling them, and use that to inform any decisions about making changes, or keeping/not keeping a program or aspect of the program in place. Program development on the above illustration can thus be either initial curriculum/program development, or it can represent the stage in the cycle where an existing program is tweaked for improvement. In many ways, Program Evaluation is the other side of the Instructional Design coin, and a close partner to creating and implementing the best possible curriculum in your medical school.

Asking Evaluation Questions

In program evaluation it is important to ask what the **GOAL** of your program is: what is the goal of your curriculum? What is the goal of a particular course? Once goals are identified, ask what program areas need to be evaluated (4). One way to do this is to ask some of these types of questions:

Implementation (Process), Outcomes, and Attribution. Implementation questions, or Process-related questions are often used for program improvement, so in the case of

UME, for curricular improvement. These questions get at the Who, What, When, Where, Why, and How. Often, these questions address fidelity of implementation—was the program implemented as intended?

Outcomes questions can be used to determine changes in knowledge, behavior, and attitudes. An outcomes question might ask if the program goals were met, or to what extent the changes are attributable to the program.

Attribution questions ask if what resulted can be attributed to what was implemented.

Stakeholders

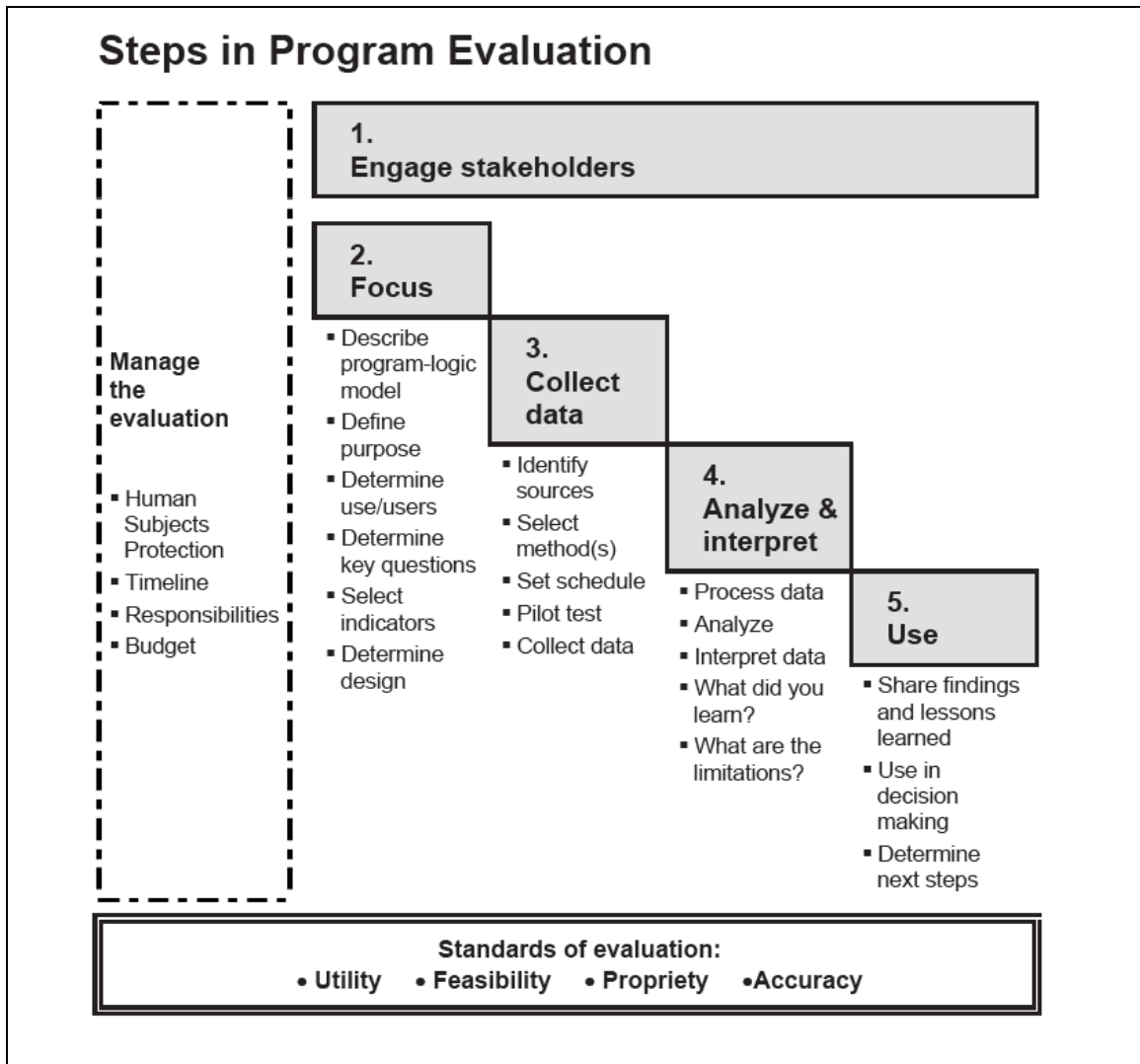
In program evaluation, one must always consider the stakeholders. Who has an interest in this program and in knowing how it is working? In the case of medical students, information from program evaluation may be used by, or desired by the students, the school's faculty, staff, and administrators, alumni, prospective students, parents of students, prospective employers of the students, other partner locations (e.g., hospitals and doctors' offices in the communities where students rotate through during medical school clerkships), and various accrediting bodies, including the LCME, among others.

Data Considerations

When conducting program evaluation, consider not only stakeholders. Ask questions about what the data sources are, what resources are needed, what if any decisions rest on your findings, who will use the resulting information, who is responsible for the decision-making based on program evaluation findings, and what the limitations of evaluation findings are.

It requires careful thought to ask the right questions, and collect the right data in program evaluation. The data collected depends on the question(s) asked, and what you want to know about the program and how well it is doing or how it performed. If needed, and possible, it is advisable to establish baseline data. Think about your available sources for data, as well as how to collect the data. For systematic program evaluation, consider the technology at your medical school. Is there an online course evaluation system, or online faculty evaluations? Also consider when to collect data and when to analyze it. The use of your findings can be to find lessons learned, to share results/findings with others, to make decisions about the program's implementation or improvement.

Steps in Program Evaluation:



From: *University of Wisconsin-Extension • Cooperative Extension • Program Development & Evaluation* 2006 by the Board of Regents of the University of Wisconsin System <http://www.uwex.edu/ces/pdande> (4).

Logic Models

Logic models are “a systematic and visual way to present and share your understanding of the relationships among resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve”. A logic model, defined quite simply, is a road map. In program evaluation, it is the whole program, which then yields what questions you may have and what you may evaluate: planned work (inputs/resources, activities, such as human, financial, organizational, and community resources our program

utilizes, or processes, tools, events, technology, and actions within) and the intended results (outputs, outcomes, impacts, such as changes in program participant behavior, knowledge, skills; one-three years for short term outcomes, four-six years for long term outcomes; expressed as direct changes statements; or Fundamental intended or unintended change occurring in our institution as a result of program activities (seven-ten years out). Logic models can help guide program planning, implementation and evaluation (5).

Logic models are great to use with teams of stakeholders. A sample template for a logic model is available at

<http://www.uwex.edu/ces/pdande/evaluation/evallogicmodelworksheets.html>.

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Managing Resources

There are two major costs to the startup and maintenance of a medical school. One is the cost of employing staff and faculty and teaching students which is in the \$15-\$20 million range (1). The second major expenditure is the medical school capital cost to build or renovate and maintain a medical education center which includes laboratory and clinical space, simulation centers, classrooms, faculty and administration offices and possibly housing for medical students. The capital costs are estimated between \$50 and \$100 million (1-2). In this chapter we will discuss the administration of medical education operations: managing people, managing finances and managing space including off campus sites.

Managing People

Managing Students

The medical school is required to provide students with all the material relevant to their participation in medical school. School policies, procedures and requirements are provided in a student handbook, class meetings, emails, webpages and informative memos. Students are expected to familiarize themselves with the requirements and updates that impact their programs. The Office of Academic Affairs is the unit which provides these materials and guides the students' medical education. The medical school accrediting body, the Liaison Committee on Medical Education (LCME) requires medical schools to provide student resources for financial aid, counseling, academic learning, career advising and services for students with disabilities. In addition, the office of academic affairs manages compliance programs which are required by the agencies where students train such as teaching hospitals, clinics and public health departments. See a full discussion of required student credentialing on page 79.

This section will review two medical student compliance issues: The Family Educational Rights and Privacy Act (FERPA) and Health Information Portability and Accountability Act (HIPAA). Examples will be provided from programs established at two medical schools.

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the United States Department of Education (3).

FERPA gives parents certain rights with respect to their children's education records. These rights transfer to the student when he or she reaches the age of 18 or attends a school beyond the high school level. Students to whom the rights have transferred are "eligible students."

Parents or eligible students have the right to inspect and review the student's education records maintained by the school. Schools are not required to provide copies of records unless, for reasons such as great distance, it is impossible for parents or eligible students to review the records. Schools may charge a fee for copies.

Parents or eligible students have the right to request that a school correct records which they believe to be inaccurate or misleading. If the school decides not to amend the record, the parent or eligible student then has the right to a formal hearing. After the hearing, if the school still decides not to amend the record, the parent or eligible student has the right to place a statement with the record setting forth his or her view about the contested information.

Generally, schools must have written permission from the parent or eligible student in order to release any information from a student's education record. However, FERPA allows schools to disclose those records, without consent, to the following parties or under the following conditions:

- School officials with legitimate educational interest.
- Other schools to which a student is transferring.
- Specified officials for audit or evaluation purposes.
- Appropriate parties in connection with financial aid to a student.
- Organizations conducting certain studies for or on behalf of the school.
- Accrediting organizations.
- To comply with a judicial order or lawfully issued subpoena.
- Appropriate officials in cases of health and safety emergencies; and
- State and local authorities, within a juvenile justice system, pursuant to specific State law.

Schools may disclose, without consent, directory information such as a student's name, address, telephone number, date and place of birth, honors and awards, and dates of attendance. However, schools must tell parents and eligible students about directory information and allow parents and eligible students a reasonable amount of time to request that the school not disclose directory information about them. Schools must notify parents and eligible students annually of their rights under FERPA. The actual means of notification (special letter, inclusion in a Parent/Teacher Association (PTA) bulletin, student handbook, or newspaper article) is left to the discretion of each school.

Examples:

Scenario 1: A frantic woman approaches you in person saying that her daughter is nine months pregnant and on medication and that she hasn't seen her in six days and needs you to give her the student's schedule so the mother can find her. Can you provide her with the student's schedule? **The answer is no.** You may not release a student's location, time or class schedule to anyone without written permission from the student or in response to a subpoena which has been approved by your college attorney. If this occurs, tell the person that you may not release that information. If they press you, refer them to your supervisor for backup help. The Registrar could make a decision to notify the student that there is a concern and ask her to contact her mother. **Health and Safety Emergency:** If you are presented with facts surrounding a situation where the student

could be at risk of hurting themselves or others, you must report it to your supervisor. If FERPA protected information is released to authorities, a record of this release must be in the student's educational record. **Definition of a student:** According to your school's FERPA policy definition of a student. International students are protected under FERPA. Scenario 2: You call for the next person in line waiting to come to the front counter of Enrollment and Student Financial Services. It is a man in a military uniform with a paper signed by a student. He says that you need to release a transcript to him, but the student has a financial hold on his account. You tell him you cannot because of the hold and he claims you must under the Solomon Amendment to FERPA. Are you bound to release the transcript? **The answer is no.** Just because the military recruiter has a signed release and is claiming the Solomon Amendment you are not bound to release the transcript without the debt being paid. If the recruiter wants to pay the debt and you have a signed release, you may do so. The Solomon Amendment does not apply to this situation. Individuals working for the government are not allowed to have FERPA protected information any more than any other individual asking to access a student's record. **Solomon Amendment:** This allows each of the branches of the United States Military to have access to student data once a term for students enrolled in at least one credit. They cannot choose for which students they receive the information & will not receive information on students with an opt out and the school can charge for this release. This is not related to an individual request for a release. The data is released by your institutional research department. **Signed Release:** A student can provide a signed release for a transcript and this release should be archived to the student's record.

Health Insurance Portability and Accountability Act (HIPAA)

HIPAA (Health Insurance Portability and Accountability Act) is a federal law that protects personal medical information. This means that employers or groups who want access to personal medical information for their own use are restricted access to health care information (4).

Understanding Health Information Privacy

The HIPAA Privacy Rule provides federal protections for individually identifiable health information held by covered entities and their business associates and gives patients an array of rights with respect to that information. At the same time, the privacy rule is balanced so that it permits the disclosure of health information needed for patient care and other important purposes.

The privacy rule specifies a series of administrative, physical, and technical safeguards for covered entities and their business associates to use to assure the confidentiality, integrity, and availability of electronic protected health information. For a full discussion of the electronic health record, see page 11 of this chapter.

Medical School or Teaching Hospital Faculty

As of 2011, the Association of American Medical Colleges (AAMC). AAMC represents 128,000, faculty who teach medical students in the United States at 141 accredited US medical schools (5). Medical schools and teaching hospitals are complicated entities. Many have a three-part mission to educate, conduct clinical care and research. A faculty

member employed by a medical school or teaching hospital may be a research scientist, clinical faculty or clinician-teacher and as such has differing requirements for promotion and productivity goals.

Most medical schools house faculty in departments organized by their boarded specialty of medicine or science such as anesthesiology, biological structure, family medicine, internal medicine, microbiology, pediatrics, obstetrics and gynecology, surgery, etc. Faculty teaching responsibilities and evaluation are handled within their department and supervised by the division head or chair.

Volunteer Faculty

Medical schools rely upon volunteer faculty to teach their medical students at local or regional clinical training sites.

Physicians who have clinical appointments provide both professional and educational services. Clinical track faculty may be full- or part-time educators. There is usually a minimum number of hours clinical track faculty must teach to maintain their faculty appointment, e.g. 50 hours per year. Clinical faculty appointments carry no tenure or guarantee of employment; if the minimum teaching requirement is not met, the clinical faculty appointment may be terminated. As with other faculty tracks, clinical track faculty may be appointed at the rank of clinical assistant professor, clinical associate professor or clinical professor and are reappointed every three to five years. Volunteer clinical faculty teach at the undergraduate and graduate level.

Some clinical faculty benefits include an academic (non-paid) appointment with the School of Medicine academic department, participation in faculty development at their local site of practice or at the medical school, health science library access, and university or college sports tickets.

Former students, residents and chief residents who set up practice in the area are often recruited to teach students. These individuals know the program and are often dedicated to the teaching mission of the school. Physicians who move to the area and had been involved in teaching in their previous role are another good volunteer teaching faculty source.

It is important to recognize volunteer faculty for the work that they do. Some suggestions for formal recognition include:

- Clerkship director, deans and department chairs visit community teaching sites to give medical education talks and faculty development.
- Regional teaching retreats.
- Teaching retreats at the medical school.
- Appreciation dinners which include students, hospital leadership and local physicians.
- Parking validation at the medical school.
- Teaching awards, plaques and certificates for physicians to hang in their office noting that they belong to the teaching faculty of the medical school

- Local newspaper stories announcing teaching awards.

Faculty development to support teaching faculty with online teaching modules - teach the teacher, workshops and site visits by school of medicine leadership is crucial for the recognition, teaching training and retention of volunteer faculty. However, training and recognition of regular faculty should not be overlooked. Workshops on teaching improvements, grant writing, navigating an academic career, and networking opportunities are all important opportunities for faculty development. Faculty participation in education scholarship at a national level is important to further medical education research and promote innovative teaching programs. Funding for physicians to travel to national conferences is provided by their hospital or site of practice for community-based physicians and the dean's office, department chair or division head for physicians in teaching institutions. Many medical schools have faculty development offices whose mission is to help improve the knowledge and skills of clinical teachers and basic science educators.

Creating recognition programs is most successful if tied to the mission, vision or values of the school. For example, your department may be facing a difficult curriculum renewal that might be causing significant stress. Institute a contest for students, staff and faculty to develop their own curriculum thereby participating in the process and reinforcing the schools' goals. Establish awards for positive attitudes, teamwork, customer service or leadership.

Managing Finances

The pressure on academic health centers to train and finance medical education is well documented (6). Changing reimbursement models, rising health care costs and quickly changing delivery systems require new solutions (7). Medical school administrators have published various methodologies to estimate the cost of medical education in order to respond to financial pressures and show efficiency in the delivery and decreased cost per student especially given the high cost of medical school and medical student to debt ratio (8-9). However, the cost measurement models are limited in that they do not quantify quality and capture one particular point in time.

The traditional sources of medical school revenue are: tuition, state and local government funds, private gifts and endowments and cost shifting from clinical revenue derived from patient care. Other sources of funding external to the institution include grants, support from industry, philanthropy, and other local fund raising. Growing concerns about the appropriateness of external funds and how they are distributed have led most medical schools to adopt guidelines or policies regulating the use of these sources of income, with a particular focus on assuring that funds from industry are unrestricted grants. One challenge to medical education funding is the decline in clinical reimbursement based on rising health care cost.

Governance

The LCME requires that the chief official of a medical education program, who usually holds the title "dean," must have ready access to the university president or other official of the parent institution who is charged with final responsibility for the program and to other institutional officials as are necessary to fulfill the responsibilities of the dean's office (10). There must be clear understanding of the authority and responsibility for matters related to the medical education program among the vice president for health affairs, the chief official of the medical education program, the faculty, and the directors of the other components of the medical center and the parent institution. The chief official of a medical education program must be qualified by education and experience to provide leadership in medical education, scholarly activity, and patient care. The administration of an institution that offers a medical education program should include such associate or assistant deans, department chairs, leaders of other organizational units, and staff as are necessary to accomplish its mission(s).

Course and Clerkship Budgets

Financial resources are a vital component of a successful course or clerkship. The department chair, course and clerkship director each has an important voice in managing the budget. Course and clerkship budgets have become increasingly more complex, mirroring the complex nature of medicine and medical education and training. Appropriate institutional and departmental support is vital. Great variation in overall costs exists between institutions, but we have attempted to present a general guideline to assist directors in lobbying for appropriate funding.

Although financial support for the clerkship may come from multiple sources, traditionally the bulk of clerkship budgets originate in the Dean's office and flow to the department and department chair. Therefore, a collaborative working relationship between the course or clerkship director, dean, and chair is crucial.

Medical education financial needs have expanded greatly, particularly with new technological advances such as distance learning, online case-based teaching cases, simulation and standardized patient encounters. While most department budgets have historically incorporated administrative support for leadership and financial and salary support for faculty time spent teaching in the clerkship, most budgets now include multiple components of the academic medical center mission: clinical care, research and education.

Please see Table 1 for a list of budget components compiled from a search of publically available course and clerkship budgets nationwide. Although not exhaustive, the table demonstrates the complexity of course and clerkship budgeting. The course and clerkship director has an important role in working with the chair to secure programmatic funding.

Salary Support

Adequate support for the course director, clerkship director, course and clerkship administrators and administrative needs of the program are crucial to the success of the educational mission.

Medical schools are expanding what is considered fundamental science to include topics such as population health, evidence-based medicine, health care policy and economics, and quality and safety. While this expansion of curriculum is occurring, the volume of biomedical knowledge has also expanded. Scientists and physicians are expected to understand a broad background of scientific knowledge and know how to apply it to their given specialty and patient care. This means that research has become increasingly specialized and complex and researchers are expected to spend more time conducting research and writing grants in a very competitive economic environment (11). All of this leaves less time for researchers to teach.

A medical education task force undertaken at Cornell in 2007, recommended that “course directors must spend dedicated time on the activities related to course leadership and that the departments must ensure that this dedicated time is supported to free the course director from other clinical or research activities. In addition, another subcommittee of this task force is recognizing the importance of appointing an associate course director to assist in the leadership of each course” (12). A literature search could not identify peer-reviewed articles related to job expectations for basic science course directors, however the prevailing advice from national medical education leaders such as the AAMC and Clerkship Directors in Internal Medicine is that a medical school’s faculty is its most important asset and must be supported (13,14). Productive faculty members participate in a wide variety of activities such as research and clinical care which produce revenue. Education can take faculty away from these revenue enhancing activities and become a disincentive to teaching. Cornell established a system to protect the base salary for course leaders to participate in educational activities.

As noted in the collaborative statement from the Alliance for Clinical Education (ACE), the job expectations of a clerkship director includes administration, teaching and scholarly work to assure a pathway to academic promotion and career progression. At least 50 percent support from institutional sources is expected (15). In addition, particularly in larger centers, administration of the clerkship may include an ambulatory clerkship director, a sub-internship director, and other associate or assistant directors. These faculty should also have institutional support to assure they have protected time for their academic and administrative duties. Although no universal guidelines exist, associate and assistant clerkship directors may warrant up to 0.25 FTE for support of their administrative and teaching duties.

An additional component of clinical education at many academic medical centers includes course directorship. Courses often included under the department’s administrative structure include physical diagnoses courses, OSCE preparation courses, career preparation and guidance courses, and subtopics under individual specialties such as bioethics courses, medical humanities courses and the like. The FTE support for these directorships will be guided by contact hours, class size, importance of the course and other similar factors, but typically will amount to 0.05 – 0.2 FTEs. One way many institutions have objectified the FTE support for these roles is the use of an educational relative value unit (RVU) system. In this system, the chairman, vice chair for education, dean, and other educational leaders devise an accounting system based upon the

abovementioned factors and “offload” the course director based upon the educational RVUs devoted to the individual course, and reduce the course director’s FTE by the amount of the RVU. This system is typically used to support clerkship directors, administrative personnel, teaching faculty, and is an objective means to demonstrate institutional financial support for its educational mission.

