

# Team Training of Medical Students in the 21st Century: Would Flexner Approve?

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## Abstract

As the 100-year anniversary of the Flexner Report approaches us, the physician workforce in the 21st century faces a radically different health care environment. To function effectively in this environment, future physicians, including medical students, will need educational programs that incorporate the theory and practice of teams and teamwork. Medical school graduates will be expected to understand how teams function and be capable themselves of functioning in a team. They will need to be competent in the

knowledge, skills, and attitudes of teams and teamwork.

Numerous reports during the past 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. Hospital training programs have begun implementing interdisciplinary team training around high-risk scenarios for their trainees and staff.

However, for most medical schools, competence in team training has not

been an instructional objective of educating medical students. Most instruction has been individual learning (i.e., lectures) or group learning (i.e., team-based or problem-based learning) even though there is strong evidence for team learning to be effective. With the ongoing changes in health care, it is argued that Flexner would concur that team training is necessary for medical students.

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**T**he physician workforce of the 21st century faces a radically different health care environment than did physicians caring for patients or doing research in the previous century. Today, physicians are expected to become part of interdisciplinary health care teams, and researchers (including physician scientists and translational scientists) are expected to become part of multidisciplinary research teams. Therefore, the required educational programs for all physicians, including medical students as future physicians, will need to incorporate the theory and practice of teams and teamwork.

For years, team training has been a hallmark of educational programs in at

least half of all U.S. business schools. Leading corporations have long realized that employees skilled in forming, working on, and leading teams make for a more successful, effective, and productive company. To reduce accident rates, both the aviation and nuclear reactor industries have, for 30 years, mandated team training in simulated scenarios involving complex and potentially high-risk endeavors. Implementation of such programs resulted in a dramatic decrease in errors and a markedly improved safety record for both industries. The military services, as well as domestic emergency responders such as emergency medical technicians and fire and rescue squads, use team training to achieve key goals and to create a safe working environment.<sup>1</sup>

Here, we discuss the culture change occurring in health care and why this change may necessitate team training for all future physicians. We define what constitutes a team and teamwork and explore the implications of learning in teams. A brief description of existing team training programs in undergraduate medical education and graduate medical education (GME) is provided. Looking to the future, we discuss the rationale for team training in medical school and why Flexner would concur that team training is integral to medical education.

## Paradigm Shift to Teams: Why Is It Necessary?

For most medical schools in the United States and Canada, the model for medical education during the 20th century follows the one articulated in the 1910 report by Abraham Flexner<sup>2</sup> on behalf of the Carnegie Foundation in which he described his vision of the format for medical education: “In general, the four year curriculum falls into two fairly equal sections: the first two years are devoted mainly to laboratory sciences—anatomy, physiology, pharmacology, pathology; the last two clinical work in medicine, surgery and obstetrics.”<sup>2</sup> After the publication of the report, most medical schools embraced this model, and medical education became two years of basic sciences followed by two years of clinical experiences linked primarily to a teaching hospital setting. The report solidified a model in which most of the basic science education content was delivered passively to the individual learner through lectures, and clinical training revolved around acutely ill, hospitalized patients under the care of autonomous, individual physicians.

Medical education has remained somewhat stagnant and has persevered with this model for 100 years. But as the 21st century unfolds, the culture of medicine has changed so significantly that medical education and clinical

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## List 1

**Changes in Physician Culture between the 1910 Flexner Report and 2010****The 20<sup>th</sup> Century Physician**

- Accumulate knowledge
- Individual scholarly work
- Autonomous
- Cooperative
- Individual achievement
- Solo experts (physician-centered)

training must reinvent themselves according to a model different from that of the 20th century if they are to keep pace with the advances in biomedical science and the needs of medical practice.

