

Invited Article

Medical Education in the United States: The Role of Andragogy

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Abstract

The challenge in medical education is transitioning the early learner from a teacher-centered, pedagogical learning environment to an andragogical environment that encourages both self-directed learning and internal motivation critical for a practicing clinician. The androgogical environment has the learner involved in planning and evaluating their learning, builds on experience, has immediate application, and is problem rather than topic centered. The governing bodies for medical education in the United States have changed the requirements for training programs and licensure encouraging andragogical approaches based on concepts of competencies and milestones. Achievement of competencies, including patient care, medical knowledge, practice-based learning and improvement, systems-based practice, interpersonal and communication skills, and professionalism, is supported by well-defined measurable milestones of performance that allow for feedback about progress and self-directed learning. These changes in the approach to medical education in the United States are designed to enhance the creation of physicians who are life-long learners.

Key words

ACGME; Andragogy; Competencies; Medical education; Milestones

It is a great honor to give the 2016 C. Elaine Field Lecture here in Hong Kong and be honored by the Hong Kong Paediatric Society. In a true educational process I would like to suggest that the readers of this presentation should: know the elements of andragogy vs pedagogy; know the brief history of Medical Education in the United States; be able to discuss the medical education concepts of Competencies, Milestones, and Entrustable Professional Activities (EPA's); and describe the ACGME's Next Accreditation System (NAS) for accrediting physician training programs.

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With regard to adult learning theory, an American educator from the last century, Malcolm Shepherd Knowles, popularised the term andragogy as the "art and science of adult learning". As such, andragogy has come to refer to any form of adult learning. Knowles taught that there were five assumptions about adult learners. They are: 1) self-directed, 2) use their own experiences as foundational resources for learning, 3) value learning that addresses developmental tasks of their social roles, 4) appreciate immediate application and problem centered, and 5) are internally motivated to learn.

These five assumptions led to four Principles of Andragogy shown in Table 1.

In considering adult learners and the concept of andragogy in juxtaposition to the more classic core concept of education theory and practiced embodied in the term pedagogy, which has its etymological roots focused on the child, it is helpful to compare and contrast the two. Table 2 is one way of considering the two approaches to education with experience and motivation of the learner providing guidance as to which one to utilise for effective learning. Although age is a major factor, it is not the only determinant.

The challenge in medical education is to transition the medical student from a learning environment that by necessity has a more pedagogical approach to a practicing clinician in an environment that encourages self-directed learning and internal motivation, hallmarks of andragogy. From a learner who early in training is in many ways a blank slate experientially to a professional who has acquired foundational experiences and both the skills and love for lifelong learning.

In understanding the current state and philosophy of physician training in the United States it is helpful to briefly review the national evolution of that training. Probably the first national organisation formed to formally consider the elements of medical education in any structured way was the American Association of Medical Colleges (AAMC) in 1876. However, it wasn't until 1910 that the Flexner Report was published that more clearly detailed the need for a standardised and scientific basis of physician training. Over two decades later in 1933, the American Board of Medical Specialties (ABMS) was established to set national standards for, and certify, physicians. Interestingly, it took another decade (1942) to establish the Liaison Committee on Medical Education (LCME) to accredit medical schools and almost fifty years (1981) to create the Accreditation Council for Graduate Medical Education (ACGME) for accrediting residency and fellowship training programs. Clearly the assessment of the individual practitioner

preceded the direct assessment of the elements of the training experience. Most recently, as noted below, the ACGME has moved towards focusing on the outcomes of the trainees of the programs rather than the content of the educational experiences.

It may also be helpful to review the typical course of medical training in the United States for the aspiring doctor. Beginning after secondary school, around age eighteen, there is a four year college experience that has required courses for application to medical school. A standardised test, the Medical College Admission Test (MCAT), is required by virtually all medical school applications and, coupled with college performance, it provides a basis for screening and acceptance to medical school. Medical school

Table 1 Four principles of andragogy

1. Adults need to be involved in the planning and evaluation of their instruction;
2. Experience (including mistakes) provides the basis for the learning activities;
3. Adults are most interested in learning subjects that have immediate relevance and impact to their job or personal life; and
4. Adult learning is problem-centered rather than content-oriented.