Overall, the amount of faculty salary support and administrative personnel such as administrators is dependent upon multiple factors including class size, number and location of courses, inpatient and ambulatory sites, number of Objective Structured Clinical Examinations (OSCE) stations to test clinical performance, etc. In addition, administrators serve multiple roles so funding for the administrator position may come from multiple sources. In many institutions, the clerkship administrator also functions as residency program administrator, fellowship program administrator and/or nursing student coordinator for hospital rotations. In these cases, the clerkship director’s ability to negotiate for resources with the school of medicine, school of nursing, and other sections or divisions within the department of medicine is a coveted skill.

Faculty Development Financing

Faculty professional development for courses and clerkships is required by the LCME. In addition to financing professional development for the clerkship faculty and administrator, many clerkship budgets include costs of delivering faculty development programs to others involved in student education. For example, site visits to ambulatory preceptors incur costs of travel, paper materials, meals and enduring educational materials. Other educational courses delivered to teaching faculty at the main institution may require speaker honoraria, room rental fees, AV equipment rental, photocopying and reproduction costs of delivered materials, meals, and parking for faculty traveling from outside the institution. Georgetown University typically incurs costs of \$3,000 - \$5,000 annually for such programs.

Simulation

Objective Structured Clinical Examinations (OSCEs) are used to test clinical skill performance and competency in health science professionals. Short stations are set up with standardized patients (actors or staff) and/or manikins who present with a scripted set of complaints. The students conduct a focused history and physical exam on the standardized patient or manikin. The timeframe for the administration of OSCEs varies, some schools administer in the second and fourth years, other schools also administer OSCEs in the third year clerkships. Costs of maintaining OSCEs include faculty time to write cases and oversee the program, administrative support, space costs and at some institutions, payment to the standardized patients, AV costs for videotaping the OSCEs, and costs of any documentation. Costs of OSCEs vary widely, but could exceed \$20,000 for a large class size. Other simulation activities include procedural manikins, physical examination simulators (e.g., Harvey heart sounds), Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS). Most medical schools now use standardized patients (SPs) in discrete, clerkship-specific exercises, with a focus on their own clinical learning objectives.

Managing Space

The LCME educational resources section mandates that a medical education program must have, or be assured the use of buildings and equipment appropriate to achieve its educational and other goals (10). These facilities include: library resources, computers and internet, lecture halls and classrooms to accommodate the entire class which are often equipped with televideo and distance learning technologies. Laboratories, medical student study space, overnight call rooms (if applicable), conference rooms, space to conduct research, and space to house the animals used in connection with the research are also required.

It is important that community and regional teaching sites offer comparable access to required facilities and information technologies.

Medical schools with regional branch campuses or geographically diverse teaching sites may offer housing to students participating in clinical immersion activities in years one and two of medical school, and required clinical clerkships at away sites. Students may receive housing stipends or school-provided housing may be set up in apartments, hospital owned space set up for visiting physicians, extended stay hotels, or dormitories at Veteran Affairs Medical Centers or army or air force bases. Managing housing and student travel to away sites is a significant administrative task which requires collaboration between the dean's office, department and local teaching site.

Patient Safety

Team training is an integral part of the medical student curriculum and reflects the demands of a health care system reliant upon interprofessional teams to provide patient care. As Morrison et al point out, "Numerous reports during the last 10 years from national oversight and safety institutes and agencies have supported the need for team training in the health care environment, especially as a means to decrease errors and increase patient safety" (16).

The University of Pennsylvania Perelman School of Medicine (PSOM) collaborated with the University of Pennsylvania Wharton Master of Business Administration program in 2004 to create a mandatory, longitudinal, four-year team training, leadership, and facilitated team learning program for all medical students that reflects a "real-world" interprofessional health care team or research team scenario. Implemented in 2005, PSOM's program places students in teams of six to seven during the first week of medical school orientation. Students begin working in these teams at a leadership retreat led by faculty trained by PSOM and Wharton team training experts. These teams remain intact throughout the four-year curriculum. Team learning at PSOM promotes a more active state of learning. "In a series of studies involving learning groups, simply hearing someone explain a set of concepts, as in listening to a lecture or reviewing notes that expose a student to new information, seem to have minimal effect on learning. But, students who had to explain the information to their peers, a process that forces them to reconcile inconsistencies in their understanding to answer their classmates' questions, increased their learning" (16).

Site Credentialing

The LCME contains standards that provide guidance as to the minimum content your affiliation agreements should contain. These standards can be embedded into the language utilized in an affiliation agreement. While the school of medicine attorney general's office may be primary in the drafting of the affiliation agreement, it is important to understand the standards, follow up on and audit compliance and implementation of the affiliation agreement and document findings and develop and utilize measures that show evidence of both parties complying with the LCME agreement. Such measurement tools could consist of student surveys, clerkship director surveys, site visits, documented orientation processes, documented services and service hours. The Association of American Medical Colleges (AAMC) has developed a Uniform Clinical Training Affiliation Agreement to spell out roles and responsibilities between a medical education program and its clinical affiliates and comply with LCME standards (17).

It is important to read and understand the standard(s), in sum before developing your affiliation agreement language. Looking closely at the minimum requirements of Standard ER-9 in conjunction with reading the LCME Standards, you will see that each bullet point ties back to single or multiple standards.

As an example, the first bullet point in ER-9, states that “the assurance of medical student and faculty access to appropriate resources for medical student education” (10), exhibits portions of standards ER-6, ER-7 and ER-8. Reading these standards in their entirety provide the agreement terms and conditions which will aid in compliance with LCME Standards. Language should be embedded in the affiliation agreement which obligates teaching sites to provide the medical student with specific access to resources, whether they be instructional, informational or personal. Although the LCME mentions specific resources, such as access to patient populations, computers, internet, locker and study space, each organization can add additional resources necessary for the student to achieve the goals and outcomes of each program.

Placing language in the affiliation agreement which obligates the site to provide information on disaster readiness and access to emergency treatment (in cases of illness, accident, needlestick, exposure, etc.) will assist in making sure the site complies with LCME guidelines. While Standard ER-9 sets the stage for the minimum necessary components to include in the affiliation agreement, it is also necessary to consider all LCME standards to ensure the school is able to utilize the affiliation agreement as a legal source document to show intended compliance. Again, the affiliation agreement alone is not enough to show compliance. The school must follow up with documented measures of evidence.

LCME standard ER-10 is a strong standard which must be included in your defined responsibilities of each party when drafting your agreement. This standard defines that the medical education programs and its' faculty must retain authority over the medical education program. It is important to further define within your affiliation agreement which parties are in control of each aspect of the medical education and experience. The

school should always remain the controlling party of the medical education while the site remains in control of patient care. It is required that each site have a designated faculty member that works with the medical education program and site to be sure the medical education goals and objectives are clearly defined and are being met.

Supervision of the student during the clerkship experience needs to be addressed in the agreement to be in compliance with ED-25. It is expected that the attending physician at the facility where the student is undertaking their clerkship be the direct supervisor and individual responsible for any and all clinical activities. Placing language to this extent will clearly identify that the site is providing the supervision of the student in terms of patient care and safety. However be aware that the medical school is still required, according to LCME to oversee the student's learning experience.

Attaching an exhibit to the affiliation agreement that specifies the educational program goals, objectives and core experiences solidifies and clearly communicates expectations and deliverables to the site. Measurable, outcome based objectives should be stated in order for the site to assess each students' clinical experience. Such deliverables could consist of student assessments conducted by faculty, narratives, grading policies and procedures that are expected to be followed, including timelines for submission. It is noted the LCME requires grades to be submitted within six weeks following the clerkship, therefore this would be an important area to consider adding in the terms and conditions of your affiliation agreement.

Typically the medical schools legal representatives will review the affiliation agreement for laws, regulations, liability, insurance and indemnification. The school of medicine should work with the legal department to incorporate the program educational goals and objectives in the agreement. It is important to conduct periodic and formal reviews of your clerkship sites to assure both parties are adhering to the agreement. Remember that the affiliation agreement is not a one way street. Providing faculty development opportunities, resources and other opportunities to engage your sites ultimately benefit ongoing education and will build a lasting relationship with a site so that your students can continue to achieve a positive and highly educational experience.

Student Credentialing

Criminal Background Check

Most schools require a state or federal criminal background check as recommended by the AAMC. The rationale for performing criminal background checks on accepted medical school applicants is based on a number of issues, including the need to enhance the safety and well-being of patients and, in so doing, to bolster the public's continuing trust in the medical profession, and to ascertain the ability of accepted applicants to eventually become licensed physicians. For the most part, medical schools use the AAMC facilitated criminal background check service.

Immunization Records

Students must have the following immunizations prior to entering their medical training: rubeola, mumps, rubella, varicella, hepatitis A and B, meningococcal, polio, TB skin test or chest x-ray and tetanus. Some schools or hospitals will require a 2 step TB. It is the

student's responsibility to make sure, during their medical school career that their immunization records are always up to date and to carry a copy with them. Most hospitals and medical centers will also require a flu vaccine.

Academic Standing

Students are in good academic standing for a quarter or semester if they successfully complete the required number of credits by the end of the quarter or semester and earn no failing or incomplete grades.

Professional Liability

Most universities provide professional liability coverage to students in the process of obtaining their professional training. Because this training does not necessarily include all of a student's activity while engaged in service outside of the university, students are encouraged to explore personal coverage for activities not included in the university plan.

Health Insurance Portability and Accountability Act

Universities are committed to protecting the privacy and confidentiality of identifiable health information through the utilization of reasonable safeguards and institutional compliance with the applicable laws regarding privacy and confidentiality, including the HIPAA privacy rule. All members of any university workforce must comply with the HIPAA privacy rule and the university's HIPAA privacy rule policies. Every new student should receive information and a letter describing their university HIPAA privacy rule training. Schools and affiliate hospitals will require this training to be done every year prior to starting any rotations in the hospitals or clinics.

BLS (Basic Life Support) Training

Some universities will require students to have BLS training prior to entering medical school and others will not require until the student is in their second year of training. There are many ways the student can acquire BLS training. Always check with affiliate hospitals to see which type of training is required and when. Online BLS certification is generally not accepted as an alternative to in person training.

FERPA Directory Releases

In compliance with the Family Educational Rights and Privacy Act of 1974 (FERPA), a student may request that no directory information be released outside of their university without specific written authorization. Directory information is defined as student's name, address, phone number, e-mail address, major field of study, anticipated graduation date, enrollment status, dates of attendance, degrees and awards received, participation in activities and organizations, most recent institutions attended, and photographic or electronic pictures or images. If a student requests that no directory information be released, any business the student wishes to conduct at your university must be done in person with proper identification such as student ID card or driver's license. Information will not be provided to anyone over the phone or via e-mail. If the student is unable to make the request in person, they may submit a signed and dated written request listing the specific information requested. All requests for non-disclosure will remain in effect with the registrar's office until they are informed in writing to the contrary by the student or former student.

Drug Testing

Students may be required at the time of clinical rotation assignment, to submit to a drug test as a result of the affiliation training agreement. It is important that the medical school have policies in place regarding who will administer and read the drug test results and where the test results will reside and when destroyed. Any student suspected of being under the influence of any unauthorized alcoholic beverage or drugs may be required to complete a drug test at a pre-determined interval determined by the university.

Infectious and Environmental Hazards

Education of students, including visiting students, about bodily fluid exposure, needlestick policies, and other infectious and environmental hazards associated with learning in a patient care setting is required. Please see Table 2 for Georgetown University School of Medicine needlestick guidelines and Table 3 for Georgetown University policy for bloodborne communicable disease.

Veterans Affairs Credentialing

The United States Department of Veterans Affairs (VA) operates the largest integrated health care system and has a strong teaching mission. Many medical schools are affiliated with VA medical centers and rely upon VAs for the teaching of medical students, residents and fellows. As federal institutions, VA medical centers have rigorous credentialing programs for health care providers to provide clearance to patients and computerized electronic health records. The paperwork requirements to admit students and other health care professionals will depend upon whether the VA that you are working with is a DOD (Department of Defense) facility or a non-DOD facility. The VA has two different types of security clearances that must be completed by all students prior to rotating at their facilities. There is the ANACI (Access Nation Agency Check and Inquiries) or NACI (National Agency Check with Inquires) clearance. Most locations will require the NACI clearance which is provided to US as well as non-US citizens. Any facility that is DOD will require the ANACI clearance which involves a more extensive type of homeland security clearance. ANACI clearances are harder to get if the student is a non-us citizen or holds dual citizenship. These two types of clearance will require the sending facility to include a statement of need (a letter stating that the student is not taking away the spot from a US Citizen Student). It is always advisable to check with the local VA to understand timelines and paperwork requirements.

All paperwork must be started three weeks prior to the start of the rotation. A human resource WOC Coordinator (work without compensation) will walk the student through the credentialing process. The paperwork for the clearance involves a background check (this is typically more extensive than the entering medical school background check), fingerprinting and several online modules. They will also require the student to have done HIPPA, BSIS, and the VA's mandatory training for trainees module and documented up to date immunization records. Without these items the students will not be cleared for computer or patient access at the VA.

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Table 1

Course and Clerkship Budget

- Ambulatory preceptor compensation
- Awards
- Books
- Catering
- Clerkship/Course Director Salary support
- Clerkship/Course Administrator salary support
- Computerized instructional materials
- Creation of internal examinations
- Dues to relevant professional organizations
- Faculty development
- Faculty retreats
- Financial support for teaching faculty (e.g., “educational RVU” system)
- Honoraria for outside teachers / visiting professorships
- Housing
- Laptops
- Maintenance of existing teaching site computerization and hard document libraries
- Meal tickets
- Pagers
- Parking
- PDAs
- Printed materials
- Purchasing NBME Subject Tests (approximately \$40 per exam)
- Research “seed” grants
- Retreat
- Room rental
- Simulation equipment (e.g., models)
- Standardized patient programs
- Stipends
- Student interest group
- Student-patient encounter documentation system
- Teaching awards
- Travel
- Travel expenses for CD/CA to relevant professional meetings
- Videotaped materials
- Web site development and maintenance
- Workshops

Table 2

Georgetown University School of Medicine Needlestick guide lines are listed below:

1. Wash your hands and area of exposure well and immediately
2. Inform your resident/fellow, attending you have been stuck
3. Gather information about patient and source status
4. Get to care without delay
5. Be sure to follow through with your follow up treatment
6. GUSOM will cover the cost of care
7. Please follow instruction and reach out to the team of Dean's should you have any question and/or concerns.

Table 3

Georgetown University School of Medicine Policy for Bloodborne Communicable Disease

Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C (HCV) policy for medical and nursing students

1. For incoming or in-place students: routine screening for serum HBV/HIV/HCV is not required. Students who develop HBV/HIV/HCV seropositivity must report such findings to the Senior Associate Dean for Students.
 - A. Medical/nursing students with HBV/HIV/HCV seropositivity:
 1. Center for Disease Control (CDC) guidelines suggest that medical/nursing students with HBV/HIV/HCV seropositivity can continue to attend classes and participate in clerkships/clinical preceptorships, and that a case-by-case evaluation of each infected individual shall be made in order to determine the student's ability to perform school/clerkship functions. Therefore, it is the responsibility of each HBV/HIV/HCV infected medical student to notify the Senior Associate Dean for Students of his/her status.
 2. Medical students with HBV/HIV/HCV seropositivity shall have periodic physical examinations by their private physician or staff at the Georgetown University Student Health Center. Written health clearance will be provided to the Senior Associate Dean for Students.
 3. The greatest theoretical risk of medical student-to-patient transmission of HIV, HBV or HCV involves invasive procedures with by-needle manipulation of needles or other sharp objects not under direct visualization. Medical students who have HBV/HIV/HCV seropositivity should meet with an expert panel made up of the student's personal physician, the Medical Director of the Student Health Center, as well as the Senior Associate Dean for Students/Chief of the Division of Infectious Diseases in the Department of Medicine. They should meet with the panel prior to starting any clinical rotation. Students should not perform invasive procedures unless approved by this expert panel. Should the medical student disagree with the decision of this committee, he/she may appeal to the Executive VicePresident for Health Sciences.
 4. Confidentiality regarding medical/nursing student health matters will be strictly observed.
2. Students are not obligated to answer patient questions related to their own HBV/HIV/HCV status, nor shall they answer such questions related to other medical students, other health care personnel, or patients.
3. Serologic testing of medical/nursing students for HBV/HIV/HCV antibody will not be performed routinely. Testing is recommended when there has been a documented needle

or sharp instrument puncture or mucous membrane exposure to the blood or body fluids of patients, or when there has been a medical student-to-patient exposure.

http://som.georgetown.edu/docs/AppendixA_1.pdf

Managing Health Information Technology Access in a Changing Health Care System

There has been an accelerating adoption of health information technology (HIT) in the United States by physicians, nurses, and allied health workers in clinics, private practices, and hospitals. The transformation has been spurred on by a desire to repair an ailing health care system, modernize the management of the vast and growing amount of medical information and incentive programs by government and others to encourage providers, practices and hospitals to adopt these technologies.

Electronic health records (EHR) and other information technologies offer the promise of achieving improved efficiency, reduced cost, and higher quality. HIT can help achieve these goals through better access to clinical information anywhere, anytime.

Comprehensive access to information can help health care providers reduce redundant testing and make better clinical decisions. Having access to “medical knowledge resources” at the point of care and integrated clinical decision support tools can increase evidence-based decision making; reducing medical error, avoiding missed opportunities to provide preventive services and monitoring of chronic conditions properly.

HIT when implemented well can help the health care team to achieve these goals, but implemented poorly, HIT can cause efficiency to screech to a halt and delay care or pose barriers to patients receiving the right care on time or at all. Electronic health records (EHR), if improperly used, can have incomplete, inaccurate, or conflicting information that can lead to medical error. Current EHR systems are not intuitive, complex, and vary from institution to institution. Most errors within EHR’s are the result of “training issues, implementation issues, and the time it took to become accustomed to the system” (1).

Administrative policies and procedures regarding access, training, and use of these systems are necessary, not only for clinical use by licensed professionals, but also for use by trainees at all levels. The practice of medicine requires new skills that extend beyond simple computer literacy that did not exist before the EHR. Medical education is tasked to train students to learn these skills and incorporate and integrate the technology into their developing clinical practice.

“The underlying concepts of informatics, i.e., the use of information to improve health and health care, really applies to any health care professional (not to mention the patient, the researcher, and others!) The 21st century clinician must have a basic understanding of informatics issues, such as capturing data that is correct and complete as well as consistent in its expression. He or she must be able to work in partnership with informatics professionals to achieve what we know is so critical in the application of informatics, such as adhering to standards, achieving system interoperability, appropriately and optimally implementing clinical decision support, and maintaining security to assure privacy and confidentiality” (1).

EHR Use: Knowledge and Skills

Program directors in graduate medical education expect students to have basic skills and experience using EHRs (2). In order to educate students in these new clinical skills, they need to be defined and competencies determined. Pedagogy, including providing opportunity to practice in simulation should be developed to facilitate students' ability to achieve measurable learning objectives that can be reliably assessed. Though each information system or electronic health record will vary in design and user interface, there are common data elements and functions that students should recognize, manipulate, and apply (i.e. demonstrate skill). Educators must decide when it is advantageous to use the specific information system used in their hospital or institution with its own unique attributes, customizations and quirks, or when to use another system that may be simpler, be less expensive, be more accessible, or better demonstrates the transferable function or skill being taught.

It may be difficult to discern a common function and transferable skill from one that is specific to a system. An example of a common data (function) includes the inclusion of a structured medication list and medication history, with common skills including; the user can find a patient's medication history, including the history source (local record, pharmacy, payer). The user can understand, reconcile and integrate external medication history sources with the local chart's medication list. The presumption of transferability is that if a student is aware that an electronic medical record should have the functionality to retrieve external data about medication/prescription history via SureScripts network from payers, pharmacies, and other sources, and can reconcile these lists, they will know to look for that functionality in whichever EHR they use.

What EHR Skills Will Students Need?

Learners should understand the basic functions and structural elements of a certification commission for health information technology (CCHIT) certified electronic health record shaped under meaningful use standards (3,4). They should readily expect for example that a record should have an active medication list, problem list, allergy list. Additionally it should have functions of computerized physician order entry (CPOE), electronic prescribing, health information exchange (HIE), and clinical decision support (CDS). The specific skills students need to be able to demonstrate will depend on their role, level of training, and what are they allowed to DO based on institutional policies. A second year medical student has different responsibilities than a resident and will likely have different access rights.

All students should be able to demonstrate basic skills, including:

- Navigation
- Data Retrieval: Find categories of information and specific data
- Use and organize information
- Data Entry (structured and unstructured)
- Communicate effectively with patients using an EHR

Other skills and functions students should experience include:

- Computerized Physician Order Entry (CPOE)
- Electronic Prescribing (e-prescribing)
- Recognize and respond to Clinical Decision Support (CDS)

Examples of the skills listed above include:

Navigation: Navigation skill is essential. It correlates with perceived EHR reading and writing skill (5). A student should know how and where to access the system (what ward, computer, service), how to login (and properly log out), find a patient, and find or make a list of patients for which they are responsible. Within an individual patient record, they should be able to find key clinical lists, documents, laboratory and radiology results, orders, responsible providers, advanced directives, and HIPPA information, etc.

Data retrieval: Finding specific data examples might include: When was the last potassium and what was the result? Is the patient currently on a specific medication? Were they ever on that medication? Does the patient have an allergy to a specific medication or class? When was the patient's last tetanus vaccine? Who is the patient's emergency contact? What information is permitted to be shared or not shared with family members?

Organizing/Using information: Ultimately the whole point of the EHR is for the user to be able to use the information to improve health or health care (of individuals or populations). The learner should be able to identify specific problems including unresolved issues (that are not on the problem list), interpret data and trends to arrive at diagnoses, make assessments, and formulate a plan.