In his 2007 presidential address to the Association of American Medical Colleges (AAMC), “Culture and courage to change,” Dr. Darrell Kirch<sup>3</sup> addressed “the changing culture” of medicine. The culture change he described was the paradigm shift from the need to be rewarded for one’s personal best to a reward system for one’s team effort (List 1). The 20th-century physician who had been focused on accumulating factual knowledge, had been rewarded with tenure for his achievements, had been supported for autonomous pursuits, and had been placed on a pedestal for being the solo expert in a field even while working in a group practice will be ill equipped to function in a 21st-century health care environment where the expectation for patient-centered quality care will be the norm and teamwork will be rewarded. Therefore, the characteristics of a 21st-century physician will now be totally skewed toward being an effective and competent team player and not an individual achiever. In the clinical setting, interdisciplinary teams of physicians, nurses, and other health care providers will need to work together collaboratively and share accountability

**The 21<sup>st</sup> Century Physician**

- Acquire and use knowledge
- Interdisciplinary research teams
- Collaborative
- Share accountability
- Interdisciplinary teams
- Coordination of care (patient-centered)

for ensuring quality patient-centered care. The same applies to the research enterprise, in which interdisciplinary teams of basic and clinical scientists will need to work together to solve complex research questions. Because no one can possibly learn “everything” anymore, creating lifelong learners who share information with others will be vital.

**What Is a Team? What Is Teamwork?**

Although the word “team” is used without consistency throughout the educational literature, there are certain characteristics common to teams whether they are aircraft flight crews, fire rescue units, or health care providers. Teams consist of two or more individuals, with complementary skills, that have a common commitment and purpose and that have a set of performance goals for which they hold themselves mutually accountable.<sup>4,5</sup> So, simply putting individuals together into a group will not establish them as a functional team (List 2).

Unlike a group that shares ideas and discussions but produces individual work products, a team produces a discrete product that is the joint result of contributions from all of its members and requires both individual and mutual accountability. The essence of a team is a common commitment. Without this, the

group of individuals does not perform as a true team. With it, they become a powerful unit of collective performance.<sup>5</sup> A team is therefore more than the sum of its parts. However, becoming a team takes time and requires the establishment of trust among the team members. Teamwork is a process in which team members interact and collaborate to achieve desired outcomes. To be an effective team member, one has to have a set of knowledge, skills, and attitudes that make that individual a competent team member and make the team function well. As outlined in List 3, necessary competencies for successful teamwork include having an understanding of the tasks, an awareness of other teammates’ strengths and weaknesses, a shared understanding of specific goals or objectives, and a sense of responsibility for the task at hand. A team member must be skillful in resolving conflicts, giving feedback in a direct manner, and being flexible and adaptable. A well-functioning team member will also have a shared vision for the agreed-on goal or mission, mutual trust, and a positive attitude. Most important, successful teams go through various stages of development.

Tuckman<sup>6</sup> described four stages of development that a group goes through to become a team: forming, storming, norming, and performing. During the forming stage, students learn about and gain experience about each other. All tend to be on their best behavior. As they move into the next stage of team development, storming, many students become frustrated with the group process and are unsure of how to resolve conflict. They have difficulties in handling disagreements among team members and are unable to effectively discuss their concerns and develop a consensus. It is at

## List 2

**Comparison of Traits of Individuals, Working Groups, and True Teams as a Paradigm for Learning about Teams****Individual**

- Leader is oneself
- Individual accountability
- Purpose identified by individual
- Individual work products
- Work done on own time and at own pace
- Individual performance assessed
- Does work on own

**Working Group**

- Strong, focused leader
- Individual accountability
- Group’s purpose same as organizational mission
- Individual work products
- Runs efficient meeting
- Performance measured indirectly by its influence on others
- Discusses, decides, and delegates

**Team**

- Shared leadership roles
- Individual and mutual accountability
- Specific team purpose that team must deliver
- Collective work product
- Encourages open-ended discussion and active problem solving meetings
- Performance directly assessed based on collective work product
- Discusses, decides, and works together

## List 3

**Teamwork Competencies****Knowledge Competencies**

Knowledge of team mission and objectives: *Shared understanding of specific goal(s) or objective(s) of team and resources required to achieve these*

