

Surgical Education: Principles, Challenges, & the Definition of Competency

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“In theory, there is no difference between theory and practice. In practice, there is.”

-Yogi Berra

Medical education in the United States has been constantly evolving. A medical degree could be earned in 1850 with less than 6 months of college instruction. Following an unregulated poorly defined apprenticeship of varying length and value depending on the mentor or instructor, one was off practicing medicine independently.

I shudder at the thought.

The first formalized Graduate Medical Education Curriculum in the United States was started at Johns Hopkins in 1889. This program incorporated elements from German, English and Australian medical training. This training comprised one year of structured training, an internship, to be completed after medical school. In that era, this one year was often the last year of clinical training a young doctor would receive. This program comprised the sum of graduate medical education for most non-surgeons and some surgeons until the 1940s.

Contemporary surgical training can trace its roots to William Stewart Halsted. Dr. Halsted was famous for many things including the introduction of and adherence to strict aseptic technique during surgical procedures. When he completed his own surgical training in 1877 from Columbia University College of Physicians and Surgeons he joined New York Hospital as a house physician. In addition to introducing the hospital chart where patients' hospital courses during their in-patient care could be followed, Dr. Halsted introduced other elements and unique attributes to surgical clinic care including disposable latex gloves.

His own training continued when he went to Europe to study under several prominent surgeons. Returning to New York in 1880, he had a relatively full career operating in a number of hospitals.

He was quite charismatic and popular in addition to innovative. In 1882, he performed one of the first gallbladder operations in the United States. Halsted was the first chief of the department of surgery at Johns Hopkins Hospital beginning in 1889. He became professor of surgery in 1892 with the opening of Johns Hopkins University School of Medicine. It was at this time he was credited with starting the first formal surgical residency training program in the United States.

Halsted's program was pyramidal in nature. The length of training was undefined and individuals advanced to the next level of training at Halsted's discretion. Unique to its time, the internship was followed by at least six years as an assistant resident and two

years as a house surgeon. Some of Halstead's trainees would go on to be the founders of surgical subspecialties including Harvey Williams Cushing, Walter Denny, and Hugh Hampton Young the founders of neurosurgery and urology respectively.

There are a number of specific difficulties with a pyramidal program. Two of the most significant include the uncertain nature as to the trainee's future when enrolling in a training program. This is obviously, suboptimal for both the trainee and the training program. Additionally this type of training leaves a number of undertrained individuals, discharged from their surgical training prior to completion, out practicing medicine as there were no criteria for demonstrating competence at the time.

This obligatorily leaves a number of trainees practicing substandard medicine and surgery.

Unfortunately this training style continued for decades and it's still in part present today in many surgical programs. Most surgical residency programs in general surgery today have "categorical" and "preliminary" positions available to residents for training. The "preliminary" positions are one year, renewable slots that do not progress and carry no specific guarantee of further training or ultimate certification.

The first time the issue of surgical training was discussed at the American Surgical Association was in 1907 by Dr. Dudley Allen. The American Surgical Association had been around for 27 years at that time but the specific issue of surgical training had not

been met with formal address prior to this. Dr. Allen described the best surgical training outcome as producing a surgeon who "should limit his personal service strictly to those fields in which he is a master". Dr. Allen went on to state "he should know, most of all, in which cases medicine can provide relief without operative interference. He should be able to decide wisely, not whether an operation can be done, but whether it offers a better promise of benefit than any other method".

Dr. Dudley went on to suggest that short training in a surgical internship is unacceptable and "no training is more valuable to a young man than to serve under a capable surgeon as an assistant in a hospital. Such assistantship should be sufficiently long to get a breath of observation and an opportunity to do operations". At the conclusion of his address to the American Surgical Association, Dr. Dudley recommended that some standard criteria be established so as to ensure the best possible training of future surgeons. He went on to be the initial describer of the oral examination for surgeons of all specialties when he stated to the American Surgical Association that "the American Surgical Association could create itself a National College of Surgeons and hold annual examinations. Only those passing this examination would be eligible to fellowship".