Data entry: Once a user of an EHR knows where they should find data and experiences a poorly kept electronic record, they may use more care to enter data properly. Learners should use structured data when possible and appropriate. For example, medications should be recorded in the medication list selected from a master list as opposed to free-texting in an open text box. Free-texted (medications) entered in another section of the chart as opposed to the medication list table will become lost in the electronic record. In addition, the HER, clinical decision support for drug-drug, drug-allergy, and drug-problem interactions will only function of the medications. Problems and allergies are entered as structured data into the appropriate lists/tables. Users should know not only how to enter new data but how to properly update structured lists e.g. inactivating, removing items, and correcting data errors found in the record. For areas such as the History of Present illness (HPI), learners should learn to enter data using both free text and structured templated forms.

Communicating Effectively with EHR: Practicing physicians, and learners in various stages of training, find communicating effectively with patients using an EHR to be one of the most difficult tasks (6). The electronic health record should not become a distraction or impairment, but facilitate enhanced communication with sharing clear accurate information promoting shared decision making. Training learners to

communicate within the doctor–patient – computer triangle is essential. Specific EHR communication behaviors have been described, and structured as a checklist (7).

Additional advanced skills include computerized physician order entry, e-prescribing and working with Clinical Decision Support.

“Clinical decision support (CDS) provides knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. Clinical decision support encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; and contextually relevant reference information, among other tools” (8).

Often clinical decision support will be integrated with e-prescribing and clinical physician order entry, for example providing the user with alerts of drug-drug interactions. When prescribing one drug that might interact with another the patient is already on, the system will provide an alert. The user needs to decide to change the medication, adjust the dose, adjust monitoring or proceed with prescribing despite the alert. Clinical decision support within clinical physician order entry is often facilitated by the creation of order sets for specific common conditions for example, community acquired pneumonia (CAP). The order set might contain orders used in every case of CAP, and optional orders for special circumstances. Order sets are particularly useful for avoiding errors of omission for common accepted treatment as well and reducing overuse of unnecessary tests.

What Training Do Students Need?

Like with any clinical skill, the student will need progressive training to achieve the milestones of competency, moving from basic to more advanced, eventually demonstrating the skill of using the EHR effectively in live encounters with real patients.

Opportunities for training should start early and be integrated into a larger curriculum. Boot camp type training to orient a learner to the most basic skills including navigation can be offered if time and resources are limited. To be used effectively, however, boot camp training should target the very minimal required, user-specific activities and should occur as close to just-in-time use as possible, such as at the beginning of a clerkship. If provided too far in advance or if training is too broad, it will be unsuccessful.

Creative activities can be designed to teach principles and the component skills listed above in a graduated fashion. Self-directed and guided hands-on activities are more effective for teaching these skills than lecture or simply providing reference materials. For teaching data retrieval, a variety of scavenger hunt type activities have been described. A student is provided a standardized patient record in a training EHR. In a basic scenario the student is provided a list of items to find such as an active problem in the problem list. In a more advanced activity, the student is asked to make a comprehensive problem list based on the medical record. The scenario is designed to include problems properly listed as well as problems hidden in the record such as a

pulmonary nodule recorded on a computerized tomography (CT) scan report or hospital discharge note, requiring further investigation.

Finding data is a building block toward organizing and manipulating data for clinical purpose. Activities to teach this latter skill include making assessments or treatment plans based on data found in the EHR for standardized patients. Existing paper case scenarios where the facts are presented in an organized, deliberate way can be modified and replaced with scenarios where students must find the data available only by looking in the record. The student is tasked with identifying the pertinent data to identify trends, make an assessment, or gauge response to treatment.

Using EHR data to provide population-based care by creating registries is another way to teach data organization and manipulation. Students are tasked to frame clinical questions that may be formulated into queries, e.g. “ find all diabetic patients who have had a HgA1c within the last 6 months AND show the A1c value” or “flag all patients with an HgA1c \geq 8 AND sort by A1c highest to lowest.” Students are not expected to become programmers, however; some systems allow these types of queries to be easily created by a student. Depending on the system, students may be tasked to formulate the question in a way a health informatist could query the database. These types of queries can then be used to teach continuous quality improvement (CQI).

Students should be trained to identify what data is best entered in a structured vs unstructured, or a coded vs un-coded, way. They should understand the advantages and limitations of using various database objects, e.g., checkbox, radio button, pick list. They should be provided opportunity to practice entering data in different ways. A student may be tasked to take a written narrative history - extract the structured data and enter into the EHR in the proper location and form. This is particularly useful for the key clinical lists, e.g. problems, allergies and medications. Replace traditional history and physical paper write-ups in preclinical and clinical work with EHR write up. Another activity to teach navigation and data entry is to have student be a virtual scribe by viewing an audio or video standard encounter and charting it. Ask the student to document the HPI by free text then by templated guided entry. Evaluation can be judged on accuracy, readability, and understandability but also on appropriate use of structured entry in the proper location. The activity can be (peer) evaluated by scavenger hunt described above. The activity could be timed to train and demonstrate navigation speed and efficiency.

Activities that support clinical physician order entry, e-prescribing, and responding to clinical decision support include; providing students, who are learning clinical pharmacology, simulated cases where they have to make medication choices and enter these in an e-prescribing system. Cases may be designed to force specific clinical decision support alerts. This activity teaches the required elements of prescribing as well as higher orders of learning of clinical pharmacology. For clinical physician order entry, students could be tasked to formulate their own order sets, create them in an EHR system then discuss and compare their sets with peer or institutionally created sets.

Find opportunities for preclinical students to get their hands on an EHR at various touch points to provide opportunities for formative learning, practice, and to see how basic science translates to clinical practice.

How Will Students Be Trained?

On what system should these activities be conducted and students be trained? At many medical schools or training programs, learners will work at different institutions where different electronic health records are used. Understanding and training to the common functions found in all certified EHR's will make learning a second system easier. There are pros and cons to using the same "production EHR system" used at your institution's primary teaching hospital.

Pros:

- If you will only train on one system training in the home system makes sense.
- It is the system students will likely use the most during clinical rotations.
- Learning that system provides a smoother transition from training to clinical use.
- A training environment may already exist alongside the production version of the software, avoiding the need to create a separate setup.

Cons:

- It is potentially hazardous to train in production environments as real patient data may be changed inadvertently
- There is the potential for HIPPA violations
- The production system, even in a separate test environment, may be too complex for the specific training purpose.
- Commercial systems are typically not designed for education and may pose specific technical barriers to educational purpose.
 - Difficult to create a model standardized patient records with detail
 - Limited ability to replicate standardized patient records.
 - Limited or no ability to reset database to a start point
 - System may allow one students "work" to be viewed by other students.
 - Limited ability to customize forms reports and tables with ease.

It may be useful, less expensive, and easier to create educational activities as well as provide a more clear or straightforward learning experience by using stripped-down EHR or other simulated EHR. There are a number of free open source EHR's (9) as well and tools designed for collaborative EHR education (10), that may be better tools for specific educational needs.

EHR Use - Access Control Rights

Health care students are often expected to use many different HIT systems at several institutions, hospitals, units, and clinics. Because of its ubiquitous nature and the need assure patient privacy, institutions develop policies and security measures to limit access to patient information. Members of the health care team, including students, should have access only to those patients and parts of the record for whom they are responsible. In

addition, individuals rights in an EHR or other HIT system may be further limited to only the specific functions required for the users role. A student, for example, might be allowed to view an order but not create one, or they may be able to propose an order but not approve, finalize, or send it. Policies and procedures in conjunction with HIT system design determine how access is controlled.

To assure your learners can access the systems they are expected to use, several questions will have to be answered. These questions may be used a checklist in administering your program.

- What (HIT) systems does your institution/ affiliate use?
 - What systems are used by your service or department?
- What access should students have? What access DO they have?
 - How/who can reconcile the gap between what access students have and what they need?
 - How is access granted and by whom (authority)?
- Who may request access (authority)? e.g., school official, student, other?
- When and how are provisioning credentials issued (technical/logistical)?
 - Are there FERPA limitations on exchange of student information with affiliates?
 - Are there privacy/use agreements students must attest to?
 - Who owns and tracks these?
 - Are there minimal training requirements for users to be enrolled?
 - How are students added or removed?
 - By whom? School contact? Hospital / IT contact?
 - When? How much lead time is needed?
 - How are students notified/provided their login credentials?
 - How are individuals removed who are no longer enrolled?
 - How are student removed at graduation?
 - How often are passwords required to be changed?
 - How DO students get help changing passwords?
 - Will all students at all levels receive the same access?
- How is general IT/Help desk support provided?
- Do the systems allow for remote access and is that separate from on-site access?

Wireless Networks/Personal Devices Use

Students use a variety of devices to access institution HIT systems, as well as knowledge resources from the host institution, the medical library, and public sources on the internet. Most physicians use smartphones to access point of care resources for medical decision making. There is no ideal device for all uses and the choice of a device in a given setting will depend on the use case and need.

Institutions may provide devices for student to access the HIT/EHR such as at nursing station -based desktops. Clinics may provide mobile (laptop) computers for similar purpose. Students may wish to use personal devices including laptop, tablet or

smartphone to access hospital/clinic systems. You should know for each institution where students are assigned:

- Are devices provided by institution or student?
 - Does this vary by use case?
- What are the policies regarding:
 - Institutional devices?
 - Can they be taken home?
 - Can personal content be added e.g. apps, contact, calendar?
 - What is the loss/damage policy?
 - Personal devices?
 - Are they allowed on hospital network?
 - Are they allowed for access of hospital information systems?
 - May/must device be inspected for security inspection?
 - Can PHI be kept on device in any context?
- How will students get on the network/wired or wireless? Does this differ by device? Does access expire on what time frame?
- Is access restricted e.g. website exclusions, limited website inclusion, streaming media, etc.?

Library/Hospital Information Resources

The health science schools (medicine, nursing) are a tremendous resource for students. At some institutions there may be separate a hospital system library from the medical library. Most information resources have become digital, allowing for anywhere access for those licensed. Depending on the institution and the resource, licensing may be unrestricted or limited by number of simultaneous users or further limited to individual users. Learners may wish to access these information resources from personal devices. There may be limitations to access based on employment, affiliation, or technical limitations for off-network access. A hospital network, for example, may limit access by firewall or other technologies to outside servers. Be aware of information resources your learners will need to access. Work with your library to develop processes to inform students how to install licensed content to their local personal device and to access protected online content via proxy server or remote login.

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Student Advocacy and Support Topics

How Adults Require and Attain Knowledge

Lifelong learning has become an important concept in education circles. The implication is that lifelong learning is both possible and necessary as a lifetime pursuit (1). Learning can be simplistically defined by three dimensions: content, emotional and social. The content dimension includes knowledge, comprehension, skills, abilities and attitudes around specific content. The emotional dimension is driven by incentives including emotions themselves, feelings, motivation and volition. The social dimension includes interaction, communication and cooperation. The interface between these three dimensions helps to produce lifelong learners with highly developed executive functioning. Characteristically, people with that executive functioning are able to:

- Plan and organize their thinking.
- Use reason.
- Engage in risk assessment.
- Make sense of ideas and behaviors.
- Multitask.
- Moderate emotions.
- Work with long time horizons.
- Think critically.
- Access working memory.
- Reflect on and utilize their own strengths and weaknesses (2-7).

These levels of high executive function are exponentially more important when considering the training of future physicians. The ability to master and implement these skills has a direct impact on the health and welfare of the people that they will treat and the professionals that they will become. Thus, for medical education in particular, there must be a focus on supporting students in every aspect as they strive to not only acquire and retain content knowledge, but to implement and apply higher levels of critical thinking, processing and skill-based practice.

Adult Learning Basic Concepts

According to many scholars and educational researchers, adult learning, with regard to related cognitive and psychological functions, is basically similar to childhood learning. However, when put in context of concrete learning courses or events (those that require a higher level of knowledge, are more developmentally advanced, or utilize more advanced skill levels), there are substantial life age differences; in part due to the biological and neurological maturity of the brain and in part to the changes that occur in social and emotional development and processing (1). There are entire areas of study and research devoted to adult learning – and far too vast to be explored in depth here. However, there are some significant principles and characteristics in common:

- Adults do best in an active learning environment with information presented in “small chunks” for mastery.

- Learning environments need to be collegial and collaborative rather than hierarchical.
- Adults have fairly short attention limits; mental focus and engagement greatly decrease after approximately 20 minutes.
- Learning needs to be problem-centered and results oriented. Adults need to know why learning and mastery of skills will be beneficial. Otherwise, in order to achieve the specific results that they have determined that they need, adults will seek their own outside educational and training experiences.
- Adults learn best when they are self-directed and self-paced – and when they can actively practice knowledge and skills without threat of embarrassment, humiliation or social stigma.
- Adults accept responsibility for their own learning if it is perceived as timely and appropriate.
- Adults are often highly analytical and skeptical about new information, especially if it not presented in a manner that delineates the immediate/timely relevance to their learning goals.
- The fear of failure and “looking stupid” can have a powerful impact on achievement and educational undertakings (1), (5), (8).

Learning Difficulties and Disabilities

Many medical students wrongly assume that their academic achievement and learning is a foregone conclusion and that the strategies that they have utilized throughout their educational career will continue to serve them. Unfortunately, for approximately three percent of medical students, that is proven untrue once they enter the challenging curriculum of medical education (9). Learning difficulties and disabilities are determined through assessing differences between achievement (grades/performance/scores) and ability (IQ). In earlier educational settings, these discrepancies are often detected through observed struggling or failure. Medical students have very high intelligent quotients (IQ's); they have developed strategies and learning mechanisms that allow them to succeed. However, once they start to experience the enormous demands of medical education, their previous strategies prove inadequate.

Learning difficulties can range from attention problems (attention deficit disorders) through processing disabilities (learning disorders, language processing disorders, etc.). In working with adult medical students, determination of these difficulties is challenging. Academic support services need to carefully monitor student progress (through grades, referrals from instructors, self-referrals, etc.) and offer screenings for various issues. Once there is a determination that there is evidence of difficulties, students need to be referred for a comprehensive assessment (through the disability services office or privately). It is important that the professional who is evaluating the student is highly qualified, competent and has experience working with adults with high IQs and achievement. If a learning disorder is diagnosed, the assessment report must be written very specifically so that accommodations and other support systems can be put in place. These disorders are also protected by the Americans with Disabilities Act of 1990.

As adult medical students, it is often devastating and highly stressful to not only struggle (and possibly fail) – but to deal with an entire identity shift. Typically, these individuals have never had to face difficulties in succeeding. The emotional impact of these struggles and possible diagnoses can be overwhelming, and working with mental health supports and services is vital.

Timing and Transitions from Classrooms to Clinics

Academic support is not only important for the achievement of curriculum standards but to assist with the shift into clinical settings. As adults, these shifts are both exciting and terrifying – not only are they expected to be clinically astute but to learn and maneuver through various work cultures and expectations. As part of their early training and education, medical professionals in training need to identify and strengthen learning strategies, especially as they apply in performance based assessments. Details that appear insignificant (where to park, how to dress, personality differences among staff and personnel, operating procedures, etc.) can overwhelm and greatly impact student performance in clinical settings. Quite often, there is a fear of appearing “weak” or lacking knowledge if they ask too many questions or express tentative emotions. It is important that students have academic support services available that can answer these questions and provide reassurance through this part of their academic training. Clear communication and early implementation of support systems (within and outside of the clinical experiences) can serve to reduce fears and stress and allow students to focus their cognitive energies on their clinical performance.

Non-Traditional Students

By nature, professional educational settings are populated by non-traditional students. In medical training programs, these students can often feel that they are less prepared and less able to keep pace with their colleagues who are younger and/or recently out of undergraduate programs. Academic support services can help provide these students with an awareness of the strengths and competencies that their previous work and life have provided. Using a competency based approach, helping these students to identify their strengths and translate them into skills for their academic and clinical achievement can alleviate most of these fears. Support services can also help facilitate friendships and support with other non-traditional students that can alleviate the isolation and feelings of incompetence.

Cognition and Learning

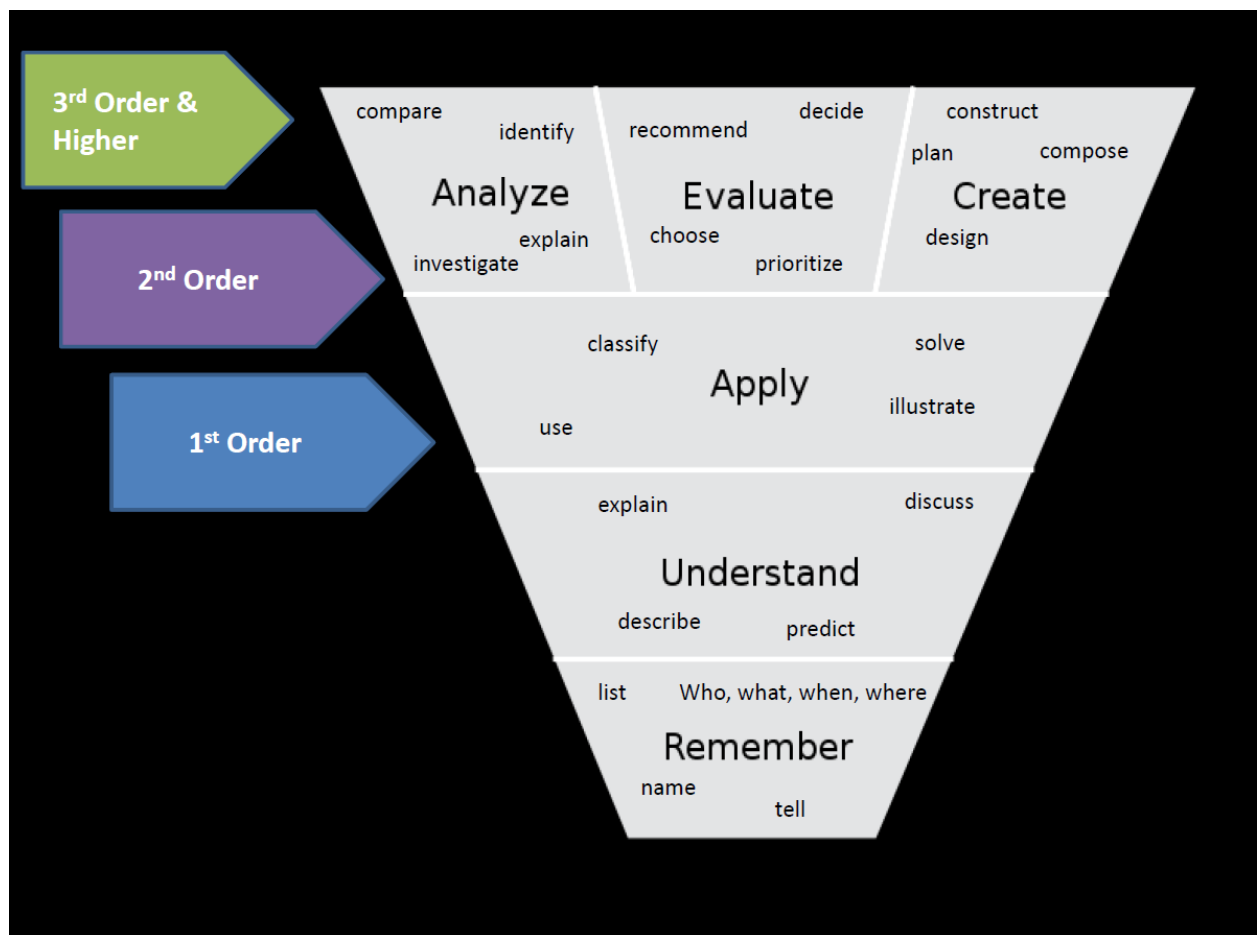
Rapidly progressing technological and scientific advances are actively changing the scope and practice of medicine. These advances have also greatly impacted the field of education and learning. The blending of these two fields in the arena of medical education offers great opportunities for improving and increasing both areas.

Critical Thinking and Higher Order Thinking Skills

As part of higher executive cognitive functioning, critical thinking is a vital skill. Clinical reasoning skills are a great example of these skills – and are directly assessed through the medical licensing examinations. Teachers in school are trained in teaching these skills to children and adolescents. Somewhat slowly, undergraduate education

programs have been employing meta-skills or higher-order skills which enable other skills to occur, in the delivery of coursework. This has also continued to move forward as medical education is beginning to implement more evidence based instructional strategies. Because most medical educators do not have formal training as teachers, faculty development and feedback opportunities are extremely important in supporting the advancement of teaching medicine.

As a foundational strategy, educating medical students about higher order thinking and processing empowers them as lifelong learners. Arguably, Bloom's Taxonomy (10) is one of the most familiar and most frequently used models of higher order thinking.



Teaching students metacognition skills allows them to assess and strengthen their skills. If they can start to identify the levels of thinking that they are utilizing, they can employ strategies to evaluate, expand and implement greater knowledge and skills.

Learning Styles and Preferences

Over the past several years, there has been a lot of conversations and controversy around learning styles. Depending on the model and the definition, there are well over 35

different aspects of learning styles, including preferences for seating, lighting, intake, input, noise levels and social settings. These styles are very personal and distinct for each individual learner. Due to the personal nature of these characteristics, perhaps a better term is learning preferences.

Historically, most educators naturally tend to base their teaching and learning expectations on their own idiosyncratic learning preferences. While it is impossible and impractical to create instructional strategies that covers all learning preferences, it is educationally sound to keep in mind that all learners will receive, process and implement information based on their own personal learning strengths. Likewise, as part of empowering adult learners, it is a good practice to help students identify their own preferences; and then implement highly effective strategies for learning based on those strategies. While using metacognitive skills and awareness is effective in increasing the efficacy of individuals' learning, it should never be used as an excuse or reason not to participate or to expect that instruction will be altered to conform to those styles. Part of being an effective adult learner is using learning preferences to take in and process information regardless of the method or style of delivery.

Competency and Proficiency in Assessments

Valid and reliable evaluation assessments are a constant struggle in all educational spheres. Typically, most institutions have entire departments devoted to that task. For students, high stakes testing has become part of their entire educational experience. Test anxiety exists and is increasing across the entire scope of education. One of the major tasks of academic support is to provide instruction and increase awareness of test-taking skills.