Understanding of team members' characteristics: *Awareness of each team member's strengths, weaknesses, and abilities*

Task specific responsibilities: *Distribution of responsibilities according to individual strengths of team members and demands of tasks*

**Skill Competencies**

Mutual performance monitoring: *Tracking of fellow team members' efforts to ensure work is being done*

Flexibility/adaptability: *Ability to recognize and respond to changes or to needs of teammates*

Supporting/back up behavior: *Coaching and constructive criticism provided to teammate to improve performance*

Team leadership: *Ability to direct/coordinate team members, allocate tasks, motivate, plan/organize, assess performance, and maintain a positive environment*

Conflict resolution: *Ability to resolve differences/disputes among team members without causing hostility or defensiveness*

Feedback: *Communication by team members without hostility or defensiveness concerns, suggestions, observations, and requests*

**Attitude Competencies**

Shared vision: *Mutually accepted attitude about team's goals, direction, and mission*

Collective efficacy: *Belief team can perform effectively as a unit*

Mutual trust: *Positive attitude team members have for one another*

Collective orientation: *Belief that team approach is more conducive to problem solving than an individual approach*

Importance of teamwork: *Positive attitude exhibited to work as a team*

this point that the group may wish to dissolve rather than continue as a team. When a group attains an understanding and acceptance of each member and can conduct a discussion in which each member shares information and thinking, the group has reached the norming stage. Once a group has achieved mutual trust of each member and a desire to perform as a unit, they have reached the last stage: performing. Many groups may only achieve the norming stage, and such groups may function quite well as a team.

**Learning in Teams: Is It Effective?**

Consuming information is only part of the learning process because information taken in and stored in short-term memory decays rapidly. That information becomes useful only if it is transferred to long-term memory and can be retrieved when it is needed. Significant learning has occurred only when the amount of information that can be retrieved and used has increased.<sup>7</sup>

In a series of studies involving learning groups, simply hearing someone explain a set of concepts, as in listening to lecture, or reviewing notes that expose a student to new information, seem to have minimal effect on learning.<sup>8</sup> But, 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. Requiring students to apply higher-level thinking skills to the information (i.e., solving problems) further

increased their long-term ability to recall the information.<sup>9,10</sup> Therefore, learning tools, like teaching others and solving problems, that require students to be actively engaged in the education process seem to increase the amount of information one learns. Learning in teams where students work together to solve a problem or learn a complex topic seems to achieve this active engagement.<sup>11,12</sup> These observations further support the concept that medical schools should move away from passive, lecture-based learning and use more active learning formats in either large- or small-group settings. But, it also supports that being competent in the knowledge, skills, and attitudes of teamwork (List 3) is the most effective way to achieve in-depth learning. However, the educational activities for these groups must also be designed to reinforce teamwork.

**Educational Pedagogy: Medical Schools Today**

Presently, the pedagogy of medical education is not geared to team learning. Instead, the three primary instructional methodologies in medical schools today are lectures, lectures followed by small-group workshops, and small-group stand-alone (i.e., PBL) sessions. Lecture-based instruction generally occurs in a large classroom or auditorium setting. A single instructor, usually a content expert, delivers a high volume of content very efficiently over a specific time period. There may be limited learner-instructor interaction depending on the amount of time devoted to questions and answers. The student-to-faculty ratio can

be high—around 200:1 at larger institutions.

As an alternative to a primarily lecture-based curriculum, many schools offer lectures followed by small-group, faculty-led workshops where students discuss, analyze, and solve case-based scenarios. Workshops facilitated by expert faculty can promote active learning among students while ensuring that the learning is accurate. The student-to-faculty ratio can be as low as 4:1, but it hardly ever exceeds 20:1. Most of the time, students participate as individual learners.