Today all surgical subspecialties have yearly in-service examinations to assess knowledge accumulation and application in addition to having a qualifying examination by the board of their specialty as well as an oral examination before granting fellowship within the College of Surgeons. In the last 10 years, there has been the addition of

maintenance of certification requirement. This is an attempt by the medical specialty boards to ensure continuing medical education among its fellows.

The first time surgical competence and certification of competence were presented was in 1935 by Edward Archibald. In his speech he proposed it was time to set up a system similar to that in New Zealand which carried out examination similar to the current certifying examinations used today. This particular address of the American Surgical Association was instrumental in forming the committee the following year which set the foundation for the creation of the American Board of Surgery and 1937. Since that time multiple boards have been created and entrusted with the responsibility of ensuring competency of the training program graduates prior to their practicing medicine independently.

As stated, the original structure of the residency system used today was designed by William Halsted in 1889. The first major change to that pyramidal system occurred in 1931 by Dr. Edward Churchill.

Dr. Churchill had a number of issues with the pyramidal system. This included the creation of a number of poorly trained surgeons, those that were discharge from the residency training prior to their completing it. Additionally the system depending on a single individual to assure competency and excellence of training and that the relationship between a dominant master in domicile apprentice was suboptimal. Dr.

Churchill's thoughts regarding training were closely aligned with thoughts of the day amongst members of the American Medical Association regarding training.

The Accreditation Council for Graduate Medical Education (ACGME) is the national body charged with accrediting graduate medical education programs in the United States. This idea of oversight of resident education began in 1914, when the American Medical Association (AMA) Council on Medical Education and Hospitals created and published a list of hospitals approved to educate physician interns. The next step in formalization of the medical education process came in 1928, when the AMA formalized specific standards for residency programs and published them under the guidelines "Essentials of Approved Residencies and Fellowships". The mid-1950's was the time period when residency review committees (RRCs) had formed in various specialties to set up specific standards for the evaluation of residency programs and their ability to train and identify student competence and ability to practice medicine and surgery independent of oversight. The ACGME was formally established in 1981 and functions to coordinate broad oversight over medical education in the United States. The ACGME has authority over the various RRCs and serves to establish the broadest requirements for training programs to have accreditation. The RRCs themselves establish the specialty specific requirements for graduates to demonstrate competency in their specific field.

There are 26 specialty specific RRCs. These governing bodies are composed of 6 - 15 specialty specific physicians and surgeons appointed by the AMA Council on Medical

Education and the specific medical specialty organization (e.g. American Board of Urology). The majority of RRC members are previous program directors.

In 2002 the ACGME established and introduced 6 core competencies: Interpersonal and Communication skills, Medical Knowledge, Patient Care, Practice-Based Learning and Improvement, Systems Based Practice, and Professionalism. The goal of resident education in all specialties is to achieve competency in each of these areas.

While the ACGME requires evaluation and mastery in each of these six core competencies, these guidelines and requirements are not specialty specific.

Additionally, the ACGME has not established evaluation tools necessary to measure each competency. If a surgeon is to be found competent then at the end of their training to practice their specialty independently and be eligible for board certification; they have to have demonstrated mastery of the described core competencies as defined by their training program and certified by the program director at that institution.

The 6 Core Competencies

Medical Knowledge:

Defined by the ACGME as a resident being able to "demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, social-behavioral sciences, as well as the application of this knowledge to patient care."

Medical school education has for about 30 years in the United States had a relatively stable curriculum and has been measured by standardized testing. Prior to obtaining State licensure, a medical student or graduate must pass three examinations. These are the United States Medical Licensing Examinations or USMLE Step I, II, and III. These tests measure basic clinical knowledge and its application over several years with the third step of this process often being taken after the internship year. This USMLE step III is comprised of medical scenarios or vignettes and the next clinical test, diagnosis, or treatment is identified by the test taker in a multiple choice format. This exam had been criticized by some as a test of English proficiency, or at least reading proficiency, because the vignettes or questions themselves are so lengthily worded that a minimum level of competency with the English language is necessary to complete the examination.