Most major high stakes testing is in a multiple choice format. This is definitely true for both the Medical College Admission Test (MCAT) and the United States Medical Licensing Exam (USMLE) along with most clerkship evaluation instruments. Preparation for these exams needs to encompass three constructs: content review, familiarity and “attack” skills with question formats, and fluency with test speed and accuracy. Along with foundational knowledge of critical thinking skills and individual learning preferences, these skills are vital for ensuring the ongoing success of medical students as they progress through their entire education. Through the awareness of their own skills and strengths, they can be a critical consumer of test preparation programs and materials, as well as study strategies.

Remediation

As a professional vocational program, medical education must effectively remediate failures and large gaps in knowledge and clinical skills. To not do so effectively is a potential threat to the welfare of future patients. As such, remediation is a serious activity that requires a collaborative effort between instructors and support personnel. As they progress, most students find some areas or subjects that are weaker than others. If their abilities are not up to the standard level of competence, there must be a plan to assist them. While the course instructors can remediate and reteach the content, the student must take responsibility to improve their study skills and habits. Often during the

remediation process, learning difficulties and test anxiety become more evident. Working closely with academic support personnel is important so that the student can identify and apply their individual strengths and competencies to the review and re-learning of these deficiencies. As part of the intervention, support personnel should assess outside stressors (financial, family, social) and possible emotional complications that could be impeding the student's success.

There is a great deal of information regarding the role of emotions in learning. Although adults would like to think that they are too sophisticated for that to be true, research supports the fact that negative and distressing thoughts directly impact the retention and recall. A second year medical student preparing for a licensing exam probably hopes for success, worries about failure and likely feels relief once the exam is over. All of these emotions influence the student's motivation, effort and study strategies (11). Due to this, it is vital that academic support personnel and mental health counselors closely collaborate in order to fully support all aspects of the student's life.

Mentoring and Defining the Path of Professionalism

One of the most important aspects of any profession is the presence of role models. While it is ideal to surround students and residents with only positive role models, in medicine as in other professions, sometimes "successful" practitioners do not necessarily possess the qualities we want students to mimic. Fortunately, with advance warning, students can benefit from poor examples as well as exemplary ones. The term "hidden curriculum" has been used to describe situations in which students see undesirable behaviors modeled while they are taught that these same behaviors are not appropriate or permissible.

It is important that students are taught to recognize these unwelcome behaviors and also have the opportunity to discuss or even report violations in a safe manner that is free from retaliation. It is essential that institutions take steps to remediate or remove individuals from teaching who cannot or will not comport with the expected norms.

The formal curriculum might include education in communication skills, including giving and receiving criticism, how to advocate for alternative or corrective treatments or approaches, maintaining appropriate boundaries in the teacher-learner community and use of social media or "e-professionalism". After students have been working with physicians in clinical settings, they may have identified examples of behavior which may be positive or negative. Sharing these observations with faculty or mentors may reinforce their understanding of behavior which is inappropriate and which they are unaware of.

Mentors are extremely important in professional development and success. While most students clearly benefit from mentors, a positive outcome is best achieved through a process of mutual selection. Rarely do assigned mentorships result in the sort of aligned goals and understanding that "organic" mentorships do. Towards this end, establishing situations that bring potential mentors and students together in social settings and informal gatherings is one of the best ways for both parties to experience the personalities and interests of the other.

Wellness and Mental Health

Acknowledgement of the increasingly rapid pace of American society is paramount to understanding and appreciating the challenges faced by medical students today. Though providing invaluable contributions and access to learning and resources, technological developments have also led to increased pressures to learn and do more with greater efficiency. Never before in our society's history has society possessed the ability to stay connected through technology and social media at work, in the pursuit of educational endeavors and in our personal lives. Medical education has progressively embraced the use of learning technologies to augment medical student learning, and students themselves have welcomed these improvements and the ability to have an abundance of professional information and training at their fingertips. At the same time, the ubiquitous nature of technology and social media can interfere with a student's ability to engage in meaningful face-to-face social interactions and the pursuit of activities in support of their own well-being.

The modern concept of wellness is credited to the American physician Halbert L. Dunn (12). His 1961 book resulted from a series of lectures and articles by Dunn on the mind, body, spirit connections. Most notably, Dunn described wellness, "as an integrated method of functioning which is oriented toward maximizing the potential of which the individual is capable. It requires that the individual maintain a continuum of balance and purposeful direction within the environment where he is functioning" (12). Physician John L. Travis further elaborated on Dunn's work, founding the nation's first wellness center in Mill Valley, California in 1975. Travis stated that "high-level wellness involves giving good care to your physical self, using your mind constructively, expressing your emotions effectively, being creatively involved with those around you, and being concerned about your physical, psychological, and spiritual environments" (13).

In *The Wellness Workbook*, Travis and Ryan describe the key ingredients of wellness (13):

1. Wellness is a choice, a decision to move toward optimal health.
2. Wellness is a way of life – a lifestyle you design to achieve your highest potential for Well being.
3. Wellness is a process – there is no end point but rather it is ongoing.
4. Wellness is an efficient channeling of the body's energy into productive action.
5. Wellness is the integration of body, mind, and spirit. Everything you do, think and feel has an impact on your state of health.

The wellness wheel offers a visual construct for understanding the seven dimensions of wellness.



Each dimension on the wellness wheel addresses a significant aspect of our lives which, when cultivated, can contribute to our sense of purpose and well-being. Conversely, those dimensions left unattended may inhibit our success in striving for a sense of balance and movement toward health.

Medicine is a profession which offers tremendous rewards to physicians in the pursuit of intellectual challenges, the capacity to positively impact human suffering, in status and respect, financial compensation and in a host of professional opportunities. It is also a profession which can require working in high-pressure, time-consuming, physically, intellectually and psychologically demanding environments. Prioritizing patient needs or work demands above personal self-care can become the accepted model. The culture, though becoming more humane and compassionate with its own, has historically valued strength and sacrifice, denial of fatigue, hunger and emotional vulnerability. Too often, personal interests and hobbies, interpersonal relationships, and other needs which normally contribute to a sense of wellbeing, are put on hold. There may be little or no opportunity to process frustrations or even the joys of each day. Expressions of weakness are subtly discouraged. The idea of intentionally seeking life balance of help when there is too little balance, is often at war with internalized values which leave no room for vulnerabilities. Lack of time, lack of awareness, denial that a problem exists, fear of loss of control, stigma, fear of breach of confidentiality or of intrusive intervention by the institution or medical licensing board are tremendous roadblocks on the path to wellness.

If these healers, teachers and mentors struggle from time to time, or more frequently, in their own pursuit of wellness and wellbeing, what happens to the medical student who looks to them for guidance and mentoring?

Medical students come to undergraduate medical education with many strengths and tremendous ambition. Students may have advanced degrees in the biological sciences, professional degrees in the arts and humanities, and may have successfully navigated a professional career prior to the start of medical school. Some have families with children or are looking forward to settling down with a partner and beginning a family of their own. Most are highly motivated to be successful and to contribute meaningfully to improving the human condition. Medical students begin their medical education with mental health which is comparable to their age related peers, however, as medical school progresses, the rates of depression, anxiety and burnout exceed those of their contemporaries (14). An exploration of the stressors of medical school may yield clues to this disturbing trend and offer ideas for improving the health and wellbeing of students.

Each year of medical training brings predictable stressors and anxiety. Thomas Wolf, in *To Your Health: Achieving Well-Being During Medical School* (15) delineates the most common stressors associated with each year in medical training:

- First Year: New learning environment; being away from home, feeling inadequate much of the time; missing prior life and free time; learning how to study efficiently.
- Second Year: Feeling burned out by the classroom; worried about USMLE Step 1. Doubts about choice of medicine as a career, marathon studying of massive amounts of material.
- Third Year: Dealing with patients, death and illness; long hours and limited sleep; feeling at the bottom of the medical hierarchy; worries about specialty choice and residency.
- Fourth Year: Dealing with residency applications and uncertainty; possible geographic relocation, loss of friendships and support system; responsibility of patient care decisions.

Additionally, first year students may find themselves surprised by the stressors associated with cadaver dissection, the increased academic demands of medical school, performance anxiety, establishing social supports and fitting in with their peers, as well as being only one among many academically gifted students. The stressors continue during the second year of medical training as students may experience a sense of surprise and frustration at their lack of free time as compared with their first year of medical education, and may engage in anticipatory anxiety regarding their upcoming clinical clerkships and the importance of performing well to their eventual success as a competitive residency applicant.

The long awaited clinical years of medical training may offer little respite from stress. Third and fourth year medical students must adjust to the challenges of constant

evaluation, isolation from their peers and social supports, financial stressors, interview anxiety, the competing wants and needs of family, and feeling unprepared to move into the rigorous demands of residency training. It is also often during these years, that students develop burnout, described as emotional exhaustion, depersonalization and a reduced sense of personal accomplishment or effectiveness. (16). Burnout can result in rigidly or compulsively seeking to prove one's self, working harder, becoming frustrated, irritable, angry or bitter. Students who are experiencing burnout often neglect their own needs while also withdrawing from their social support systems.

Each of the above stressors are normal developmental and/or transitional issues and reactions that are inevitably part of the medical student experience. Medical students, however, are also prone to the same vulnerabilities and life stressors affecting the general population. Challenges in the personal lives of students, occurring singly or in conjunction with more predictable stressors, can test the coping skills of even the most gifted students. Below is a summary of the unanticipated personal stressors sometimes experienced by students that may result in increased risk of performance difficulties:

- Balancing family needs (emotional, psychological, physical).
- Cultural issues, expectations or obligations (self and family).
- Having a history of trauma.
- A history of depression, anxiety or substance abuse.
- Health problems.
- Diagnosis of a serious or life-threatening illness (self or family).
- Pregnancy or Miscarriage.
- Acute life events (sudden loss of income, relationship break-up, infidelity, domestic violence, being the victim of a crime, death or suicide of a friend or family member).

Medical students will differ in their response to anticipated and unanticipated stressors. Individuals with a rigid or inflexible view of themselves and those with rigid thought processes are more vulnerable to experiencing a maladaptive response to stress. For example, a person with perfectionistic traits and/or high levels of anxiety is more susceptible to engaging in self-critical or self-deprecating thoughts. Students with a genetic predisposition to depression, those who are socially isolated, who engage in fanciful or wishful thinking, who are avoidant, or who engage in self-sabotaging behaviors are also at increased risk for inadequately managing stressors. Alternatively, students who learn or who possess adaptive coping skills are better prepared to succeed in coping effectively with life pressures or crises. Key among the adaptive coping skills are the ability to address problems directly, to engage in active problem-solving, to reinterpret negative events, the capacity to express feelings, to utilize social supports and other resources, and to seek help as needed.

For students who grapple with successfully navigating concomitant medical school and personal stressors, the unmanaged or poorly managed stress can result in oftentimes directly observable behaviors. These warning signs of stress overload may include the following:

- Change in classroom attendance.
- Absence from activities.
- Avoidant behavior.
- Decline in academic performance.
- Withdrawal from friends.
- Repeated requests for extensions or special consideration.
- Anger and irritability.
- Negative self-evaluations or self-talk.
- Increased criticism of courses, faculty and administration.
- Increased criticism or dissatisfaction with peers, partners and/or family.
- Increased isolation/disengagement from goals, values, or the reasons for choosing medicine as a career.
- Anxiety, depression, substance abuse, suicidal ideation.

Without intervention and support, these behaviors may lead to a further deterioration in the medical student's already fragile health and well-being.

As described earlier, medical students do begin medical school with mental health similar to their peers who are not pursuing a medical education. Numerous studies suggest that mental health worsens over the course of medical school, with rates of depression peaking during years two and three (14), (17-21). According to the National Mental Health Association, 54 percent of people believe that depression is a personal weakness (22). Medical students are not immune from perpetuating this myth, particularly when referencing their own personal struggles. It is estimated that two-thirds of people suffering from depression do not seek necessary treatment, however, of those that do, 80 percent significantly improve their lives (23). The propensity to circumvent acknowledgement of emotional vulnerabilities, limited free time to address personal difficulties, and a fear of loss of status with faculty, mentors and administration are added barriers for seeking help among medical students.

Intervening with a student experiencing difficulty finding balance or coping with significant stressors necessitates an awareness of what it means to be working with a student who is emotionally overburdened. Individuals encountering high levels of distress have decreased access to executive functions, such as higher order problem solving. For these students, the range of options available to them appears substantially limited in scope. Medical educators can effectively support students by assisting them in putting words to their own feelings and to the situation at hand. Doing so normalizes the student's struggles, assists in making the situation more manageable for the student, and conveys compassion and a willingness to help.

Beginning a conversation with a student you are concerned about may elicit feelings of uncertainty or even anxiety. Common fears are that asking questions will prove to be overly intrusive, that you won't know what to do next, or that you won't possess the skills or knowledge to intervene effectively. It is critical that medical educators quiet their own anxieties in favor of staying present in the moment and adopting an inquisitive

but caring posture. The following are suggestions for beginning the conversation with a student who appears to be struggling.

- “Recently I’ve noticed some differences in you and I’m wondering how you’re doing?”
- “I wanted to check in with you. You haven’t seemed yourself lately.”
- “I’ve noticed _____ (fill in the blank) and I’m concerned about you.”

Eliciting additional information will facilitate developing a “next steps” plan for the student. It may be useful to ask the following questions:

- “Did something happen that made you feel this way?”
- “When did this begin?”
- “Have you thought about getting help?”
- “How can I support you right now?”

With a better understanding of the nature of the student’s problems, appropriate plans will often suggest themselves. Referring the student to the school’s counselor, counseling service, or other designated health service, facilitating student communication with the student affairs dean or the student’s mentor are examples of appropriate interventions.

Known or suspected substance abuse may necessitate referral to a licensed chemical dependency professional, or to the state’s equivalent of a physician’s health program for evaluation, treatment recommendations and monitoring as indicated. These referrals best serve the student and the institution, when they are made through a single individual, usually the associate dean for student affairs or the dean for academic affairs, to allow for oversight of student compliance with treatment recommendations.

In the event of a life-threatening crisis, facilitating the immediate transportation of a student to the nearest emergency department for further evaluation is indicated if counseling services are not immediately available.

What then, is the role of wellness programming in medical education and training? Medical education is a highly intellectualized process. This process of thinking about affect and behavior and then responding without actually experiencing the feelings associated with an event, situation or patient, can become routine and normal. Thinking and functioning solely in this intellectualized perspective moves students away from making emotional connections for themselves, with others, and moves them away from activities that assist them in staying grounded in a euthymic state of wellness. Life can become unbalanced, and for some students, emotional blunting occurs.

Wellness programs have been developed and are thriving at medical schools across the country in recent years. Activities such as yoga, therapeutic massage, mindfulness meditation, and stress relief sessions with trained therapy dogs are specifically aimed at

stress reduction and are designed to support the emotional, psychological and spiritual dimensions of wellness. More active endeavors such as running clubs, hiking and biking excursions, and healthy competitions between groups of students or between students and faculty support and encourage attention to the physical dimension of the wellness wheel. Family oriented activities, brown bag discussions or skill building sessions are intended to facilitate the social/cultural, emotional and psychological dimensions of well-being. The clinical reasoning behind wellness programming is to offer a range of activities to students which support adaptive coping strategies by decreasing isolation, facilitating peer connections, and by engaging students in new and healthy self-care experiences. It is hoped that developing and fine tuning self-care skills early on in medical education will translate into lifelong wellness habits which students can access and refine through their next several years of medical training and throughout their professional careers as physicians.

The success of wellness programming in encouraging medical students to live healthier, more balanced lives requires the development of both individual and institutional strategies. Individual students must be willing to commit to prioritizing wellness in their lives. Managing time effectively, attending to basic needs and maintaining a connection to those people, activities and hobbies that give life meaning while pursuing medical training can assist students in developing a sense of resiliency and well-being, even while pursuing a rigorous professional career. Professors and administrators and institutions must also appreciate the significance of wellness, and of actively supporting wellness in both word and action for medical students, staff and faculty alike.

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Evaluation, Assessment, and Grading

This chapter will describe evaluation, assessment and grading, and review the processes for each as well as the corresponding medical school requirements for Liaison Committee on Medical Education (LCME) accreditation. Examples are provided from various medical schools to illustrate a sampling of the different elements of evaluations, assessments and grading.

Evaluations

Introduction

Evaluations rate students' skills such as fund of knowledge, interpersonal skills, behaviors and attitude. Evaluations also include comment sections which are vital for feedback to the student on areas of strength and areas for improvement, letters of recommendation and the Medical Student Performance Evaluation (MSPE), previously known as the Dean's letter, for residency applications.

Many medical schools use a competency based evaluation to define the knowledge, skills and personal and professional values expected of all graduates. Boston University School of Medicine uses the following core competencies: basic science and clinical knowledge, clinical skills, problem solving, effective communication, self-directed lifelong learning, and professionalism. The meaning and criteria for each of these competencies should be clearly defined on the evaluation form so that both the teacher and student understand what is being evaluated (1).

The format and delivery of the evaluation varies at each medical institution. Many universities and colleges use online systems such as New Innovations, E*Value, etc. to distribute evaluations, while others may still use paper or email to document medical student performance. Regardless of the format of the evaluation itself, the feedback that the medical student receives on their performance is vital for self-directed learning and improvement. Evaluations from supervising staff, residents and faculty attendings (a faculty attending physician is a physician who has completed residency and practices medicine in a clinic or hospital, in the specialty learned during residency. An attending physician can supervise fellows, residents, and medical students) provide input for the student's final grade and can influence placement in a residency program based on positive or negative comments.

Who Teaches the Medical Students?

During medical students' first and second year of medical school students are taught by basic scientists and clinicians. During the third and fourth year of medical school, residents and faculty attendings supervise the medical students in the clinical setting and complete evaluations. Nurses, administrators and other members of the health care team sometimes also participate in the evaluation process. The teaching and assessment of the students are regulated through the requirements of the LCME.

Pass or Fail

Many but not all medical schools grade the first two years of basic science education on a pass/fail criterion. The medical education literature shows that a pass/fail curriculum does have a significant increase in student well-being, greater satisfaction with the quality of their medical education, and greater satisfaction with their personal lives. The graded and pass/fail classes showed no significant differences in performance in first and second year courses, grades in clerkships, scores on United States Medical Licensing Exam (USMLE) Step 1 and Step 2 Clinical Knowledge (CK) and Clinical Skills (CS), success in residency placement, and attendance at academic activities (2).

At some schools (e.g., Stanford School of Medicine, University of Washington School of Medicine) it is the prerogative of each course director to determine the best method for evaluating student performance for his or her course. Learning activities such as quizzes, short papers, laboratory exercises, problem sets, presentations, and group discussions, may be offered on a graded or ungraded basis at the discretion of the course director. Attendance and participation may be required where small group interaction is essential to mastery of material in the course. Common exams are used as the summative assessment tool to identify student knowledge gaps.

End of the Year Assessments (EOYA)

Some medical schools utilize an end of the year assessment at the close of each of the first three years of medical school. Below are objectives for the end of year assessments from Boston University School of Medicine. The student must demonstrate progressive knowledge in each of the following areas.

- Evaluate the students' ability to interview and communicate with patients.
- Assess the students' physical examination skills.
- Gauge the students' ability to synthesize data and present it in written format.
- Provide feedback to the students on their clinical skills.
- Measure the skills of the class as a whole such that individual and curricular deficiencies can be addressed.
- Create the opportunity to experience a timed clinical skills examination that is similar to the USMLE Step 2 CS Exam.

The Boston University School of Medicine medical students are assessed through multiple choice tests, small group discussions, case presentations, write-ups, clinical visits, completion of online modules and finish the year with the EOYA (1). A medical student's assessments will follow them throughout their medical education and is incorporated into the Dean's letter (MSPE).

Content of the Clinical Evaluation

The performance of the student becomes the basis for the clinical evaluation, which includes competencies of patient care, medical knowledge, experienced based learning, interpersonal and communication skills, professionalism and systems-based practice. Also essential is the report of strengths and suggested improvement. The language of the written evaluation and verbal feedback should be consistent, focused on observed

behavior and clear. Both teachers and students should have an understanding of the words defined in order for improvements to be made. Each resident and faculty member should be familiar with the vocabulary and use it to provide vital feedback not only for the medical student but for the clerkship director.

RIME

RIME is one evaluative method used by several medical colleges and universities to standardize and facilitate feedback to third and fourth year medical students (3-5). The student is evaluated on their ability to assume the following roles: reporter, interpreter, manager and educator. More recently professionalism and team have been added to the acronym and adopted by some schools.

Reporter

The medical student can accurately gather and clearly communicate the clinical facts on his/her own patients. Mastery in this step requires the basic skill to do a history and physical examination and the basic knowledge to know what to look for. It emphasizes on the day-to-day reliability, for instance, being on time or follow-up of a patient's test results. Implicit in this step is the ability to recognize normal from abnormal and the confidence to identify and label a new problem. This step requires a sense of responsibility, and achieving consistency in bedside skills in dealing directly with patients. These skills are often introduced to medical students in their preclinical years, but now they must be mastered as a passing criterion.

Interpreter

Making a transition from reporter to interpreter is an essential step in the growth of a third year medical student, and often the most difficult. At the basic level, the medical student must prioritize among problems identified during the interaction with the patient. The next step is to develop a differential diagnosis. Because a public forum can be intimidating to beginners, the third year medical student cannot be expected to have the 'right' answer all the time. Success is defined as offering at least three reasonable diagnostic possibilities for new problems. Follow-up of tests provides another opportunity to interpret the data (especially in the clinic setting). This step requires a higher level of knowledge, more skill in selecting the clinical findings which support possible diagnoses and in applying test results to specific patients. The medical student has to make the transition, from bystander to an active participant in patient care.