PBL—learner-led small-group learning—contrasts with the other two models.<sup>13</sup> In this model, learners work to solve problems, but they must first identify the important facts and deficiencies in their knowledge. Between sessions, learners become aware of their deficiencies and are better able to address their problems in follow-up sessions. The PBL instructor is not usually a content expert, but he or she assists the learning by fostering good group process and helps learners identify their deficiencies. The student-to-faculty ratio is also generally low, usually between 4:1 and 10:1. Students participate as individual learners but also as part of a group.

However, even though most medical schools have small-group workshops and PBL sessions with groups of students learning together, these learning environments in medical school do not usually fit the model of true team learning: teams of students working

together toward a common goal with each student contributing toward that goal (List 2). In team learning, each team, not just individual students, must be assessed for achieving the correct answer and functioning as an effective team.

### Health Care Environment Takes the First Steps

Most, if not all, of health care team training today occurs in teaching hospitals, the setting responsible for training future physicians and nurses, faculty, and other support staff. The impetus for initiating team training for health professionals lies in numerous reports published since 1999 that show the majority of medical errors over this time period have been the result of health system failures rather than substandard performance of individual caregivers. The seminal Institute of Medicine report, *To Err Is Human: Building a Safer Health System*, recommended establishing interdisciplinary team training programs as a way to decrease medical errors and increase patient safety.<sup>14</sup> Other reports that followed emphasized the “imperative need to embed” team training throughout a health care provider’s career,<sup>4</sup> encouraged the move to a more multidisciplinary and team-based approach,<sup>15</sup> and concluded that teamwork is essential for optimizing quality and safety<sup>16</sup> and essential for the care of patients with complex problems.<sup>17</sup>

Hospitals responsible for training physicians, nurses, and other support staff have responded to these calls for action and have developed and implemented a number of medical team training programs. Some of these programs are domain-specific (anesthesia departments); others are multidisciplinary (trauma, transplant, operating room); some rely on state-of-the-art simulators (critical care); and others rely primarily on classroom instruction. Despite these differences, each of these programs has been based on crew resource management (CRM) programs, the team training strategy from the aviation industry that has successfully improved aviation safety for more than 30 years. CRM training has resulted in heightened safety awareness, improved communication, coordination, and decision-making behaviors, and enhanced error-management skills.<sup>18,19</sup> Recent studies suggest that CRM training

cultivated positive reactions to teamwork concepts, increased knowledge of teamwork principles, and improved teamwork performance in a situational simulator.<sup>20</sup> After CRM team training, commercial flight crews made substantially fewer errors than crews that did not go through such training.<sup>21</sup> Most medical team training programs use the principles of CRM training with the ultimate goal of reducing the number and severity of medical errors in their specific discipline.

Anesthesia and emergency medicine departments were among the first responders in the health care community to develop and implement medical team training programs based on the CRM training model. The Anesthesia Crisis Resources Management program developed at Stanford University and Palo Alto Veterans Affairs Medical Center,<sup>22</sup> and implemented at Penn Medicine and Harvard,<sup>4</sup> placed anesthesiologists in multidisciplinary teams that included physicians, nurses, technicians, and other medical professionals to better manage crises. Teamwork training enabled the anesthesia team to better prepare for adverse occurrences in the clinical environment and to work effectively with different personalities. In emergency departments, the MEDTeams program was implemented to reduce medical errors through the use of interdisciplinary teams. MEDTeams training promoted cooperation and shared responsibilities among physicians, nurses, technicians, and other key constituencies.<sup>23</sup> More recently, the TeamSTEPPS program (Team Strategies and Tools to Enhance Performance and Patient Safety) developed by the Department of Defense Patient Safety Programs, in collaboration with the Agency for Healthcare Research and Quality, has created a teamwork training system designed to improve quality, safety, and efficiency of health care. TeamSTEPPS provides an evidence-based and field-tested set of teamwork care competencies with identified knowledge, skills, and attitudes and an accompanying comprehensive set of tools and strategies to implement successful changes.<sup>24</sup>