A resident's, or medical trainee's demonstration of Medical Knowledge competency within Graduate Medical Education (GME), may be more difficult to define and measure. A major hurdle to defining this is that the body of medical information is growing exponentially, with the total amount of medical information available doubling every 5 years. In a perfect universe a resident trainee would have defined for him or her the parts of the medical literature applicable to their specialty that was required knowledge by year of training; the mentors or attending faculty can then give regular and appropriate feedback to that resident several times per year regarding the progress in the assimilation and application of that information. The current mechanism for medical

knowledge assessment and subsequent demonstration of competence is two fold: the first is the annual in-service examination which allows the resident and the program mentors to see how well the resident physician understands disease, physiology, diagnostic studies, appropriate therapies, the specialty guidelines, and other elements of medical knowledge and compares them to peers in other national programs with respect to these elements. Secondly, each educational rotation, the training physician participates in, should have defined goals and objectives for that experience adjusted to year of training. The director of that rotation should then be able to give constructive feedback to the trainee in a real time fashion so as to promote growth and assess competence. The difficulty with this should be self evident.

It has been suggested that the application of Bloom's taxonomy to the assessment of medical knowledge may lend some reproducible objectivity to the real time evaluation of resident medical knowledge and its real world application to patient care. Bloom's taxonomy for educators measures six fields: knowledge, comprehension, application, analysis, synthesis, and evaluation. Applying this taxonomy to residency programs in the assessment of medical knowledge, Nkanginieme suggested the following criteria: knowledge, comprehension, application, analysis and synthesis. Several "check box" forms have been established to aid with this process. None of them, in my opinion, represent, a satisfying solution to the problem of objectively measuring knowledge base and its application.

Patient Care:

This competency is defined by the ACGME as "providing patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health."

The broad application of this requirement to GME training encompasses the entire spectrum of patient encounters with the trainee including: obtaining a history, physical examination skills, demonstration of respect and empathy (including sensitivity to cultural issues), and communication with patients. Added to these elements, this competency includes the ability to formulate a differential diagnosis, communicating the need for additional tests and the risks and benefits of therapeutic options, and involving consultants when necessary to assist in care. Finally, the use of information technology in the management of disease, the identification of problems with patient safety and ways to improve safety and use social services in the community when appropriate.

Finally, and possibly as an after thought, this competency calls for demonstration of competency in invasive procedures applicable to the specialty.

This may be one of the hardest elements to apply progressive criteria to in the assessment of competency.

There are tools and opportunities available to the educator in the assessment of the resident within this core competency. A resident staffed clinic affords opportunities for

the assessment and teaching of proper technique in patient history and physical examination skill, disease evaluation, diagnostics, application of medical knowledge to patient care, and the discussion of subconscious elements and mannerisms within the resident interaction with the patient that may have been positive or negative. Case conferences provide a venue for the faculty and resident's interaction and two way discussion about different ways to approach clinical problems, identify medical errors, and improve outcomes in the future.

Obviously within the surgical suite the surgeon has the opportunity to teach the resident staff proper surgical technique and assess their ability to perform the technical elements of a procedure.

Interpersonal and Communication Skills:

This competency is defined by two skill areas – first, the ability to communicate effectively with patients, families, other healthcare professionals including physicians encompassing both written and verbal encounters. The second, interpersonal skills encompasses teamwork within the healthcare group of providers and comforting patients. The importance of this skill set was recognized when medical training was in its infancy. In 1927, Francis Peabody wrote

"The treatment of a disease may be entirely impersonal; the care of a patient must be completely personal. The significance of the intimate personal relationship between

physician and patient cannot be too strongly emphasized, for in an extraordinarily large number of cases both diagnosis and treatments are directly dependent on it, and the failure of the young physician to establish this relationship accounts for much of his ineffectiveness in the care of patients."

Poor communication skills have been cited as the primary reason for malpractice claims including patient abandonment, devaluation of the patient's viewpoint, lack of patient understanding of the treatments proposed, and the physician's failure to understand the patient's perspective. Lectures, role playing, and small group discussion are methods to teach this competency. It seems the best method is direct observation of the attending interacting with a patient by the resident ; the resident then undertakes a similar, observed interaction with another patient, receives feedback and then reflects on the experience.

Have we come very far from see one, do one, teach one?