Manager

This step takes even more knowledge, more confidence and more judgment in deciding when action needs to be taken, and to propose and select among options for patients. Medical students cannot be required to answer each suggestion correctly, so we ask them to include at least three options in their diagnostic and therapeutic plan. A key element is to tailor the plan to the particular patient's circumstances and preferences.

Educator

Success in each prior step depends on self-directed learning, and on a mastery of basics. To be an educator in our framework means to go beyond the required basics, to read deeply and to share new learning with others. Defining important questions to research in

more depth takes insight. Having the drive to look for hard evidence on which clinical practice can be based, and having the skill to know whether the evidence will stand up to scrutiny are qualities of an advanced trainee; to share leadership in educating the team (and even the faculty) takes maturity and confidence.

Two additional descriptions that are being incorporated with RIME are Professional and Team, which is referred to as PTRIME.

Professional

Takes patient ownership and makes contributions to patient care. Demonstrates honesty and integrity in all interactions, advocates for and takes interest in the patient more than self-interest and builds a therapeutic relationship through a respectful, empathic approach that gains the trust of the patient.

Team

The team develops a productive, collaborative working relationship with all members of the health care team.

Feedback Sessions

Mid-clerkship feedback is required by the LCME and should be provided to students in person and in writing to allow the student adequate time to address any educational gaps in learning prior to the final week of the course. This will allow a chance for the clerkship director to touch base with the students, allow time for improvement and to address any questions or concerns the student may have.

To ensure that students know exactly where they stand at mid-point with regard to their course assignments, you can provide them with a copy of their patient logging (Table 1, ED-31) and a list of other assignments either completed or missing. Providing this information at the mid-point may assist students in organizing their time.

Tracking System for Evaluations

Regardless of whether students are being evaluated electronically or by paper, a reliable tracking system should be in place to ensure evaluations are being completed in a timely manner. This will be helpful for the administrator/coordinator as well as a record of what steps have been taken to provide for a site visit (Table 9).

Conclusion

The importance of receiving both written and verbal feedback is vital for a medical student to succeed. The evaluation form and feedback sessions will help facilitate feedback by using common language that both teachers and medical students understand (e.g., PTRIME). By using these tools, the medical student and clerkship will have a clear understanding of what is to be expected of them not only during the time that the student is taking the course, but as a future physician providing excellent patient care.

Assessment

Introduction

Assessment is the process of documenting a learner's knowledge through various forms of material: case studies, write-ups, and examinations (Table 1, ED-26). The goal of the assessment process is to have formal documentation that learning and knowledge acquisition has taken place during the course or clerkship.

National Assessment

US medical students are required to pass the United States Medical Licensing Examination (USMLE) Step 1 prior to the beginning of the third year of medical school and Step 2 at the end of their third year to demonstrate knowledge learned during medical school.

Throughout medical school students are assessed multiple times during each academic year. This link provides you with a timeline from the Association of American Medical Colleges (AAMC) - <https://www.aamc.org/download/46336/data/part5.pdf>

Challenges in Assessment

Assessing medical students can be challenging. Medical educators are wearing multiple hats (clinician, researcher and teacher). Dr. Pauline W. Chen, MD touches on these issues in her article "Why Failing Med Students Don't Get Failing Grades". Dr. Chen used data published by Drs. Sara Fazio, Klara Papp, Dario Torre and Thomas DeFer's article on grade inflation in the *Teaching and Learning in Medicine: An International Journal* (6). In her article Dr. Chen explains why bedside manner does not overrule standardized tests. Typically, evaluators do not write "this student would be a horrible doctor because of x, y, and z reasons." Instead they might use the word satisfactory, which could lessen the student's application for residency. If a student feels an evaluation is not accurate a grievance policy should be in place to contest an evaluation or grade. It is common for evaluators to use generic descriptors such as "good job" and "satisfactory" without describing particular areas to work on. Verbal feedback and written feedback are also sometimes incongruous which creates a lack of clarity for the student to understand how to improve. Dr. Chen suggests that this is one of the reasons why there are grade inflations across the country in medical school (7).

Conclusion

Through successful assessment, progression of medical knowledge will build for the learner and they will receive written feedback of their growth. By providing documentation such as evaluations, assignments and examination scores, assessment can be a successful tool for student success.

Grading

In a student's first and second year of medical school their final grade is determined by their knowledge of evidence-based medicine. "Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means

integrating individual clinical expertise with the best available external clinical evidence from systematic research."

Final third year clerkship grades are determined based on a number of different assessments such as the NBME subject exam, in-house medical school examinations written by scientists, educators and clinicians, and inpatient and outpatient evaluations. Please see section on grading systems and measurement tools for an in-depth discussion of assigning clerkship grades. This is an area in which many medical schools differ. Several have gone to pass or fail with H, HP, P, F, etc. while others still use the traditional grading system of A, B, C, etc.

Why Do Clinical Clerkship Students Need to be Graded?

There are several reasons why clerkship grades are important. This chapter will focus on learning assessment, formative feedback, and residency program applications.

The implementation of a grading system is an accreditation requirement of the LCME. In the 2012 version of *Functions and Structure of a Medical School: Standards for Accreditation of Medical Education Programs Leading to the MD Degree*, the LCME puts forth several criteria regarding evaluating and grading medical students (8).

Students use grades as a tool to assess their achievement in the course. With adequate information, students can also use grades and feedback as a means of formative assessment to make improvements going forward. When a medical student is given a grade on a certain measurement tool it will determine whether they can use that information to make improvements (formative) or whether it is a closed snap-shot of their performance after-the-fact (summative) (8). In both cases, students should be told how they are doing and how they can improve, as mandated by the LCME in ED-32 (8). Even in the case of a summative evaluation, however, the medical student should be able to use the general principles from the feedback of his/her performance in the completed clerkship in his/her future rotations; in that sense, one could think of all feedback as formative since learning and improving is a life-long endeavor. Of note, that is why requiring evaluators to make detailed comments about what the medical student did well and what specifically he/she can improve upon are so crucial to his/her ongoing development as a clinician.

An established grading system also allows medical schools to rank students according to their level of performance, which is especially important for residency programs that use school ranking as a criterion for invitations to interview and/or acceptance into their programs. As a direct result, medical school rankings and grades are very high stakes for students and they care a great deal about how these will affect their future educational and career plans. It is up to the medical school to decide how to structure their ranking system. For example, normative grading systems benchmark medical students against each other (on a curve), whereas a criterion based grading system allow students to be benchmarked against a preset and unmovable achievement standard (8).

The LCME does not mandate a specific, universal grading system for all clerkships, and so the development of the grading system falls to the discretion of the medical school. Alexander et al (2012), collected information on grading systems used by the 119 LCME-accredited, AAMC affiliated medical schools in the 2009-2010 academic year (11). This research discovered an enormous variety of grading systems used at these medical schools. They are summarized in Table 2, and listed in order of frequency of use.

Measurement Tools

The LCME does not mandate a specific set of measurement tools to be used in determining a student's final grade, but they do require medical schools to employ a variety of methods for assessing student achievement in the areas of "knowledge, skills, behaviors, and attitudes" (Table 1, ED-26) (8). Therefore, it is up to the clerkship director, in conjunction with the medical school, to decide what measurement tools to utilize for evaluating medical student outcomes assessment. Furthermore, as per the LCME, these tools must "support the goals, objectives, processes, and expected outcomes of the curriculum" (9).

Some measurement tools used to determine a medical student's final clerkship grade can include clinical evaluations from house staff and attending physicians (both inpatient and ambulatory rotations as appropriate), examination scores (such as the NBME shelf exam and a clinical OSCE, which measures a medical student's clinical ability in a standardized setting), a score regarding professionalism (such as punctuality, attendance, and level of participation), and other academic assignments such as evidence-based medicine assignments, team-based learning assignments, write-ups, or case reports.

Formal Case Presentation

Case presentations can provide insight into how much a student understands the process of presenting a case, information gathering, reporting, differential diagnosis, etc. An example of a grade assessment for case presentations can be found in Table 10.

Clerkship directors have the authority to weigh scores from measurement tools differently. Examples of measurement tool weights are included in the figures in the Tables 3 and 4. One thing to be conscious of when assigning weights to measurement tools is how medical students will perceive their importance and therefore how they will treat that particular assessment instrument. For example, Zahn et al (2004) warned that "a heavily weighted examination may encourage the medical student to focus on mastery of written materials and text, leading to a de-emphasis of clinical skills (10). This approach has the potential for diminished experience in patient interview and physical examination skills, less focus on communication skills, and less emphasis on deductive reasoning in formulating a differential diagnosis and patient management plan. Alternatively, a minimally weighted formal examination may encourage little reading, particularly because clerkships are more like an apprenticeship, with less dedicated or assigned time for reading compared with the medical student's classroom type learning that they have been accustomed to throughout their prior education. Unless the medical student commits time to read, there exists the potential for sacrificing important knowledge or

achievement of other course objectives. This decision on assigning weight to the examination, if used, is a real dilemma for many programs (1).

Some schools adjust what criteria are required to meet a certain benchmark based on where the medical students are in their clinical year. The rationale for this is “to account for the level of experience that the medical student has had in the clerkship year up to that point” (3). In these situations, grading criteria and how final grades are calculated may be applied differently.

Calculating Final Grades and Grading Policies

For the clerkships, it is usually the job of the clerkship administrator/coordinator to gather and calculate grades, often in conjunction with the clerkship director or perhaps with a grading committee. Having a system for tracking scores and grades, such as a spreadsheet or database, is invaluable. An added benefit of using a spreadsheet is that functions can be preset into the appropriate cells so that all calculations are calculated automatically.

Providing medical students a copy of your grading policy and how grades are calculated can ease a lot of anxiety and confusion at the end of the rotation, particularly if there is a grade dispute. Examples of grading policies which include measurement tool breakdowns can be found in Tables 3 and 4.

The clerkship administration assigns a rank and order to the various grade components in an effort to qualify and effectively summarize each medical student’s performance during his/her time in the clerkship. These assessments strive to measure medical student performance across several categories such as clinical ability, medical knowledge, and professionalism. The synthesis and review of these assessments during the final grade process provides a means of assigning value to each, with the goal of providing both the medical student and outside institutions with an accurate understanding of the medical student’s abilities as measured against his/her peers. The clerkship administrator/coordinator plays an integral role in this process, as he/she is responsible for collecting and maintaining an accurate record of the medical student’s performance in the clerkship. The administrator/coordinator often drafts the initial summary of a medical student’s final grade before the grades are reviewed and approved by the clerkship director and/or the clerkship grading committee.

Timeliness of Submitting Final Grades

The LCME requires grades to be submitted within six weeks of the close of the clerkship. ED-30 reads “An important element of the medical education program’s system of assessment should be to ensure the timeliness with which medical students are informed about their final performance in courses and clerkship rotations. In general, final grades should be available within six weeks of the end of a course or clerkship rotation (8).

You may encounter some barriers to being able to submit final grades within the expected six week window. One of the primary reasons for this is that not all the data that factor

into a grade are available. For example, there may be times when not all faculty, fellows, senior residents, or interns complete their clinical evaluation of a medical student.

An effective way to ensure the faculty and house staff complete their clinical evaluations is to send reminders. This may be done automatically (generated every x days via an electronic evaluation system), or via email by the clerkship administrator. In the latter case, clerkship administrators/coordinators have had success personally sending an initial reminder directly to the person in question. If no response is received, a second reminder would be sent with the clerkship director and/or the person's supervisor copied. Such reminders could continue to ramp up as appropriate to each site. Before implementing this system, however, the administrator/coordinator is advised to work in conjunction with the program director and any other necessary department heads to ensure that such a method congeals with the program's culture, and that any punitive steps are in line with the program's policies.

Final grades for fourth year clerkships and clinical rotation electives are often based on preceptor evaluations, clinical performance and final exams in rotations such as elective rotations in their chosen discipline and required rotations in acute/chronic care, ambulatory care, emergency medicine, neurology and sub-internships.

Failure Policies

Unfortunately there are times when a medical student fails a clerkship. Luckily this is not often. According to Alexander et al., less than one percent of medical students failed in the 2009-2010 academic year (11). The clerkship should have a failure policy in place, which should be provided to the medical student at the beginning of the clerkship. Failure policies should be created by clerkship directors in conjunction with the medical school. Many medical schools require the failing medical student to meet with a Student Progress or Student Standards committee to determine what remediation steps will be implemented (Tables 5, 6).

Grading Disputes and Appeals

The clerkship should have a policy for grade disputes and appeals, which may come directly from the medical school. As with failure policies, grading dispute policies should be provided to the medical student at the outset of the rotation (Tables 7, 8).

Conclusion

The assignment of a final grade provides both medical students and outside institutions with a standardized, qualified assessment of each medical student's clinical knowledge, skills, and professional behavior during his/her time in the clerkship. The clerkship should strive to make this assessment as objective and complete as possible through the inclusion of a variety of assessment tools. To provide medical students with a clear understanding of their performance in the clerkship, the final grade process should be reviewed in detail with medical students at the beginning of the clerkship, and medical students should be encouraged to ask questions about elements of their final grade. One of the primary goals in the assignment and reporting of final grades is to provide the

clerkship with an accurate and comprehensive understanding of student performance with the aim of improving the quality of teaching/learning in the clerkship. The clerkship coordinator should be familiar with both the clerkship's individual grade policies and those policies set for the larger academic medical institution so that he/she can accurately and comprehensively address student questions and concerns about final grades. The clerkship should strive for transparency and accuracy in reporting final grades to its medical students, providing a thorough understanding of why a particular grade was assigned will provide medical students with valuable insight into their clinical performance and feedback on areas of improvement in their medical knowledge.

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Table 1. Liaison Committee on Medical Education (LCME).

ED-2. An institution that offers a medical education program must have in place a system with central oversight to ensure that the faculty defines the types of patients and clinical conditions that medical students must encounter the appropriate clinical setting for the educational experiences, and the expected level of medical student responsibility. The faculty must monitor medical student experiences and modify them as necessary to ensure that the objectives of the medical education program are met.
ED-24. At a institution offering a medical education program, residents who supervise or teach medical students and graduate students and post doctoral fellows in the biomedical sciences who serve as teachers or teaching assistances must be familiar with the educational objectives of the course or clerkship (or in, Canada, clerkship rotation) and be prepared for their roles in teaching and assessment. The minimum expectations for achieving compliance with this standard are that: (a) residents and other instructors who do not hold faculty ranks (e.g. graduate students and postdoctoral fellows) receive a copy of a course or clerkship/clerkship rotation objectives and clear guidance from the course or clerkship/clerkship rotation director about their roles in teaching and assessing medical students and (b) the institution and/or its relevant departments provide resources (e.g., workshops, resource materials) to enhance the teaching and assessment skills of residents and other non-faculty instructors. There should be central monitoring of the level of residents' and other instructors' participation in activities to enhance their teaching and assessment skills.
ED-25. Supervision of medical student learning experiences at an institution that offers a medical education program must be provided throughout required clerkships (or in Canada, clerkship rotations) by members of the institution's faculty.
ED-25-A. At a medical education program, students in clinical learning situations involving patient care must be appropriately supervised at all times. While students learn through graded responsibility as their skills progress, supervision at all times must ensure patient and student safety.
ED-26. A medical education program must have a system in place for the assessment of medical student achievement throughout the program that employs a variety of measures of knowledge, skills, behaviors, and attitudes. Assessments of medical student performance should measure the retention of factual knowledge; the development of the skills, behaviors, and attitudes needed in subsequent medical training and practice; and the ability to use data appropriately for solving problems commonly encountered in medical practice. The system of assessment, including the format and frequency of examinations, should support the goals, objectives, processes, and expected outcomes of the curriculum.
ED-27. A medical education program must include ongoing assessment activities that ensure that medical students have acquired and can demonstrate on direct observation the core clinical skills, behaviors, and attitudes that have been specified in the program's educational objectives.
ED-29. The faculty of each discipline should set standards of achievement in that discipline and contribute to the setting of such standards in interdisciplinary and inter-professional learning experiences, as appropriate.

ED-30. The directors of all courses and clerkships (or, in Canada, clerkship rotations) in a medical education program must design and implement a system of fair and timely formative and summative assessment of medical student achievement in each course and clerkship/clerkship rotation. Faculty of the medical education program directly responsible for the assessment of medical student performance should understand the uses and limitations of various test formats, the purposes and benefits of criterion-referenced vs. norm-referenced grading, reliability and validity issues, formative vs. summative assessment, and other factors associated with effective educational assessment. In addition, the chief academic officer, curriculum leaders, and faculty of the medical education program should understand, or have access to individuals who are knowledgeable about, methods for measuring medical student performance. The medical education program should provide opportunities for faculty members to develop their skills in such methods. An important element of the medical education program's system of assessment should be to ensure the timeliness with which medical students are informed about their final performance in courses and clerkships/clerkship rotations. In general, final grades should be available within four to six weeks of the end of a course or clerkship/clerkship rotation.

ED-31. Each medical student in a medical education program should be assessed and provided with formal feedback early enough during each required course or clerkship (or, in Canada, clerkship rotation) to allow sufficient time for remediation. Although a course or clerkship/clerkship rotation that is short in duration (e.g., less than four weeks) may not have sufficient time to provide a structured formative assessment, it should provide alternative means (e.g., self-testing, teacher consolation) that will allow medical students to measure their progress in learning.

ED-32. A narrative description of medical student performance in a medical education program, including non-cognitive achievement, should be included as a component of the assessment in each required course and clerkship (or, in Canada, clerkship rotation) whenever teacher-student interaction permits this form of assessment.

Table 2: Types of Grading Systems

No. of Tiers in Grading System	No. of Schools Using System	Examples of Tiered System
4-tier	63	A/B/C/F Honors/High Pass/Pass/Fail High Honors/Honors/Pass/Fail Honors/Near Honors/Pass/Fail High Honors/Excellent/Good/Fail Honors/Pass/Conditional Pass/Fail Honors/Commendable/Satisfactory/Fail Honors/Satisfactory/Low Satisfactory/Fail Outstanding/Advanced/Proficient/Unsatisfactory Honors/Satisfactory Plus/Satisfactory/Unsatisfactory Honors/Letter of Commendation/Satisfactory/Unsatisfactory
5-tier	27	A/B+/B/C/F Honors/High Pass/Pass/Marginal/Fail Honors/High Pass/Satisfactory Pass/Marginal Pass/Fail Outstanding/Above Expected/Expected/Below Expected/Fail Honors/High Satisfactory/Satisfactory/Low Satisfactory/Unsatisfactory
3-tier	15	Honors/Pass/Fail Honors/Satisfactory/Remediation
2-tier	6	Pass/Fail
6-tier	5	A/B+/C/C+/C/F A/AB/B/BC/C/F Excellent With Honors/Excellent/Good/Marginal/Pass/Fail
7-tier	1	A/B+/B/C+/C/D/F
9-tier	1	Honors/A/A-/B+/B/B-/C+/C/C-
11-tier	1	A/A-/B+/B/B-/C+/C/C-/D+/D/D-/F

Table 3: Example of a Grading Policy and Breakdown of Measurement Tools from the Pediatric Clerkship at the Perelman School of Medicine at the University of Pennsylvania

The grading procedures in the clerkships are determined by the clerkship directors in consultation with other faculty within the departments. Final grades are a composite of several components, with cut-off points and weighting determined individually by each department and for each course. All clerkships assign grades consistent with the School of Medicine Definition of Grades - see

<http://www.med.upenn.edu/student/AcademicPerformanceProgression.html> -

Section III.

A medical student must receive a grade of Pass, High Pass or Honors to satisfactorily complete the six-week clerkship. If a student fails the course, he/she must repeat the entire six weeks. In addition, the grade of fail will be a permanent part of the medical student's record and will appear on the transcript. A grade of Unsatisfactory will be issued to a medical student who has not passed or completed the course requirements by the course end date. Remediation can include repeating the exam, repeating clinical time, or other assignments as determined by the course director.

The requirements for assessment in the clerkships are determined by the clerkship directors in consultation with other faculty within the departments. Most clerkships use multiple assessment methods. An example of this type of method is the requirements for Pediatrics 200 are listed below.

	Hon	HP	Pass	Low Pass	Fail
Shelf Exam (25%)	25	20	15	NA	NA*
Inpatient Clinical Evaluations (30%)	30	24	18	15	0
Ambulatory Clinical Evaluations (30%)	30	24	18	15	0
Write Ups (5%)	5	4	3	2.5	0
Case Conferences (5%)	5	4	3	2.5	0
Professionalism (5%)	5	4	3	2.5	0
Final Grade (100%)	92-100	76-91	60-75	NA	<60

*A failing shelf grade may be replaced by a passing make-up exam grade

Table 4: Example of a Grading Policy and Breakdown of Measurement Tools from the Internal Medicine Clerkship at the School of Medicine at Virginia Commonwealth University

The Internal Medicine Grading Committee reviews the individual components of a medical student's grade before a final decision is made. Medical student grades are reviewed by the committee in rank from highest score to lowest. A medical student's overall weighted T-Score is a factor in his/her eligibility for a High Pass or Honors—a medical student with a minimum overall T-Score of 50 may be eligible for a High Pass or an Honors upon review of his/her individual grading components. This score is composed of the following grade components:

KNOWLEDGE (50%):

Written Examination	35%
TBL	15%

PERFORMANCE (50%):

Ward Evaluation	35%
OSCE	15%

To be eligible for a final grade of Honors in Internal Medicine, a medical student must make a minimum T-Score of 55.00 in both the Knowledge and Performance components of their final grade. In addition, the medical student must make a minimum of 70% on the OSCE, and his/her TBL score cannot fall below two standard deviations of the mean. To be eligible for a final grade of High Pass in Internal Medicine, a medical student must make a minimum T-Score of 50.00 in both the Knowledge and Performance components of their final grade. In addition, the medical student must make a minimum of 70% on the OSCE, and his/her TBL score cannot fall below two standard deviations of the mean. To be eligible for a final grade of Pass in Internal Medicine, a medical student must make a minimum of 60% on the written examination. The medical student must make a minimum of 60% on the OSCE. Ward and TBL scores cannot fall below two standard deviations of the mean.