TeamSTEPPS has been implemented throughout U.S. health systems in numerous emergency medicine departments, operating rooms, labor and

delivery units, intensive care units, and clinical units in medical centers and has seen improved patient outcomes. Unfortunately, medical students do not usually participate in these team training programs because they are not official members of hospital teams. Therefore, the vast majority of medical students graduate with little or no team training hospital experiences. But, because team training is required for all hospital trainees in GME programs, it is only a matter of time before GME program directors will expect future medical student graduates to be competent in the knowledge, skills, and attitudes for teams and teamwork. In fact, the Accreditation Council for Graduate Medical Education recently required surgical residents to demonstrate several teamwork-related competencies. These competencies included effective communication with patients and families, patient counseling and education, cooperative work-sharing with health care professionals, and the ability to instruct students and other health care professionals.<sup>25</sup> In addition, the AAMC funded an investigation to identify successful and unsuccessful behaviors (critical incidents) that regularly emerged during medical school and residency training.<sup>26</sup>

### Teams in Medical Schools

#### What exists today

Most medical schools do not have the faculty expertise to implement a team training program by themselves. In fact, most team training for medical students occurs around high-fidelity simulators where students practice responding to rare and potentially life-threatening events in a safe and controlled environment. Though the simulation sessions are often referred to as “team training,” they are generally not designed to achieve the team training competencies outlined in List 3.

In 2004, educators at the University of Pennsylvania School of Medicine (SOM) decided to partner with the University of Pennsylvania Wharton MBA program, which has had a successful team training and leadership program for their MBA students for more than 10 years. A jointly designed, mandatory, longitudinal, four-year team training and leadership program for all medical students was implemented in 2005 in the SOM. The purpose of this program was to prepare

medical students to be competent in the knowledge, skills, and attitudes of teams and teamwork. The program is implemented at a two-day retreat during orientation to medical school, keeps students in the same teams of six or seven for all four years, and embeds team learning activities for student teams throughout the four-year curriculum. All educational activities emphasize and reinforce team and teamwork competencies in addition to curricular content. But, even with a business school partner, implementation of this program required a faculty development program and additional administrative infrastructure to support it. Most important, it only succeeded because of an underlying commitment by SOM faculty that team training should be a medical school competency.

Using the TeamSTEPPS program is another example of how to implement team training in medical schools. Emory University School of Medicine and the Woodruff School of Nursing<sup>27</sup> have used TeamSTEPPS for teaching handoffs and some components of team training during an interprofessional team training scenario. All third-year medical students and fourth-year nursing students are required to participate together in this team training activity.

### The future

The physician of the next century will face both complexities and opportunities that will transform health care. When Abraham Flexner led the reform movement of the early 20th century, the goal was to transform the physician from an unscientific, idiosyncratically trained individual into a scientifically trained clinician. Medicine was about to experience a revolution in understanding the nature of disease and a dramatic expansion in the diagnostic and therapeutic tools at the physician's disposal. The physician of the 21st century will face a very different set of challenges with an emphasis on coordinating the care of patients and the application of an array of technologies that will require teams of experts and support staff for their successful implementation.

Flexner brought the model of the scientifically trained and highly knowledgeable physician to medical care. In his time, the only repository of

medical knowledge was the bulky text on the library shelf. Given the limited technologies available to physicians, the physician was primarily a diagnostician whose encyclopedic knowledge of the manifestations of disease was the measure of his worth. Teamwork was of no real value. The physician described and prescribed, often only comforting patients. Physician autonomy and the medical hierarchy fortified this model and further reinforced the view for both the patients and the physicians that the physician was the captain of a team of one.

The future of medical care will more and more resemble some of the innovative approaches now developing in the United States where nurses, physicians, doctors of pharmacy, social workers, and other technical staff are all not only resources for the physician—decision maker but actually are responsible for key decisions in the patient's care. Two factors have come together to create this new dynamic. First, the knowledge base previously residing in the physician's memory is now available on multiple computer work stations in each office and central station on a clinical unit. The diffusion of this information empowers all the members of the team. Second, the complexity of care including detailed hemodynamic monitoring, a vast array of pharmaceuticals and biologics, a large variety of imaging techniques, and the high degree of clinical specialization of modern medicine all demand that no one individual can provide all the care that patients require.