Table 2 Pedagogy vs. Andragogy

	Pedagogy	Andragogy
The Learner	Learning content, method, and evaluation is determined by teacher often with summative evaluations, e.g. final exams, board certification exams.	Learning is self-directed and learner is responsible for his/her own learning and evaluation, preferably on an ongoing basis.
Role of the Learner's Experience	The learner comes to the activity with little experience that could be tapped as a resource for learning and the experience of the instructor is most influential.	The learner brings a greater volume and quality of experience and serves as a basis for future learning.
Readiness to Learn	Students are told what they have to learn in order to advance to the next level of mastery.	The need to know in order to perform more effectively in some aspect of one's life is important and change is likely to trigger a readiness to learn.
Orientation to Learning	Learning is a process of acquiring prescribed subject matters.	Learners want to perform a task or solve a real life problem. Learning is organised around life/work situations rather than subject matter units.
Motivation for Learning	Primarily motivated by external pressures, competition for grades, and the consequences of failure.	Internal motivators: self-esteem, recognition, better quality of life, self-confidence, self-actualisation.

is four years with in depth clinical exposure occurring typically in the third and fourth years after basic biological and pathophysiological training in the first two years. Medical school is followed by three to five years in a specialty residency, e.g. pediatrics, and, for those so inclined, another 1-3 years in subspecialty fellowship training (e.g. pediatric cardiology). An even smaller sub set of trainees will do a 1-2 year sub-subspecialty fellowship, e.g. pediatric echocardiography.

In the past decade, both the AAMC and the ACGME have recognised the need to reconsider how physicians are educated. As the AAMC stated: "Training physicians and physician scientists who are well-prepared and nimble enough to practice in today's rapidly evolving health care environment requires comprehensive educational transformation..... to ensure that physicians are ready to demonstrate competence not simply in medical knowledge and patient care, but also in interpersonal and communication skills, practice-based learning and improvement, systems-based practice, interprofessional collaboration, professionalism, and personal and professional development." Similarly the ACGME is striving to change the learning environment "to enhance the ability of the peer-review systems to prepare physicians for practice in the 21st Century and accelerate..... movement towards accreditation on the basis of educational outcomes". In this regard, the ACGME, has stated that the residency program must require its residents to obtain competencies in six areas to the level expected of a new practitioner. As such, programs must define the specific

knowledge, skills, and attitudes required and provide educational experiences as needed in order for their residents to demonstrate competency in the areas noted in the AAMC statement – patient care, medical knowledge, practice-based learning and improvement, systems-based practice, interpersonal and communication skills, and professionalism. Table 3 provides a brief description of each of these competencies. It is important to note that the competencies of medical knowledge, practice-based learning and improvement, and systems-based practice all have elements that align with andragogy – self-directed learning that is based on experience and evaluation and a motivation to apply that learning to practice.

Since the desire was to measure training by trainee outcomes, the challenge became how to effectively measure achievement of these competencies. To this end the concept of "milestones", specific observable measures of progressive levels of competency on a developmental continuum, was embraced by the ACGME and developed through a Milestones Project. The Project brought together the ACGME, the residency review committees and the academic specialty communities to develop specialty-specific "educational milestones" that residents are expected to attain at specific times throughout their education. These milestones reflect five levels of competency, ranging from Level 1, the knowledge and skill of a typical graduating medical student, to Level 5, the knowledge and skill of an independently practicing physician and have been developed at both the residency and fellowship levels. Each medical discipline also determined Entrustable Professional

Table 3 Six core competencies

Patient Care	that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.
Medical Knowledge	about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioural) sciences and the application of this knowledge to patient care.
Practice-Based Learning and Improvement	that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care. Example: Demonstrates a clinical practice, e.g. asthma care, that incorporates principles and basic practices of evidence-based practice and information mastery.
Systems-Based Practice ,	as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Example: Develops and works with multidisciplinary teams (e.g. human factors engineers, reference librarians, and cognitive and social scientists) to find systems solutions to patient safety problems that have high reliability.
Interpersonal and Communication Skills	that result in effective information exchange and teaming with patients, their families, and other health professionals.
Professionalism ,	as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.

Activities (EPA's) that are measured at the end of training and are indicative of the trainee's ability to practice unsupervised. Entrustable Professional Activities are activities identified as core to the profession, which should only be 'entrusted' to those with sufficient competencies to undertake the activity successfully. An Entrustable Professional Activity is acquired once a supervisor deems that a trainee can undertake the task unsupervised (or be trusted to recognise when they would need additional supervision).