IM Clerkship Grading Calculation Elements

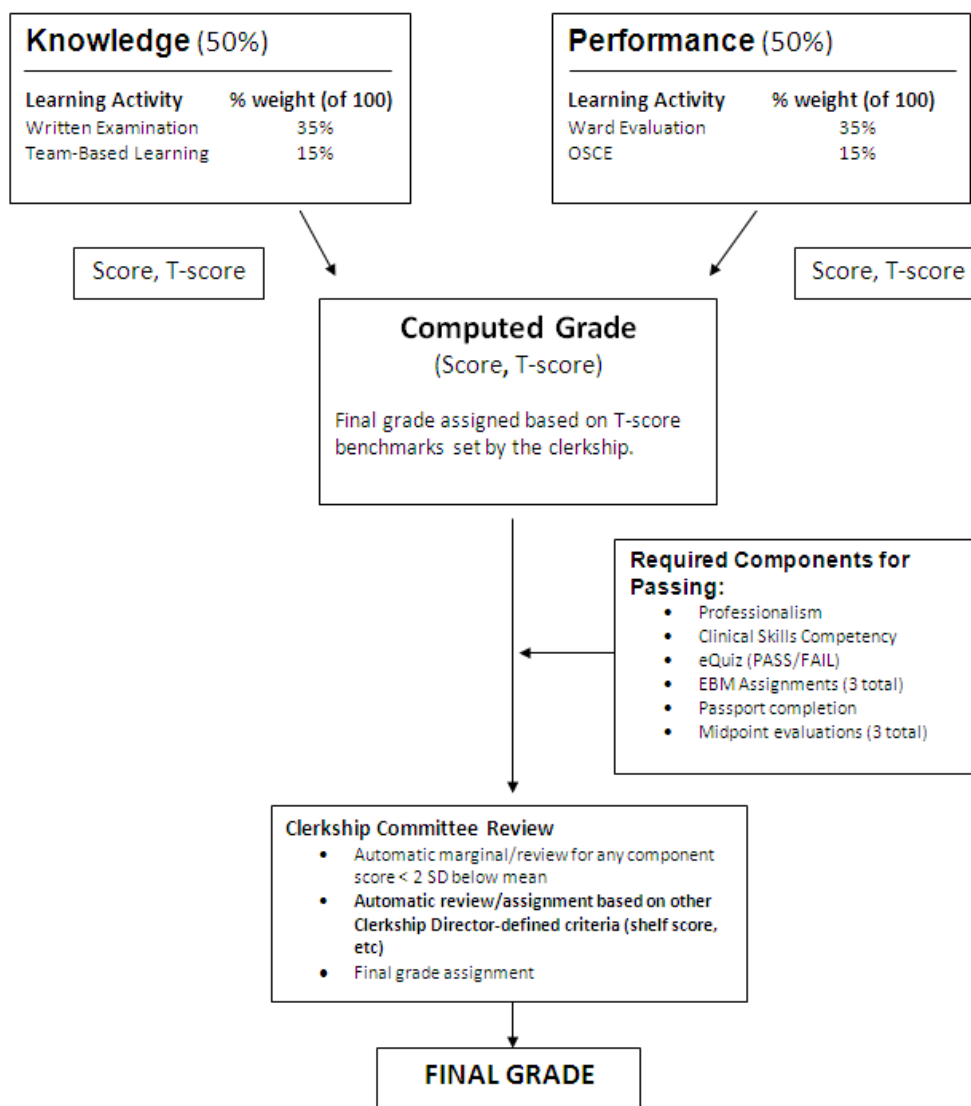


Table 5: The Shelf Exam and Clerkship Failure Policy from the Pediatric Clerkship at the Perelman School of Medicine at the University of Pennsylvania

A medical student who fails the exam will earn an Unsatisfactory until the exam is retaken. The exam may be retaken at any time, but must be completed and passed before entrance to Module 5. If medical student receives Honors for their clinical work, but fails the shelf or other end of clerkship exam, they will take the exam again, timed and final grade can be no higher than High Pass; the final clerkship grade may be Pass or High Pass as determined by the clerkship director based on clinical performance and repeat exam grade.

- If medical student receives a High Pass for their clinical work, but fails the shelf or other end of clerkship exam, they will take the exam again, timed and final grade can be no higher than High Pass; the final clerkship grade may be Pass or High Pass as determined by the clerkship director based on clinical performance and repeat exam grade.
- If a medical student receives a Pass for their clinical work, but fails the shelf or other end of clerkship exam, they will take the exam again, timed, and final grade can be no higher than a Pass.
- If a medical student fails the shelf exam twice, the medical student will be brought before to the student standards committee and a remediation plan, which will include input from the clerkship directors, will be implemented. It is possible the plan may include a failure of the clerkship which would require the medical student to take the clerkship over again in its entirety. The final grade can be no higher than a Pass.

If a medical student is considered to be failing during the clerkship, the directors can withdraw the medical student, who would then receive a withdrawal pass, a withdrawal fail, or an incomplete, depending on the circumstances. The grade of withdrawal fail would require the medical student to take the clerkship again in its entirety.

Table 6: Clerkship Failure Policy from the Internal Medicine Clerkship at the School of Medicine at Virginia Commonwealth University

Any medical student receiving an evaluation more than two standard deviations below the mean (T-score < 30) will automatically be assigned a grade of 'Marginal' and will be reviewed by the clerkship committee. Other criteria for assigning a less than passing grade are defined by the individual clerkships and will be reviewed at the clerkship orientation.

Medical students must successfully complete clerkship requirements in order to pass the clerkship. These include: A rating of 'met' on all professionalism evaluations, passport requirements, and other clerkship directed assignments or requirements.

Medical students receiving a rating of 'did not meet' on professionalism evaluations will receive a non-passing grade. Medical students not successfully completing any of the other requirements will be reviewed by the clerkship committee. The respective clerkship committee determines final grades and minimum passing standards, including remediation in order to achieve the competencies for the clerkship if the medical student has a less than passing grade.

Medical students should contact the Curriculum Office to schedule clerkship remediation time and the clerkship coordinator to schedule shelf exam retakes. A Marginal grade may be remediated to Pass (P) or a High Pass (HP). A Fail grade may be remediated to a Pass (P). The Marginal or Fail grade will remain on the transcript in the third year. The new grade will be listed next to the original grade on the transcript if the clerkship requirements are completed in the same academic year. Otherwise, the original grade will remain on the transcript for that year and the remediated grade will be reported in the academic year in which the remediated clerkship requirements have been completed. If a medical student does not pass the remediation assignment, for example the retake of a shelf exam, the medical student will receive a failing grade in the clerkship and be required to repeat the entire clerkship.

Remediation plans may ultimately be rejected by the School of Medicine's Promotions Committee if they believe the plan either does not adequately address the medical student's academic weaknesses or does not allow a continuity of experiences for the Promotions Committee to assess student progress.

If a medical student receives three less than passing grades, the medical student will be required to repeat the year in its entirety. If a medical student is in a repeat year, the medical student must pass all classes or will be dismissed.

Per the AAMC guidelines for medical schools regarding academic transcripts, "the academic transcript should reflect the total, unabridged academic history of the medical student at the institution. All courses should be recorded in the academic period in which the course was taken and graded."

Grades will be recorded as follows if a third year medical student:

- Repeats only the shelf exam due to a Marginal grade, the original M grade remains, and the new revised grade is entered in the repeat column for the *M3* academic year.
- Repeats part of a rotation due to a Marginal grade, the original M grade remains, and the new revised grade is entered in the repeat column for the *M3* academic year.
- Repeats an entire rotation (due to a Failing grade for any reason) during the **M4 year**, the original F grade remains in the M3 year, and the revised grade is entered in the repeat column for the *M4* academic year.

Table 7: The Grading Dispute Policy from the Pediatric Clerkship at the Perelman School of Medicine at the University of Pennsylvania

Every attempt will be made to ensure that the overall course grade is an accurate and fair representation of the compiled evaluations received from your inpatient and outpatient team members and the teaching senior, in combination with the shelf exam score. Because attendings change frequently on service, heavier emphasis is often made on the evaluations by senior residents on the wards. Your input, sent via email to the course coordinator prior to the end of the rotation, regarding any extenuating circumstances including which evaluators you had most/least contact with will be considered in making the final grading determination. Despite our best efforts, grade challenges sometimes occur. Although it is rare for a grade to be changed, you have the right to a fair and thorough review of your grade. The following is the procedure for challenging your course grade:

- 1) Contact the course coordinator via email or phone to explain your specific objections and concerns. All questions about evaluations need to be handled through the course director or course coordinator.
- 2) If the concern cannot be resolved via email or phone, a meeting with the course director and course coordinator will be scheduled, in which your objections will be discussed with you. You will have the opportunity to review and discuss the individual feedback from each of the evaluators.
- 3) If indicated, the course director and coordinator will further research your objections by contacting evaluators to collect additional information and details.
- 4) The course director and course coordinator will then review the grading decision and contact you with their determination. In most cases, this process does not result in a grade change, but occasionally systematic irregularities are discovered whose correction not only helps the individual student involved, but students who come after them.

Although the issue of grades can be anxiety-provoking to our students, we encourage the students not to over-react to grades that are short of an honors recommendation. Only a third of our students get honors in the clerkship, and the vast majority will receive a grade of high pass. While a grade short of honors can be disconcerting, particularly for students who are interested in pediatrics, it is our experience that many of our students accepted into top pediatric residency programs, including our own, did not receive honors in their Peds 200 rotation. What becomes more important than the core clerkship final grade is the performance on externships, during which time a more focused team experience provides a greater opportunity for more thorough and objective feedback.

Still, though, it is possible that after a review with the course director or coordinator, a student

may still be dissatisfied with their grade. Under those circumstances, the student reserves the right to appeal the grading decision to the chairman of the pediatrics department. The student can solicit letters on their behalf for that review, and he/she will have an opportunity to present their argument for a grade change to the department chair. Although it is unusual for a department chair to overturn a course director's decision, this still provides an extra opportunity for a review if a student wishes to continue to pursue a grade change.

Additional Considerations:

The course director and coordinator expect that any challenges to a grade in the Peds 200 course will be conducted in a professional manner by the student involved. Under no circumstances should a student directly contact inpatient or outpatient team members to challenge their comments or scores. All communication should be conducted through the course director and course coordinator. It is the responsibility of the course director and coordinator to individually contact house staff and faculty on behalf of students. Any efforts to circumvent this process will immediately terminate the review process. If this or any other unprofessional behavior is identified during the process of a review, that information may be forwarded to the medical school for inclusion in the student's record.

Table 8: Grading Disputes/Appeals Policy from the Internal Medicine Clerkship at the School of Medicine at Virginia Commonwealth University

All grades in Internal Medicine are determined by a committee. A careful review is given to every student prior to finalization of his/her individual grade. Students may review the content of their file (e.g.: student evaluations, TBL scores, written exam score) in the presence of the Clerkship Coordinator. These reviews must be scheduled one day in advance of the desired meeting time. The course director is available to meet with students should they have any additional questions regarding a grade calculation after they have reviewed the orientation materials.

If a student disagrees with his/her final grade in internal medicine, he/she is encouraged to file a formal appeal with the Department of Internal Medicine according to the policies outlined by the School of Medicine. Please note, the Department of Internal Medicine highly values the evaluations of its faculty and residents and is not in the habit of expunging evaluations and comments.

Students wishing to file a formal appeal of their final grade must draft a letter of appeal to the Chairman of Internal Medicine within 30 days of the date that the grade is posted. Students appealing grades assume the burden of proof. The appeal shall state and support with all available evidence the reasons why the student believes the grade should be changed. The student should not approach faculty members or housestaff to appeal a clerkship grade. This letter should be submitted directly to the clerkship coordinator, by email or campus mail, along with any other additional documentation the student would like included supporting the appeal. Once the coordinator has received the letter of appeal, he/she will compile an appeal summary which includes the following documentation: the student's letter of appeal, a summary of the student's final grade scores (raw scores and their corresponding T-scores), and a copy of each evaluation the student has received. The student will be informed of the chairman's decision by email, typically within two weeks of the initial appeal submission.

Table 9: Example of Evaluation Tracker, The University of Oklahoma, COM, School of Community Medicine, Tulsa, Department of Internal Medicine

Student Performance Evaluation Tracker

Month/Year

Hospital	Student	Senior Res.	Initial delivery w/deadline	Email delivery/deadline	3rd Notice w/addt. Deadline & warning	Received
Hosp Name						
Team Name						
Hosp Name						
Team Name						
Hosp Name						
Team Name						
Hosp Name						
Team Name						
Hospital	Student	Attending	Initial delivery w/deadline	Email delivery/deadline	3rd Notice w/addt. Deadline & warning	Received
Hosp Name						
Team Name						
Hosp Name						
Team Name						
Hosp Name						
Team Name						
Date Exam Scores Received						
Date Grades Submitted						

Table 10: Sample of Case Presentation, The University of Oklahoma, COM, School of Community Medicine, Tulsa, Department of Internal Medicine.

Case Presentation Assessment Internal Medicine Clerkship						
Date:						
Presenter:						
Topic:						
Evaluator:						
CASE PRESENTATION	1	2	3	4	5	6
1 - disorganized, inappropriate data 2- limited information 3 - all info included, but extraneous or irrelevant information presented 4- 5 - concise clear case presentation which shows evidence of diagnosis is accurate 6 - exceeds expectations						
CASE DISCUSSION	1	2	3	4	5	6
QUESTIONS (score 0 if no time for questions)	0	1	2	3	4	5
EVIDENCE	1	2	3	4	5	6
1 - none anecdotal 2 - limited use of reference material 3 - use of reference book, ex: up to date 4- 5 - use of randomized clinical trial or other evidence literature if no RCT available 6 – exceeds expectations						

Undergraduate Medical Education (UME) and Graduate Medical Education (GME) Working Together

This chapter will discuss the roles and responsibilities of medical students, residents, and fellows and the residency application process. Educators will learn the roles of the different levels of the trainee and better understand the day to day life of both undergraduate medical education (UME- which refers specifically medical students) and graduate medical education (GME-which refers to those participating in residency and/or fellowship programs). Although this chapter is geared towards new educators walking into their role it is a refresher for even the most seasoned of educators.

Roles and Responsibilities

Medical Students

The students are active participants of the inpatient and outpatient team and work closely with all members of the team including residents, fellows, University-based faculty, community physicians in both urban and rural locations, nursing staff and allied professionals. Students are directly supervised by residents and faculty. At the beginning of the rotation the clerkship site director should ask the student what they would like to learn from the rotation and should suggest that the student's goals and objectives also be shared with the residents and teaching faculty. During the time the student is on an inpatient service students should contribute to the care of their assigned patients by performing daily rounds, writing progress notes in the medical record, interpreting laboratory and imaging studies, and presenting those patients during team rounds. The student should also take the time to read up on their patients' illnesses so they are ready to present at daily rounds. In addition to taking care of patients on the floors, students also have weekly didactic sessions, physical diagnosis sessions and may be required to complete one or more mini-clinical examination (mini-CEX) exercises, oral case presentations and written history and physical documentation all of which should be signed by the supervising resident or attending.

By the end of the rotation students should be proficient in taking a complete history and physical exam, be able to develop an appropriate problem list and differential diagnosis, present patients to the team, prepare topic presentations, interpret laboratory and radiological tests, develop the appropriate procedural skills, demonstrate interpersonal skills and actively participate as a member of the health care team.

Students on an outpatient service will spend time in the office of an urban and/or rural community physician or university based outpatient clinic. Students will participate in the care of both well and sick children and adults and fully participate in the activities of the office. Students will gain an understanding of professional attitudes that promote good health care practices in primary care settings, acquire skills in time-limited patient encounters and knowledge of common outpatient illnesses, as well as community resources related to child and adult development education and health care.

At the end of the rotation, the students evaluate both faculty and residents with whom they worked through either an on-line evaluation system or paper evaluation.

Residents

During the time of residency training, residents have many professional responsibilities including but not limited to the clinical care of patients, improving their own educational preparation, and teaching those with whom they work. In addition, graduate medical education is based on the principle of progressively increasing levels of responsibility in caring for patients under the supervision of qualified faculty.

Residents work closely with students, fellows and faculty. The first year resident or intern reports directly to the senior resident on the service and the attending physician assumes responsibility for supervising all members of the team.

Residents have direct supervision of students and work closely with them. At the beginning of the rotation, the resident should meet with the student and review the student's goals and expectations. During the course of the rotation, the resident's responsibilities include assisting the student to learn how to take complete histories and physical exams, develop an appropriate problem list and differential diagnosis, give an effective oral case presentation, interpret lab studies, develop skills in routine procedures, and develop good interpersonal and communication skills. Feedback should be given on a regular basis during the rotation through verbal feedback, completion of a mini-CEX card, oral case presentation card, and/or written documentation feedback card and at the end of the rotation through a formal written evaluation which should be completed either through an on-line evaluation system such as OASIS, E-Value or a paper evaluation.

Fellows

The goals of training fellows in a subspecialty program are to gain proficiency in all clinical aspects of the subspecialty in order to provide the highest standards of care in any clinical setting. Fellows, under the attending's supervision, are frequently responsible for the day to day management of the patient care team, particularly in the intensive care unit and for teams providing consultative or diagnostic services. They may also provide care for patients in the outpatient setting or emergency department under the supervision of an attending. Fellows coordinate the actions of the team and interact with nursing and other administrative staff.

Fellows gain proficiency in their designated subspecialty by providing direct care to patients. Fellows function with more autonomy than residents and medical students. In the inpatient and outpatient setting fellows function under the close daily supervision of faculty. In the first year of training, fellows function as trainees with limited experience, often with direct supervision. They report to their supervising faculty member. In the second and third years of training, fellows function with greater autonomy, and in some cases may function independently with subsequent reporting to the supervising faculty member. At all training sites, fellows function alongside fellows and residents in other specialties/subspecialties. Depending on the subspecialty, fellows can be key members of the procedural teams. The fellow often communicates with the patient to gain procedural consent, demonstrate how to do subspecialty specific procedures such as

catheterization, colonoscopies, kidney biopsies, and bone marrow biopsies under the management and guidance of a board certified subspecialist. Fellows also meet with the patient and families to conduct a post procedural evaluation. One of the key roles and responsibilities of the fellow on the medical team is supervisory. The fellow works with residents and students to provide the best patient care as part of a team. They will often round with the residents and students on individual patients and will work as a team to create treatment plans. Fellows will typically see consults and may also assign cases depending on the acuity and complexity to medical residents and students who rotate through the subspecialty services.

Teaching is an essential aspect of fellowship across all subspecialties. Not only do the fellows encounter multiple teaching opportunities on the medical teams both in clinic and through hospital teaching rounds, but also provide lectures at medical schools, and for various educational conferences. Providing fellows with different opportunities to teach allows them to become more proficient in their field of choice. During the course of the rotation, the fellow should be working with the residents and students to enhance their skills in learning how to take complete histories and physical exams, develop an appropriate problem list and differential diagnosis, give an effective oral case presentation, interpret lab studies, develop skills in routine procedures, and develop good interpersonal and communication skills. Feedback should be given on a regular basis during the rotation through verbal feedback, completion of a mini-cex card, oral case presentation card and/or written documentation feedback card). Some institutions will also require a formal written evaluation of the resident or student which should be completed either through an on-line evaluation system such as OASIS, E-Value or a paper evaluation.

Career Advising and Mentoring

Medical student career development as defined by the American Association of Medical Colleges (AAMC) is a four year process of self-assessment, career exploration, career decision-making and implementation (1). Internship is the next step for a medical graduate in becoming a fully qualified physician after obtaining a medical degree. In the United States completion of an internship is the minimum requirement for which a general license to practice medicine is granted. Many interns, however, continue for three to six more years working as a resident in the hospital or medical center, acquiring all the skills and experience necessary to specialize in their chosen field of medicine.

Below are the pertinent steps to applying to residency programs.

The first step is to decide on a career path, whether it is internal medicine, surgery, radiology, etc. Once the decision has been made, students should meet with their school of medicine career counselor, Dean of Students, department career counselor or clerkship director to ascertain who in the selected specialty would be a good mentor/advisor. Each medical school will have a career advising process for medical students. The career advising meeting can occur as early as the second year of medical school.

Medical schools provide workshops which are given in the latter part of the third year on topics including determining residency program competitiveness, what residency programs look for in candidates, and personal statement writing. In addition, schools usually set up individual mock interview sessions with a faculty member in the specialty to which the student is applying so the student can become familiar with the questions the student wishes to ask and the questions that interviewers may ask the student.

Early in the fourth year most schools will schedule class meetings to discuss the application process. In addition, students may sign up for individual career counseling by being assigned a career advisor. During this meeting with the advisor students should share his/her goals and what type of career interests her/him. Include important personal goals such as wanting to be near family or other family issues, geographic preferences and if you are couples matching. The student should ask the advisor to review his/her CV and personal statement and go over the list of programs to which he/she wishes to apply. He/she can advise the student as to whether those are the right programs for his/her specific interests, experience and academic record, and suggest programs the advisor believes may be better suited to the student's interests, experiences and academic record. At the meeting with the advisor, the student should let the advisor know his/her particular interest in the field so the advisor can advise what would be good rotations to take during the elective years to further cement the student's decision.

The student may also meet with the clerkship director. The clerkship director is in a position to advise in more depth the appropriate programs to apply to based on the student's evaluations and feedback from faculty. In addition, it may be possible to meet with the program director of the specialty to which you are applying and/or the chair of the department for additional advice.

Some schools have programs that will match students with alumni in cities nationwide, who can provide information about that particular residency program with which they are affiliated. Many alumni also offer to host students during the interview season. It is recommended that the student check with his/her medical school to see if this network exists at their institution.