Health care reform proposals such as HR 3200 and the American's Healthy Future Act of the Senate Finance Committee have incorporated some of these factors into new models of care that emphasize teams of caregivers rather than individual physicians providing care. Accountable care organizations are defined in the legislation as teams of physicians combined with hospitals that, to assume the care of patients, are reimbursed as a single entity and are jointly responsible for clinical outcomes. Also, HR 3200 endorses a demonstration project termed "The Medical Home," a coordinating entity composed of specialists as well as a team of primary care physicians to provide comprehensive and longitudinal care. These models describe a potential revolution in medical care that will require a revolution in medical training.

Our team-based curriculum is designed to create a sense of responsibility in the team, not only for creating presentations and carrying out simulated patient interactions but also for actually developing a team knowledge base. A key to the future health care system will be to create entities for which the collective group knowledge and expertise far exceeds that of any individual in the group and actually exceeds the sum of the knowledge of the individuals in the group. The only way to inculcate this ethos in the team is for medical schools to value assessing and affirming the competence of each student as he or she functions as a member of a team. This requires team-based exams and a school's willingness to accept the team's performance as an indicator of the competence and knowledge base of individual team members. Individual assessments will always be necessary, but the success of the team should be valued as equal to the success of the individual. These training experiences will be crucial for the 21st-century physician.

How might Flexner view the development of team-based studies and assessments? First, he would likely stress the need for a scientific base for the team activity. Although there is a "technology" we have described for successful team interactions, such interactions are primarily focused on social and collegial activities. Flexner would expect a scientific knowledge base to characterize the team and therefore would likely endorse team summative assessments to verify mastery of a complex topic. He would likely support the idea of assessing competency of a student to be a capable team member as much as a capable consumer of scientific information. He would likely press for an increased emphasis on training in the scientific basis for error reduction, an effort that is at its heart a team-based initiative.

In reality, some elements of the future are already here. An example has recently been described by John Toussaint writing about ThedaCare, a four-hospital health care system in northeastern Wisconsin that transformed care delivery for patients with acute myocardial infarction (AMI). The American College of Cardiology goals for the delay between a patient entering the emergency room with an AMI and an angioplasty procedure should be 120 minutes; ThedaCare was hitting that mark

70% of the time. Then, ThedaCare empowered teams to examine and improve the process. The results are dramatic. Initially, after an emergency room doctor diagnosed a heart attack in progress, he or she would phone a cardiologist to come to the emergency room, reexamine the patient, and make an independent diagnosis before calling in the cardiac catheterization team and preparing a room for surgery. The team analysis realized that the emergency room physicians could accurately diagnose heart attacks and included them as part of the overall heart attack treatment team. It empowered them to order the cardiac catheterization. ThedaCare's average time between a patient entering the emergency room with an AMI and an angioplasty procedure is now 37 minutes.

In this example, the team uses its collective knowledge and expertise to treat a patient with an AMI. Medical students must learn this approach and must understand its potential in high-stakes circumstances. Future medical education must inculcate these approaches so that an achievement like ThedaCare's approach to the treatment of AMI is not exceptional but, rather, is the norm of American medical care. Abraham Flexner would heartily approve of that development.

## Conclusion

It seems fairly certain that team-related competencies will have to be embedded into educational programs at medical schools. The recommendation for the need for team training by national organizations overseeing health care in this country and, as a result, the implementation of team training for hospital physicians, trainees, and staff across many disciplines, has highlighted a new competency for graduating medical students. Exactly how to embed the concept of teams and teamwork into medical school curricula is the question, because most medical school instruction is delivered to groups, not true teams, of students.

As the paradigm for learning and patient care continues to move toward teams and

teamwork training, medical schools will have no choice but to accept the inevitable: Team training must be embedded in medical school education.

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