Utilising these measurement and assessment concepts, the paediatric residency review committee in collaboration with the academic pediatric community identified twenty one required milestones. For each milestone there were observable behaviors described that allow evaluators to attribute a level of function to the learner in a particular competency related to that milestone. For example, in the competency of patient care, there is a subcompetency of making informed diagnostic and therapeutic decisions that result in optimal clinical judgement. The levels of function include: Early clinical reasoning – analytic reasoning through

basic pathophysiology, e.g. oliguria suggests a problem with kidneys; Intermediate clinical reasoning entails the emergence of illness scripts, e.g. the overall clinical picture of anuria, increased creatinine, and edema suggests renal failure; and advanced clinical reasoning – avoiding premature closure with regard to diagnosis, e.g. there is an array of causes of renal failure and additional diagnostic tests are required to delineate the final diagnosis and treatment. Evaluation of these subcompetencies are then aggregated to levels of competency for each milestone and an overall assessment of the trainee's progress in each milestone is achieved. Feedback is given to the trainee about this progress with specific observed behaviors delineated that can be acted upon if there are deficits.

In another way of conceptualising this, Figure 1 reflects the overall concept of starting with a consensus of the global elements of a good doctor in a given discipline to inform the training system for that discipline to achieve that good doctor level of performance. Those global elements are used to determine specific EPA's, milestones, and core competencies that are in turn used to describe the process