The Association of American Medical College (AAMC) has a web page that offers advice on residency applications. The AAMC Careers in Medicine (CiM) website is a useful tool that provides many articles and data specific to particular users (1).

A good resource for a list of programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) is The Fellowship and Residency Electronic Interactive Database (FREIDA) (2).

Applying to Residency from the Student Perspective

ERAS

The Electronic Residency Application Service (ERAS®) provides applications and supporting documentation to programs for their review during recruitment. Medical

student applicants will receive information from their medical school regarding ERAS deadlines and registration information. The MyERAS account will be used by the applicant to upload documentation within the system. All applicants are encouraged to visit the AAMC website to view ERAS fees and procedures (3).

ERAS opens in September for students to download applications and supporting documents. Programs are able to transmit applicant data mid-September and Medical Student Performance Evaluation's (MSPE) are released to the residency programs in early October. Applicants will be contacted directly by the residency program if they are being invited for an interview.

Applicants are encouraged to upload the following documentation to aid in a smoother review process.

- USMLE Step Scores
- Personal Statement (if applying to multiple subspecialty programs within one institution the applicant is encouraged to provide a separate personal statement for each subspecialty program).
- ERAS main application
- Letter of recommendation*
- Curriculum vitae
- Digital photo (not mandatory)
- Medical student performance evaluation (MSPE) formally referred to as the 'deans letter'
- Education Commission For Foreign Medical Graduates (ECFMG®) certification (if applicable)
- Medical school transcript

*As found on the ERAS website, "should you waive your rights to see your letters of recommendation you must complete and print the document submission form (DSF) and provide it to your letter writer, instruct your letter writer to include it along with your letter of recommendation, and provide the ERAS letter of recommendation (LoR) request form to your letter writer. The LoR request form is available once you have finalized the LoR author in MyERAS". The documents the dean's office uploads are queued for the programs. The letters of recommendation are transmitted from the ERAS letter of recommendation portal to the ERAS post office and then placed in the programs' mailboxes. The dean's office is sent a list of programs to which each student applied.

Programs are able to immediately see documents that are missing when initially downloading an application thus applicants are encouraged to download all documents that they are responsible for in a timely fashion. Programs contact the post office frequently during recruitment season to download new or additional documents.

Applying for Residency from the Residency Program Perspective

ERAS

Residency programs receive all applications through the ERAS post office workstation which is available in early September.

It is recommended that programs download applications on a daily basis so that the program can stay up to date on application review. Programs can determine certain parameters which guide them in the selection of applicants they wish to interview (e.g. minimum board scores, etc). After careful review of the applications, interview invitations are sent out to the applicants.

There is a section in ERAS where a program can insert notes about the applicant, such as the number of honors they received, whether they are AOA, etc.

The system allows the program to note when an application has been reviewed, when an applicant has been invited to interview, when they have been scheduled for an interview and if an applicant is ranked.

There is also an interview tab where one can insert interviewers' comments and scores for each applicant. This information can be used to create a worksheet for ranking applicants. Each program will have different criteria for ranking applicants. This may include not only the interviewers' scores but also Step 1 scores.

ERAS allows the programs to perform many different tasks such as:

- Review all documents uploaded
- Filter/sort information such as residency programs/medical schools, visa status, couple matching, USMLE scores, letters of recommendation, missing documentation, scheduled interview dates, etc.
- Interview manager allows programs to set up and schedule interviews
 - Score/Rank applicants
- Email applicants
- Print entire application and supporting documentation in any order
- Once ERAS is loaded onto an individual computer the program directors, associate program directors and coordinators are able to view each other's comments on applications

Applying to Fellowship from the Resident Perspective

Registering

The first step is registering with the ERAS Fellowship Documents Office (EFDO) (4). This is an online service exclusively for medical residents and fellows to support the centralized processing of fellowship application materials submitted via ERAS. Fellowship applicants must request an electronic token to access MyERAS. The EFDO

is the “Designated Dean’s Office” whether you are a US medical school graduate or an international medical school graduate.

The EFDO creates and assigns electronic tokens to all fellows applicants so that they may access MyERAS and begin the application process. During the season, the EFDO receives and attaches supporting documents to applicant files and transmits those documents through the ERAS post office to programs designated by the applicant.

Application Process

The process begins with the student’s request to EDFO for a MyERAS token which is a unique identifier that provides the student access to MyERAS. Once the student’s token has been provided he/she will be able to complete the MyERAS application, select programs, and assign supporting documents.

Fellowship programs can set their own requirements regarding application deadlines, eligibility criteria, etc. It is extremely important that the resident or fellow research and contact the programs they are interested in applying to confirm the requirements, deadlines, etc.

The EFDO on-line services link will become available on the documents tab in MyERAS twenty-four hours from the time the resident or fellow registers at MyERAS. Documents should not be sent prior to registration.

Once the resident or fellow certifies and submits their application, their account will be locked to make sure that all programs receive an identical application. Although changes cannot be made to the MyERAS application once it has been certified and submitted, the resident or fellow is encouraged to keep their profile updated throughout the season.

The EFDO on-line services includes a “verify receipt of document” feature which will allow the resident or fellow to track the receipt status of their documents received by the EFDO, excluding LoRs uploaded through the ERAS LoR Portal.

The timeline for the July and December application cycles can be found at the ERAS Fellowship website (4).

What Is the National Resident Matching Program (NRMP)?

‘The National Resident Matching Program (NRMP) is a private, not-for-profit corporation established in 1952 to provide a uniform date of appointment to positions in graduate medical education (GME) in the United States’ (5). The NRMP conducts a main residency match for the residency programs and a fellowship match. The residency match is in March and the subspecialty fellowship match is in December. Some programs such as sleep medicine will open in July and match in mid-November (see the timeline below).

According to the NRMP, “the NRMP is not an application processing service; rather, it provides an impartial venue for matching applicants' and programs' preferences for each other consistently. Each year, approximately 16,000 US medical school students participate in the main residency match. In addition, another 20,000 ‘independent’ applicants compete for the approximately 26,000 available residency positions. Independent applicants include former graduates of US medical schools, US osteopathic students and graduates, Canadian students and graduates, and students and graduates of international medical schools”(5).

All NRMP matches are managed through the NRMP’s Registration, Ranking and Results (R3) system. Registration for the NRMP requires logging in to the R3 system and completing the eleven step registration process.

- Select a match
- Participant Type
- Demographic Form
- Login Credentials
- Match Participation Agreement
- Payment

NRMP registration for the resident or fellow includes registering for the main residency match or the specialties matching service (SMS). The main residency match provides a consistent opportunity for both applicants and programs to make their training selections without pressure. All applicants must meet all requirements for entry into GME as set forth by the Accreditation Council for Graduate Medical Education. Applicants must apply directly to residency programs in addition to registering for the match. Most programs participate in the Electronic Residency Application Service (ERAS). Applicants must register with both the NRMP and ERAS to use each service.

The Specialties Matching Service (SMS) also provides a consistent opportunity for both applicants and program directors to make their selections for fellowship training. To qualify for a fellowship position, applicants must have completed a core residency training program as well as meet all of the requirements for entry into GME as prescribed by the ACGME if the program is accredited by the ACGME. Each sponsoring institution (e.g. a teaching hospital) may have additional eligibility requirements. Fellowship programs may be selective in determining which programs are eligible to participate in the SMS Match. Only programs in a specialty for which an SMS match is being conducted may offer positions through the SMS. A program must be either accredited by the ACGME or affiliated with an ACGME accredited program in the core discipline to be eligible to offer positions through the SMS match.

When an applicant registers for the match it is important that they are aware of the schedule of dates for the match pertaining to their interest. The schedule of dates varies from year to year and can be found on the NRMP website (5). Below is a table outlining important deadline dates that an applicant and programs should be aware of.

	Match Begins	Rank Order List Opens	Quota Change Deadline	Rank Order List Closes*	Match Day
Main Residency Match	Mid September	Mid January	End of January	End of February	End of March
Internal Medicine Subspecialty Fellowship Programs	End of July	Beginning of October	End of October	Mid November	Beginning of December
Sleep Medicine Example	End of July	Mid September	Mid October	End of October	Mid November

*no changes may be made after this date

The NRMP process is an attempt to place the applicant in his/her most preferred program. If the program is unable to fulfill placing the applicant in his/her first choice the program will move onto the second choice and so forth until the applicant has matched with a program. The process is the same for the programs. Applicants should be advised to only include programs on their rank list that they are truly interested in matching. Once the match is made it is considered a binding contract and if broken will place the applicant in a match violation status thus hindering their ability to match into another program. In rare instances, if an applicant wishes to withdraw after the match for either personal or professional reasons, the program director of the respective program (program applicant has matched into) has the opportunity to approve the withdrawal, therefore not placing the applicant in a match violation status. Residency programs must also register with the NRMP annually which includes updating their profile and program information. Through this system programs must register how many positions are eligible for recruitment.

Ranking Applicants

After each interview, applicants are assessed by their interviewers through a mechanism such as an evaluation form. Each program will have their own system of evaluating the applicants. After the end of the interview season, it is time for the ranking process to begin. A ranking meeting should be held where the ranking committee who can be comprised of the Vice Dean for Education, program directors, associate program directors, faculty and resident interviewers and the chief residents will review each applicant file and assign the applicant a number on their rank list.

The rank order list will be inputted into ERAS where it can be reviewed and edited any time prior to uploading it into the NRMP. The rank order list may be uploaded into the NRMP as early as January but the programs must certify and submit their ranking list by late February. Once the list has been certified and submitted, it cannot be changed.

The match occurs in mid-March and the process is below (the days specified below refer to the 2014 Match week which begins on March 17, 2014):

Monday, March 17, 2014	Programs find out if they have matched all of their positions
Tuesday, March 18, 2014	If a program did not fill all of their slots, they will start the process in Supplemental Offer and Acceptance Program (SOAP)
Wednesday, March 19, 2014	Programs finalize their first rounds SOAP preference lists and then SOAP rounds begin
Friday, March 21, 2014	Students receive their official Match assignment
Day after Match	Programs are permitted to send out official letters of appointment on the day after Match

Supplemental Offer and Acceptance Program (SOAP)

The Supplemental Offer and Acceptance Program (SOAP) is the system by which unfilled residency programs can accept unmatched applicants and students can match with unfilled programs. Fellowship programs do not participate in the SOAP process. Programs must register with the NRMP if they wish to participate in the SOAP process.

SOAP eligible unmatched applicants initiate contact with the directors of unfilled programs through ERAS. Contact between programs and matched applicants prior to the general announcement of the match results is a violation of the match participation agreement.

Students find out if they have matched the Monday of match week. On Monday, a list of unfilled programs is made available to the students and medical schools. Applicants can express their preferences by applying to the programs that are unmatched in ERAS and programs can express their preferences by reaching out to applicants on the unmatched list. Students are able to submit applications to unfilled programs throughout the week.

SOAP is a series of "rounds" that begins at 12:00 noon eastern time on Wednesday of match week. At 12:00 noon, the first SOAP offers are extended through the ERAS system to the unmatched applicants listed at the top of programs' preference lists. Offers are extended to as many applicants on a program's preference list as there are unfilled positions in that program. Each SOAP round lasts two hours, during which applicants can accept or reject any offers they receive. Offers are sent at 3:00 p.m. Wednesday, 9:00 a.m., 12:00 p.m., and 3:00 p.m. on Thursday and Friday. SOAP concludes at 5:00 p.m. eastern time on Friday of match week.

Positions offered and accepted through SOAP constitute a binding agreement which is subject to the conditions outlined in the match participation agreement for applicants and programs.

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Professional Development for the Medical Education Administrator

Introduction

One of the most exciting aspects of starting a career is creating your own path. In the medical education field, this is no different. Depending on the educational requirements for a position, an assistant can turn into a coordinator, a coordinator can turn into an assistant director, an assistant director can turn into a director and a director could turn into an executive position. If a person works hard enough and is driven to succeed, there will always be an opening that suits their career personality. Ways to carving a career path include the following: educational advancement, volunteering for various assignments and responsibilities, making a name for yourself by leading by example, serving on committees, participation in workshops and professional development, attending conferences and joining professional organizations. In this chapter you will gain a better understanding of professionalism and leadership development; you will identify your strengths to understand your leadership style; establish short term and long term career goals; and understand tips to advance in your medical education administrator position.

Identifying Short and Long Term Goals

Short and long term goals influence the strategies you will use in obtaining your ideal position or finding value in your current role. The nature of the medical education administrator position is in constant flux as one group of student's transition to a new course or clerkship or changes are made in a course or clerkship's structure as problems are identified. Given such fluctuations, you may find yourself constantly revisiting short term goals (likely every six months) while aligning them with your longer range goals. Utilizing the SMART model, reflect on your professional goals and delineate differences in the process, taking into account those things that can be achieved in the short versus the long term (1).

<ul style="list-style-type: none">Where would you like to be in...?	6 months-1 year (short term)	1 year-3 years (long term)
Specific <ul style="list-style-type: none">What is the desired job? (i.e., position, industry, responsibilities, benefits, hours)		
Measurable <ul style="list-style-type: none">How can you quantify (numerically or descriptively) progress and completion? (i.e.,		

title, responsibilities, pay)		
Achievable <ul style="list-style-type: none"> • What training, certification and skills are needed? • What experience is necessary? • What resources (i.e., money, equipment) are needed? • Do you need help from other people? 		
Relevant <ul style="list-style-type: none"> • Is the goal in alignment with your values and strengths? 		
Time-bound <ul style="list-style-type: none"> • What is the deadline? • Is the deadline realistic? 		

Aligning Goals and Work Tasks

Now that you have a clear understanding of your professional goals, it's important to reflect on your current work and begin to think about how you transition work tasks in the context of reaching your overall goals (7). While most of the tasks you complete on a day-to-day basis may be essential for the program, you should consider ways to become more efficient or creative in such tasks to allow more time to complete tasks/projects that will lead you to your vision of success, or improved alignment between tasks and goals.

Completion of the following prioritization exercise will serve as a good first step in developing awareness around the work tasks you complete on a regular basis.

	Urgent	Not Urgent
Important (to the program and your development)		
Not Important (to the program and your development)		

After completing the worksheet, begin to think about the role each task plays in helping you to reach your professional goals. Consider the following questions:

- If certain tasks will not help me reach my professional goals, can I delegate such tasks to someone else?
- Do I have the capacity (time, resources, and training) to take on additional tasks that may help me reach my goals?
- How can I re-organize my time to focus on both the urgent and not urgent important tasks?
- Is there a better way to manage the tasks that are not important so that more time can be spent on the important items?

Aligning Career Plans with Personal Values

“Values are the lenses through which you view yourself and your world. As values develop, they are crystalized and prioritized to form a values system. In essence, they form your own **“personal truth”** from which self-esteem, fulfillment, and resilience develop” (5). While described broadly in this statement, through reflection an individual is able to adapt the components of their “personal truth” to the workplace.

To gain a better sense of your established or emerging values, complete the free life values inventory at <http://www.lifevaluesinventory.org/>. At the conclusion of the program, you will receive personalized results and strategies that allow you to connect your values with strategies aimed at improving alignment between values and tasks/actions as it relates to your personal and professional development.

Where Should I Go from Here?

Now that you have a better sense of your values, short and long term career goals and work tasks, you need to ask yourself where to go from here to ensure you’re personally fulfilled in your career. Success and fulfillment are highly personal and mean different things to different people. You may be happy where you are, but want to seek additional tasks/projects that challenge or fulfill you, need to consider a career change to reach your goals, or seek extracurricular (outside of work) activities to feel balanced.

The scope of this chapter is limited and therefore focused on opportunities within health care and medical education, but you may feel the need to seek positions in other industries. The continuum of medical education provides many opportunities for administrative personnel. Positions exist in medical schools (undergraduate medical education), academic medical centers (undergraduate and graduate medical education), CME providers (mostly based in academic medical centers) and with associations that manage or regulate education providers. The following websites provide the best access to positions in the fields described:

- <https://www.aamc.org/services/careerconnect/>

- University Health System Consortium - <https://www.uhc.edu/23987.htm>
- http://acgme.org/acWebsite/hrJobs/hr_jobIndex.asp
- <http://accme.org/about-us/careers>

You Can Make Your Own Path, it's Your Career

Holding the appropriate educational degrees is a large component to not only advancement, but your ultimate “dream” position. In the higher education setting, your education in conjunction with the other aforementioned skill-set and participation, can aid in separating you from the rest of the applicants for a position. The educational requirements for a medical education administrator can range from a high school diploma, to an associate’s degree and from a bachelor’s degree up to a master’s degree. As you go higher in the position rankings, a master’s degree and/or a doctorate paired with five to ten years of experience within a supervisory capacity relevant to the position are expected to obtain the job. Education is a key component, but certainly not the only factor that plays into creating your career path.

A major component of professional development is comprised of the tasks you complete on a daily basis. Volunteering for additional assignments and responsibilities is essential to being noticed and making yourself stand out in your profession. The key is to not overload yourself with duties outside of your position; take on what you feel comfortable with. Examples of additional daily responsibilities within the medical education setting include serving on committees, subcommittees and task force committees, volunteering to take on special projects within your job responsibility (being a team player) and thinking of methods to improve your day to day duties. The more that a person can put on their resume, the more they stand out when they are looking to move up in their career path. Managers and peers notice when employees are stepping up, standing out, and being a team player, thus creating an employee putting their stamp on the organization.

Leading by example begins with being a leader. As evidenced in the Life Lessons for Leadership section earlier, no one person leads the same. People have different methods of providing motivation, giving feedback and leading a team. In addition, J. Richard Hackman states that “literally hundreds of research studies have attempted to identify the traits that distinguish naturally good leaders from those who consistently fail to get the best out of the people with whom they work. The research was conducted by measuring leadership traits such as intelligence, sociability, self-confidence and dozens more, to see which ones predict leadership effectiveness. As long ago as the 1950s, it had become clear that research would not succeed in identifying any set of universal traits that could reliably distinguish good from poor leaders” (4). Each person is capable of leading in their own way, but to lead by example is to be reliable and accountable at all times.

Participation in workshops and professional development as well as attending conferences and professional organizations is vital in setting up your career path for the future. A huge advantage of attending conferences and joining professional organizations is enhancing job skills and opening up networking opportunities. This gives you a

chance to meet people in your field, gain more insight and information in the specialty field (higher education, medical specialty, etc.), as well as conducting research and presenting amongst your peers. As the medical education field continues to grow, many professional medical organizations are starting to implement special programs at the conferences that tailor specifically to medical education coordinators. As a result, networking is much more simple and powerful.

Lessons Learned – Life Lessons for Leadership

The best leaders have an acute awareness of their natural strengths as well as their limitations. As a result, the best leaders know when to call on someone else for help or reach out to others if there is an area where they are not as effective in their leadership style. In leadership programs, many people are challenged to find the strengths they bring to the table rather than harp on what they do not do well. This is where the StrengthsFinder assessment comes in. “Over the past decade, this assessment has helped millions of people in more than 50 countries discover and describe their strengths” (6).

Although the StrengthsFinder 2.0 textbook is certainly effective and helpful, the real challenge is to take the assessment in the back of the book which reveals your top five strength areas of leadership. Upon completion of the assessment, you receive a highly customized strengths-based leadership guide that lists the top five themes that you received as well as several suggestions for leading with each theme of strength and illustrations for each theme in action. Here are the 34 themes listed in the text:

34 StrengthsFinder Themes include:

<u>Achiever</u>	<u>Connectedness</u>
<u>Activator</u>	<u>Consistency</u>
<u>Adaptability</u>	<u>Context</u>
<u>Analytical</u>	<u>Deliberative</u>
<u>Arranger</u>	<u>Developer</u>
<u>Belief</u>	<u>Discipline</u>
<u>Command</u>	<u>Empathy</u>
<u>Communication</u>	<u>Focus</u>
<u>Competition</u>	<u>Futuristic</u>
<u>Harmony</u>	<u>Relator</u>
<u>Ideation</u>	<u>Responsibility</u>
<u>Includer</u>	<u>Restorative</u>
<u>Individualization</u>	<u>Self-Assurance</u>
<u>Input</u>	<u>Significance</u>
<u>Intellection</u>	<u>Strategic</u>
<u>Learner</u>	<u>Winning others over</u>
<u>Maximizer</u>	
<u>Positivity</u>	

“The text has a section starting on page 101 that gives a brief definition of the theme, strategies for leveraging that theme to meet followers’ four basic needs and tips for leading others who are strong in that theme” (6).

Leadership Style

As a medical education administrator you should work on developing and perfecting your leadership style. You might have a different approach depending on who you are working with at the time from students, preceptors, coworkers, and your supervisor. Based on what you learned from the strengths finder and strengths-based leadership approach, discussed earlier in the chapter, you can determine your current leadership style and how slight modifications might help you be more successful in certain situations depending on who you are working with.

Network

The best way to network is to find a professional organization for your program for example one might join Clerkship Directors in Internal Medicine, Association of Surgical Educators, American Congress of Obstetricians and Gynecologists, etc.

Join the organization, read the list serves, get involved in a committee and attend the annual meetings if your institution’s budget allows. The annual meeting is a great place to get involved and allows you to meet other professionals that have a wealth of information that you might be able to use in your own clerkship. You should make a goal to find a mentor at the annual meeting.

After a year of attending the conference you should challenge yourself to give a presentation or present a poster at the presentation. This is a great professional development opportunity and shows your institution that you are serious about your own professional development. The more active you are in your professional development, the more you will reap (3).

Become an Expert

Be the go-to person. Work to be known for delivering excellence. Excellence speaks for itself and creates opportunities. Be the go-to person for your students, co-workers, course or clerkship directors, attendings and residents. Think of the areas you are responsible for, from computer programs to building relationships. Think about how you can be the expert at your institution’s online learning system to your evaluation system, to proctoring the National Board of Medical Examiners exam (NBME). Become a resource for your institution and then share your knowledge with others. Share your wealth of knowledge with others, either in person, one on one, at a staff meeting or in a training manual. Once you are an expert, be an advocate for yourself and show others what you can do.