Practice Based Learning and Improvement

This competency centers on instruction in the need for life long learning, self assessment, and quality improvement. In short, eventually every medical professional is responsible for their own continuing medical education and the skill to obtain that continuing medical education is a necessary component of training. Within this competency, the resident physician is required to identify their strengths and

weaknesses. It is not uncommon that these "millennials" fail to see that they have areas for improvement. The trainees should participate in the development of the goals and objectives for each rotation and when possible there is an expectation that if a resident lags behind in one area of their training, the resident should be able in part to identify this deficit and contribute to the modification of their specific training to remedy identified deficits.

This is the opportunity for residents to identify weaknesses in their understanding of disease process and patient management and make improvements; subsequently applying this scenario to future experiences where they identify a weakness in their knowledge base, surgical skill set, etc. Ultimately, they will apply this to their own professional career.

To demonstrate mastery of this core competency, the resident should also recognize the ways in which they learn best whether book, interactive medium, simulation labs, videos, conferences or other.

Finally, the resident must learn to always be looking for ways to improve patient care whenever possible.

Systems-based Practice:

The requirement by the ACGME here is that "residents demonstrate an awareness of and responsiveness to the larger context and system of healthcare, as well the ability to call effectively on other resources in the system to provide optimal health care." A more simple definition, and more practical, might be "the use of healthcare services for patient care, and how the costs of providing those services can affect the delivery of care."

This competency evaluates the residents' ability to advocate for their patients and improve the delivery of care within the health care system - while keeping cost considerations in mind. Additionally the coordination of care, working within multiple teams as part of the delivery of care, and the identification of errors (or opportunity for errors) are essential elements to understand and master before being granted competency.

Actually assessing these elements, teaching them actively, and identifying areas for improvement, are the challenges within graduate medical education today. I think we can all agree that the elements presented here are very important attributes for future independent physicians to have, but how to teach these elements after 25 - 30 years of formative development remains a challenge.

Professionalism:

"Residents cannot be expected to perform in a more professional manner than those leading them" -GL Lankin

Components of professionalism were not present formally in resident GME until about 1980. The previous underlying assumption was that if you were a physician, you knew how to be professional. We know this not be a de facto statement and the ACGME has outlined, albeit loosely, the elements of professionalism as pertains to the medical profession.

These include commitment, technical skills, accepting responsibility for patient care and its continuity, and sensitivity to cultural, age related, and disease specific issues. Specifically a cancer diagnosis is different than a diagnosis of gall stones and should be recognized as such. Different diagnoses have different implications for different patient populations.

An easy way to promote and monitor professionalism in the workplace is to adhere to a code of conduct across all roles.

Sir Oliver Wendell Holmes stated:

"I don't know how to define pornography but I know it when I see it."

I think we can all agree that it is relatively easy to identify unprofessional behaviors. Codifying those behaviors and providing feedback regarding them are the challenge.

Tools that are available to the training program to achieve these core competencies are numerous. These include the previously described in-service examinations and oral examinations. Simulations, whether oral, role-playing, electronic or written also allow for the real time feedback on resident progress and learning.

Direct attending physician observation, 360 degree evaluations, and discussions about patient and rotation feedback are also critical elements in identifying areas of development requiring further instruction or development. Self- assessment by questionnaire has, in my opinion, been one of the most interesting tools. Individual responses to this self administered questionnaire are very revealing about the person filling out the form.

Review of the self assessment then becomes a challenge in many circumstances. For the outstanding resident who rates him or herself poorly on the examination, confidence building is what is required. Much more difficult is the technically challenged, or incompetent, resident or the resident who has communication issues with patients and no insight into their educational needs.

I have dealt with the latter on more than one occasion. The outcome has been variable.

At the conclusion of resident training a letter is sent to the ACGME stating:

“On the basis of this final evaluation, I have made a recommendation to the American Board of Urology that this individual be allowed to enter the certification process. It is the consensus of the faculty that Dr. _____ has successfully fulfilled all program

requirements and is able to practice successfully and independently without supervision in our specialty.”

This is in short the demonstration of competency. Much remains ill defined at best.

I leave you with a quote from JR Senior, a member of the National Board of Medical Examiners:

“*Competence* is that which a physician is capable of doing and *performance* is that which a physician actually does”