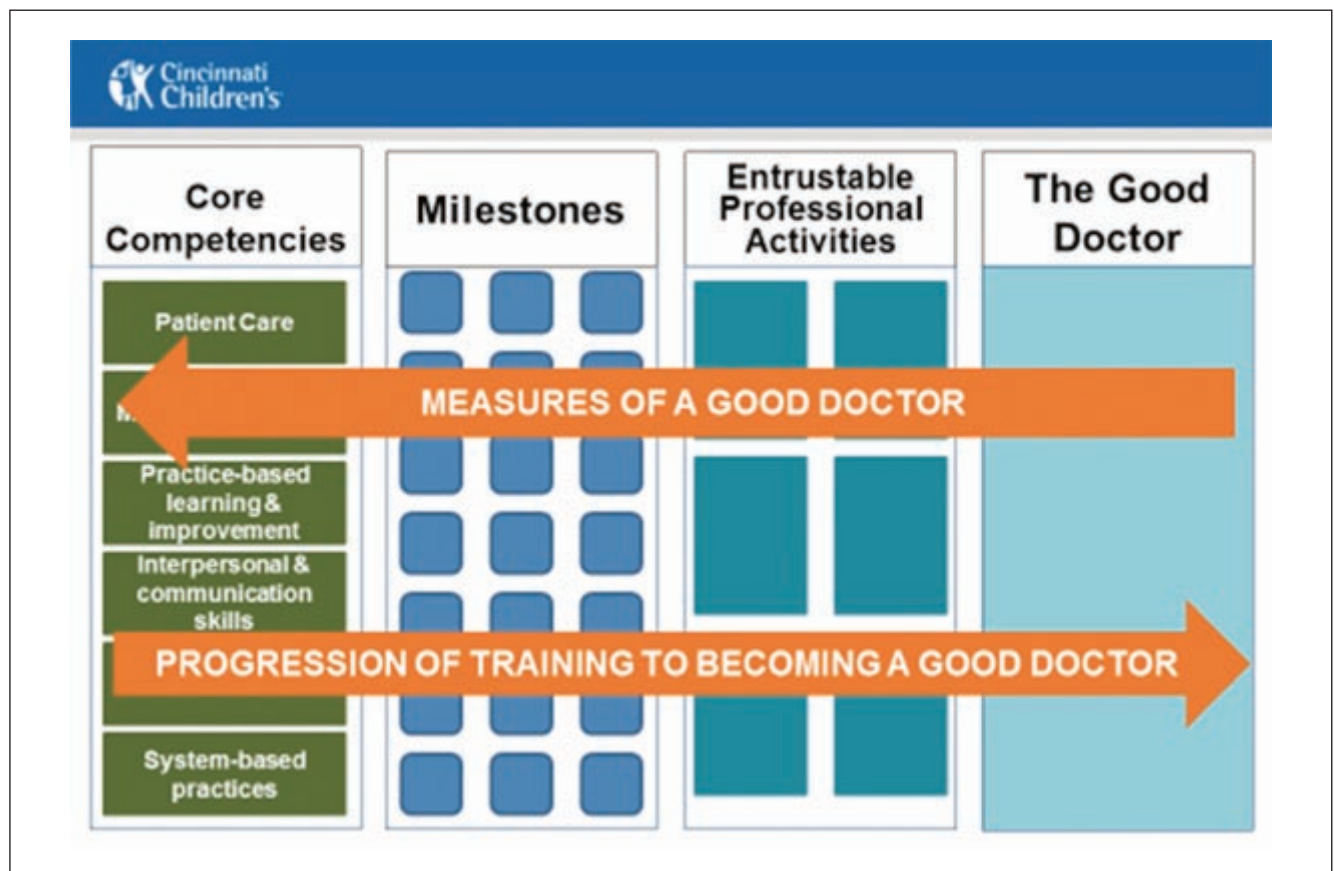


Figure 1 Interaction between core competencies and training of the "Good Doctor".

and measures a trainee must go through to become that good doctor.

In 2013, the ACGME instituted a major change in the process of accrediting physician training program in the United States, a change known as the Next Accreditation System (NAS). Many of these changes were based in part on a practical application of andragogy and more focused on trainee outcomes and feedback rather than extensively described program elements. As such, the frequency of site visits of the programs was decreased from 1-5 years previously to every ten years unless performance tracking systems indicated issues that needed to be addressed sooner. Those performance measures include the results of annual surveys of trainees and faculty, semi-annual reports on trainee progress on milestones, board scores, and annually reported faculty scholarly activity and board certification. The very specific and proscriptive requirements for program elements have been replaced with fewer required "core" elements and more flexibility for innovation resulting in better trainee outcomes. All these changes were designed to create a learning environment that has more flexibility and support for individualised learning experiences that recognises resident and fellow trainees as adult learners.

To reinforce this concept of an environment that enhances the learning experience of trainees, the ACGME also instituted the Clinical Learning Environmental Review (CLER) site visits. These occur every 1½ to 2 years at all institutions with ACGME programs and their findings are reported to the head of the institution and the medical education leadership. Spending two long days at the institution meeting spontaneously with trainees, faculty and support staff, they inquire about integration of trainees in to safety and quality improvement activities, their supervision, transitions in care, duty hours especially with regard to fatigue management and mitigation, and professionalism. As noted, the emphasis is on assessment of whether there is a supportive learning environment and although this evaluation is currently not factor in program accreditation it may be so in the future.

Finally with regard to attention to andragogical concepts in medical education, particularly graduate medical education, are the ACGME requirements for trainee and program evaluation. The ACGME states "the (training) program must demonstrate that it has an effective plan for assessing (trainee) performance throughout the program and for utilising assessment results to improve (trainee) performance." This plan should include: use of dependable measures to assess residents' competence in patient care, medical knowledge, practice-based learning and

improvement, interpersonal and communication skills, professionalism, and systems-based practice – i.e. milestones; mechanisms for providing regular and timely performance feedback to residents; and a process involving use of assessment results to achieve progressive improvements in residents' competence and performance. In all situations the learner is encouraged to be an active participant in the process and development of an action plan to address deficiencies. For program evaluation, the ACGME states that the residency program should use resident performance and outcome assessment results in their evaluation of the educational effectiveness of the residency program and have in place a process to use those assessment results together with other program evaluation results to improve the residency program. Both trainee and program requirements have elements of self-evaluation which are used to address self-directed improvements in performance motivated by real life/work engagement – hallmarks of andragogy.

Medical education in the United States has a long tradition of a pedagogy, being very teacher-centred. The desire and need for physicians to be life-long learners, constantly striving to update their practice of medicine in a rapidly changing health care environment, suggest that a blend of andragogy and pedagogy in the training of physicians is an optimal approach. Such an approach may optimally transition the medical student from a learning environment that by necessity has a more pedagogical approach to a practicing clinician in an environment that encourages self-directed learning and internal motivation. As stated earlier, from a learner who early in training is in many ways a blank slate experientially to a professional who has acquired foundational experiences, and both the skills and love for lifelong learning.

Further Readings

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