Once you are the expert you can become the course or clerkship director's support system and spring board for new ideas for the clerkship. Students will depend on you and you should be able to confidently answer them knowing the director supports you and your decisions.

Be clear about who you are and make sure you consistently deliver a clear message when working with students and preceptors. You are the expert for your course, therefore you and your knowledge should be respected.

Once you feel like you are the expert at your institution, challenge yourself to try new things and learn new ways of doing things. Look at other institutions and see if someone else has a new or more efficient approach that might work well for you in your course.

Be In a Place of Yes

Say "Yes" to new opportunities and tasks you may view as a challenge. Being able to say yes to new opportunities takes belief in yourself and a leap in faith from you. You have to believe you can do the task at hand and the person who assigned the task to you has confidence in you that you can complete the task successfully. Saying yes is a leadership skill that will get easier for you to accept with time. The more you say yes, the more self-confident you will become. Saying yes builds trust in yourself and with everyone around you. Saying yes is a true foundation of leadership (2).

Be Your Own Advocate

One way to advance your career is to realize and remember that it's your career; it is not your partner's, your co-worker, or your boss'. It's your career and you have to be on the lookout and be an advocate for you. This might not be easy or comfortable for some people but the only way others will know what you are doing is to share accomplishments with supervisors. You might think they recognize what you are doing well but they might be too busy to truly recognize everything you have done. Keep a portfolio of accomplishments, projects, thank you notes, presentation invitations, and student notes for annual reviews. This portfolio might be able to help you get a higher rating at your annual review and might give you support of an annual raise.

Conclusion/Case Study

Course or clerkship administrators play varied roles in designing and managing educational experiences. The following scenario was designed to highlight some of the day-to-day expectations that are commonly seen in the position.

Sarah, the Internal Medicine Clerkship Coordinator at Sunnyside Medical School is ready to return to work on Monday after wrapping up her previous clerkship. She's always excited about meeting the new group of students and introducing them to what tends to be the most popular third year rotation. As usual, she prepares to multi-task as a slew of

questions come from the new students and as preceptors figure out their new schedules based on student availability.

She starts her day by sending out an email message to all of the residents and faculty on the service to remind them of the clerkship requirements. She tends to focus on the logbook (procedure/diagnosis) requirements as that is an easy way to have them understand the expectations. Next she meets with the students alongside the Clerkship Director to talk about the schedule, evaluation requirements and other orientation content.

As she wraps up the orientation session, she notices she has a message from the residency program director who noticed that she forgot to include one of the interns on her email. Sarah quickly realizes that the intern does not have a faculty appointment and calls the faculty affairs office at her college. She contacts the resident and asks them to follow the process for a faculty appointment so she can be sure he receives important information from the college.

Next, she begins to schedule the final evaluations for the last group of clerkship students. She logs into OASIS which is the schools learning management system and ensures evaluations get sent to all residents and attendings who have interacted with the students.

- What would you do differently in this situation?
- What is the importance of daily job responsibilities in your professional development?
- What professional development opportunities were presented in this situation?

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Acronyms Used in Medical Education

Acronym	Acronym Expansion	Definition
AACOM	American Association of Colleges of Osteopathic Medicine	The American Association of Colleges of Osteopathic Medicine (AACOM) was founded in 1898 to lend support and assistance to the nation's osteopathic medical schools, and to serve as a unifying voice for osteopathic medical education. The organization represents the administration, faculty and students of all of the osteopathic medical colleges in the United States. The association, guided by its Board of Deans and various other member councils and committees, is actively involved in all areas of osteopathic medical education.
AAFP	American Academy of Family Physicians	The AAFP was founded in 1947 to promote and maintain high quality standards for family doctors who are providing continuing comprehensive health care to the public.
AAIM	Alliance for Academic Internal Medicine	AAIM is a consortium of five academically focused specialty organizations representing departments of internal medicine at medical schools and teaching hospitals in the United States and Canada. AAIM consists of the Association of Professors of Medicine (APM), the Association of Program Directors in Internal Medicine (APDIM), the Association of Specialty Professors (ASP), the Clerkship Directors in Internal Medicine (CDIM), and the Administrators of Internal Medicine (AIM). Through these organizations, AAIM represents department chairs and chiefs; clerkship, residency, and fellowship program directors; division chiefs; and academic and business administrators as well as other faculty and staff in departments of internal medicine and their divisions.

Acronym	Acronym Expansion	Definition
AAMC	Association of American Medical Colleges	The Association of American Medical Colleges (AAMC) is a not-for-profit association representing all 141 accredited US and 17 accredited Canadian medical schools; nearly 400 major teaching hospitals and health systems, including 51 Department of Veterans Affairs medical centers; and 90 academic and scientific societies.
AAMC - GBA	Group Business Affairs	The AAMC's Group on Business Affairs (GBA) advances administrative and fiscal management in academic medical institutions to support medical education, research, and health care. It also serves to facilitate direct interaction of the AAMC staff and Councils with institutional representatives charged with responsibilities in these areas.
AAOS	American Academy of Orthopaedic Surgeons	Founded in 1933, the Academy is the preeminent provider of musculoskeletal education to orthopaedic surgeons and others in the world.
AAP	American Academy of Pediatrics	An organization of 60,000 pediatricians committed to the optimal physical, mental and social health and well-being for all infants, children, adolescents, and young adults.
AAP	The Association for Academic Psychiatry	Focuses on education in psychiatry at every level from the beginning of medical school through lifelong learning for psychiatrists and other physicians. It seeks to help psychiatrists who are interested in careers in academic psychiatry develop the skills and knowledge in teaching, research, and career development.

Acronym	Acronym Expansion	Definition
ABMS	American Board of Medical Specialties	The American Board of Medical Specialties (ABMS) is an organization of medical specialty boards with shared goals and standards related to the certification of medical specialists. Certification includes initial specialty and subspecialty certification and maintenance of certification throughout the physician's career.
ACCME	Accreditation Council for Continuing Medical Education	The ACCME's mission is the identification, development, and promotion of standards for quality continuing medical education (CME) utilized by physicians in their maintenance of competence and incorporation of new knowledge to improve quality medical care for patients and their communities.
ACE	Alliance for Clinical Education	The Alliance for Clinical Education (ACE) is a multidisciplinary group formed in 1992 to enhance clinical instruction of medical students. ACE's mission is to foster collaboration across specialties in order to promote excellence in clinical education of medical students. ACE represents leaders in education from a broad range of medical specialties, and plays a key role in issues related to multi- and interdisciplinary undergraduate clinical medical education.
ACEHP	Alliance for Continuing Education in the Health Professions	Membership in the Alliance is open to any individual involved in continuing education and professional development for the health care professions.
ACEP	American College of Emergency Physicians	Supports quality emergency care and promotes the interests of emergency physicians and our patients.

Acronym	Acronym Expansion	Definition
ACGME	Accreditation Council for Graduate Medical Education	The Accreditation Council for Graduate Medical Education (ACGME) is the body responsible for accrediting the majority of graduate medical training programs (i.e., internships, residencies, and fellowships, aka subspecialty residencies) for physicians in the United States. It is a non-profit private council that evaluates and accredits medical residency and internship programs.
ACHE - CHEF	American College of Health care Executives - Chicago Health Executives Forum	American College of Health care Executives (ACHE) is an international society that was established to advance health care management through education and research. Chicago Health Executive Forms is the largest ACHE chapter in the nation.
ACLS	Advance Cardiac Life Support	A set of clinical interventions for the urgent treatment of cardiac arrest, stroke and other life threatening medical emergencies, as well as the knowledge and skills to deploy those interventions. Most medical schools require ACLS Training.
ACOG	American College of Obstetricians and Gynecologists	The ACOG was founded in 1951. The College has over 55,000 members and is the nation's leading group of professionals providing health care for women.
ACP	American College of Physicians	The ACP is a national organization of internists - physician scientists who apply scientific knowledge and clinical expertise to the diagnosis, treatment, and compassionate care of adults across the spectrum from health to complex illness.
ACS	American College of Surgeons	The American College of Surgeons is a scientific and educational association of surgeons that was founded in 1913 to improve the quality of care for the surgical patient by setting high standards for surgical education and practice.

Acronym	Acronym Expansion	Definition
ACUME	Administrators/Coordinators Certification in Undergraduate Medical Education	ACUME is a certification for Administrators/Coordinators that recognized an individual's contribution to undergraduate medical education. ACUME's mission is to establish professional standards that acknowledge the expertise needed to coordinate educational programs in undergraduate medical education.
ADFM	Association of Departments of Family Medicine	The ADFM is the organization of departments of family medicine and is devoted to transforming the care, education, and research to promote health equity and improve the health of the nation.
ADMSEP	The Association of Directors of Medical Student Education in Psychiatry	Dedicated to the education of medical students in the behavioral sciences and psychiatry. Fosters the professional development of medical student psychiatric educators and develops goals and objectives for medical student psychiatric education.
AHME	Association for Hospital Medical Education	Access to training and current information for medical education professionals.
AHME-CADME	Association for Hospital Medical Education - Council of Administrative Directors of Medical Education	The mission of the Council of Administrative Directors of Medical Education (CADME) is to provide a network of support, information, and education for its members; to promote the professional development of its members; and to enhance the ability of its members to provide high quality administrative direction of medical education programs.

Acronym	Acronym Expansion	Definition
AHME-COPAC	Association for Hospital Medical Education - Council of Program Administrators and Coordinators	The mission of the Council of Program Administrators and Coordinators (COPAC) is to serve as an information resource for graduate medical education administrators and coordinators in matters affecting medical education. COPAC's emphasis focuses on information sharing among colleagues in various specialties; understanding accreditation issues and the ACGME; effectively managing the ERAS and NRMP systems; and developing effective relationships with colleagues and resident physicians.
AIAMC	Alliance of Independent Academic Medical Centers	The Alliance represents independent academic medical centers in national forums where medical education policy is developed and discussed. Alliance members are leaders in organizations such as the Accreditation Council for Graduate Medical Education (ACGME) and its Institutional Review Committee as representatives of the American Hospital Association (AHA), the National Resident Matching Program (NRMP), the Association of American Medical College's (AAMC) Council of Teaching Hospitals, and Group on Resident Affairs (GRA).
AMA	American Medical Association	To promote the art and science of medicine and the betterment of public health.
AMCAS	American Medical College Application Service	A centralized application processing service that is only available to applicants to the first-year entering classes at participating US medical schools.
ANACI	Advanced National Agency Check with Inquiries	ANACI is a security clearance that is required by Veteran's Affairs medical centers which are Department of Defense facilities.

Acronym	Acronym Expansion	Definition
AOA	American Osteopathic Association	The American Osteopathic Association promotes public health and encourages scientific research. In addition to serving as the primary certifying body for doctors of osteopathic medicine, the AOA is accrediting agency for all osteopathic medical schools and has federal authority to accredit hospitals and the other health care facilities.
AOA	American Orthopedic Association	The mission is to identify, develop, engage and recognize leadership to further the art and science of orthopedics.
APDIM	Association of Program Directors in Internal Medicine	The international organization of accredited internal medicine residency programs.
APGO - MECCOG	Association of Professors of Gynecology and Obstetrics - Medical Education Clinical Coordinators	The mission is to facilitate and promote professionalism and continued dedication to undergraduate medical education among clinical coordinators for women's health.
ASE - CCSE	Association for Surgical Education - Committee on Coordinators of Surgical Education	The Committee on Coordinators of Surgical Education develops resources to support, educate and inspire coordinators in surgery. This Committee addresses the educational needs of medical students in surgery and is focused on developing effective plans and goals to make the surgical clerkship successful. The Committee provides helpful information and guidance to coordinators and enables them to get involved in group discussions on issues surrounding medical student education.
BLS	Basic Life Support	The level of medical care which is used for victims of life-threatening illnesses or injuries until they can be given full medical care at a hospital. It can be provided by trained medical personnel, including emergency medical technicians, paramedics, and by laypersons who have received BLS training. BLS is generally used in the pre-hospital setting, and can be provided

Acronym	Acronym Expansion	Definition
		without medical equipment. Most medical schools require BLS training for their medical students.
CCHIT	Certification Commission for Health Information Technology	An independent, 501(c)3 nonprofit organization with the public mission of accelerating the adoption of robust, interoperable health information technology.
CDEM	Clerkship Directors in Emergency Medicine	To advance the education of medical students in the specialty of emergency and acute care medicine and serve as a unified voice for EM clerkship directors and medical student educators on a national level.
CDIM	Clerkship Directors in Internal Medicine	The organization of individuals responsible for teaching internal medicine to medical students.
CDS	Clinical Decision Support	CDS is a sophisticated health information technology component. It requires computable biomedical knowledge, person-specific data, and a reasoning or inferencing mechanism that combines knowledge and data to generate and present helpful information to clinicians as care is being delivered.
COCA	Commission on Osteopathic College Accreditation	Accredits medical schools granting the Doctor of Osteopathic Medicine degree (DO) in the United States. The United States Department of Education lists the Commission as a recognized accreditor.

Acronym	Acronym Expansion	Definition
COGME	Council on Graduate Medical Education	The Council on Graduate Medical Education (COGME) provides an ongoing assessment of physician workforce trends, training issues and financing policies, and recommends appropriate federal and private sector efforts on these issues. COGME advises and makes recommendations to the Secretary of the United States Department of Health and Human Services (HHS) and to the Senate Committee on Health, Education, Labor and Pensions, and the House of Representatives Committee on Energy and Commerce.
COM	College of Osteopathic Medicine	Please refer to AACOM, American Association of Colleges of Osteopathic Medicine.
COMSEP	Council on Medical Student Education in Pediatrics	The pediatric clerkship administrators and coordinators from medical schools and teaching hospitals located across the United States and Canada.
CPOE	Computerized Physician Order Entry	A system that allows direct entry of medical orders and instructions for the treatment of patients by a medical practitioner using a computer network program.
CQI	Continuous Quality Improvement	Is an ongoing effort to improve products, services or processes.
DO	Doctor of Osteopathic Medicine	A DO is a professional doctoral degree for physicians and surgeons offered by medical schools in the United States. Holders of the DO degree have attained the ability to become licensed as osteopathic physicians who have equivalent rights, privileges, and responsibilities as physicians with a Doctor of Medicine degree (MD)
DOD	Department of Defense - National Security	Is the executive department of the government of the United States charged with coordinating and supervising all agencies and functions of the government concerned directly with national security and the United States Armed Forces.

Acronym	Acronym Expansion	Definition
ERAS	Electronic Residency Application Service	A service coordinated through the Association of American Medical Colleges that transmits the student's residency application and supporting documentation and their designated Dean's Office to program directors. ERAS consists of MyERAS, Dean's Office Workstation (DWS), Program Director's Workstation (PDWS), and ERAS PostOffice.
EHR	Electronic Health Records	A systematic collection of electronic health information about individual patients.
EYOA	End of Year Assessments	This is an overall assessment of the required learning areas for the year and helps to evaluate an individual's performance.
FERPA	Family Educational Rights and Privacy Act	A federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the United States Department of Education.
GME	Graduate Medical Education	Graduate Medical Education refers to any type of formal medical education, hospital-sponsored, hospital-based training, or community training, pursued after receipt of the MD or DO. Provides residency programs through guidance, evaluation, progressive supervision; and facilitating the resident's ethical, professional and personal development while guarantying safe and high-quality patient care.
HIPAA	Health Insurance Portability and Accountability Act	Offers protection for millions of American workers to improve portability and continuity of health insurance coverage. The administrative simplification provisions also address the security and privacy of health data.
HIE	Health Information Exchange	The electronic sharing of health related information among organizations.
HIT	Health Information Technologies	Provides the framework that describes the comprehensive management of health information across computerized systems.

Acronym	Acronym Expansion	Definition
JCEHP	Journal of Continuing Education in the Health Professions	Promotes scholarship in continuing education of a broad range of health professions and is intended primarily for researchers, practitioners, and policy makers in the field. The LinkedIn JCEHP group is intended to provide members with inside information about the journal and a forum to discuss 1) emerging issues in the field, 2) articles that have been published in JCEHP, and 3) writing for publication.
LCME	Liaison Committee on Medical Education	Medical education programs leading to the MD degree in the United States and Canada are accredited by the Liaison Committee on Medical Education (LCME). The LCME's scope is limited to complete and independent medical education programs whose students are geographically located in the United States or Canada for their education and that are operated by universities or medical schools chartered in the United States or Canada.
MCAT	Medical College Admission Test	A standardized, multiple-choice examination designed to assess the examinee's problem solving, critical thinking, and knowledge of science concepts and principles prerequisite to the study of medicine.
MD	Doctor of Medicine	The Doctor of Medicine degree is granted at the end of medical school. Students complete a four year undergraduate degree at a college or university and then enroll in medical school which in the United States is typically four years in length.
MSPE	Medical Student Performance Evaluation	The Medical Student Performance Evaluation is a written transcript of the student's performance in medical school and a required component of the residency application. The School of Medicine prepares MSPEs for all students in their final year of medical school regardless of the student's residency application plans.

Acronym	Acronym Expansion	Definition
MSTP	Medical Scientist Training Program	A training program for learners to earn a combined Medical Doctor and PhD degree.
NACI	National Agency Check with Inquiries	Security check required in the United States for some Veterans Affairs medical centers.
NBME	National Board of Medical Examiners	An independent, not-for-profit organization that serves the public through its high-quality assessments of health care professionals.
NBOME	National Board of Osteopathic Medical Examiners	An independent, non-governmental, not-for-profit organization whose mission is to protect the public by providing the means to assess competencies for osteopathic medicine and related health care professions.
NCCME	National Commission for Certification of CME Professionals	To improve the health of the public through the examination and certification of persons who provide or support continuing education activities for physicians that are also relevant to other health care professionals
NCURA	National Council of University Research Administration	NCURA serves its members and advances the field of research administration through education and professional development programs, the sharing of knowledge and experience, and by fostering a professional, collegial, and respected community.
NFEI	National Faculty Education Initiative	The Alliance for Continuing Education in the Health Professions and Society for Academic Continuing Medical Education (SACME), in collaboration with the Association of American Medical Colleges (AAMC), and endorsed by AHME, are delighted to announce the launch of the National Faculty Education Initiative (NFEI) that provides online training on the differences between Certified CME and Promotional Activities, as well as a searchable database of medical education faculty who have completed the program.

Acronym	Acronym Expansion	Definition
NIGMS	National Institute of General Medical Sciences	Supports research that increases understanding of life processes and lays the foundation for advances in disease diagnosis, treatment and prevention.
NRMP	National Residency Matching Program	The National Resident Matching Program (NRMP) (or the Match) is a United States-based private non-profit non-governmental organization created in 1952 to help match medical school students with residency programs. The NRMP is sponsored by the American Board of Medical Specialties (ABMS), the American Medical Association (AMA), the Association of American Medical Colleges (AAMC), the American Hospital Association (AHA), and the Council of Medical Specialty Societies (CMSS).
OMM	Osteopathic Manipulation Medicine	The core technique of osteopathic medicine. Practitioners believe they are able to diagnose and treat somatic dysfunctions of the body by manipulating the bones and muscles of a patient.
OSCE	Observed Structured Clinical Exam	A type of examination that is designed to test clinical skill performance and competence in skills such as communication, clinical examination, medical procedures, prescription, exercise prescription, joint mobilization, manipulation techniques, radiographic positioning, radiographic image evaluation and interpretation of results.
PBL	Problem Based Learning	Students learn about a subject through the experience of problem solving.
PTRIME	Professional, Team, Reporter, Interpreter, Manager, Educator	Describes the professional growth of medical students in allowing them to monitor their own progress and to acquire appropriate feedback.

Acronym	Acronym Expansion	Definition
SACME	Society for Academic Continuing Medical Education	The mission of the Society for Academic Continuing Medical Education is to promote the research, scholarship, evaluation and development of CME/CPD (continuing medical education/continuing professional development) that helps to enhance the performance of physicians and other health care professionals practicing in the United States, Canada, and elsewhere for purposes of improving individual and population health.
SPE	Standardized Patient Examinations	The use of individuals trained to portray the roles of patients, family members or others to allow students to practice physical exam skills, history taking skills, communication skills and other exercises.
STFM	Society of Teachers of Family Medicine - Medical Student Education Academic Coordinators	This group provides a forum for academic coordinators in medical student education to share ideas and challenges of undergraduate medical education with colleagues nationwide. The goals are to support the career development, satisfaction, and retention of academic coordinators.
TAGME	Training Administrators of Graduate Medical Education	To assure a comprehensive level of services, training, knowledge and leadership through certification for the administration of graduate medical education programs for physicians-in-training.
TBL	Team Based Learning	Students rely on each other for their own learning and are held accountable for coming to class, lectures or rounds prepared.
UME	Undergraduate Medical Education in the United States	Four years of education at one of the United States medical schools accredited by the Liaison Committee on Medical Education (LCME) for an MD degree or Commission on Osteopathic College Accreditation for a DO degree. The four year curriculum consists of basic science and clinical parts. After completing medical school, students earn their doctor of medicine degree (MDs), or doctor of

Acronym	Acronym Expansion	Definition
		osteopathic medicine degree (DO) although they must complete additional training before practicing on their own as a physician.
USMLE	United States Medical Licensing Examination	A three step licensing process that assesses a physician's ability to apply knowledge, concepts, and principles, and to demonstrate fundamental patient-centered skills that are important in health and disease and that constitute the basis of safe and effective patient care.
VA	Veterans Affairs	A government run military veteran benefit system with Cabinet level status that is the United States government's second largest department after the United States Department of Defense.
WOC	Work without compensation	Work without compensation (WOC) individuals perform various research and training related duties without any direct monetary compensation from the Department of Veterans Affairs.

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