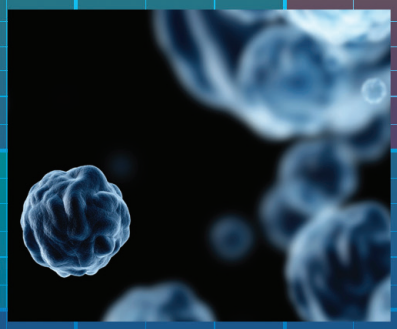
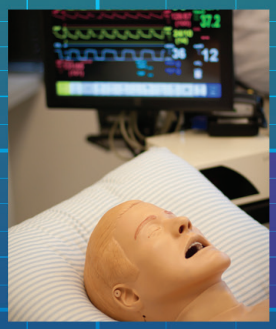
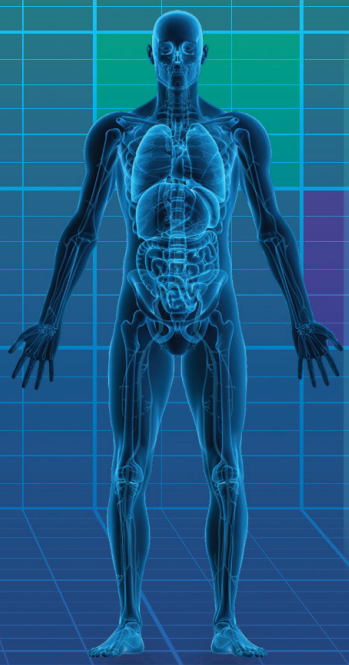
AAMC

Tomorrow's Doctors, Tomorrow's Cures®

Medical Simulation in Medical Education: Results of an AAMC Survey







September 2011

Learn

Serve

Lead

Association of
American Medical Colleges

Medical Simulation in Medical Education: Results of an AAMC Survey

September 2011

Authors

Morgan Passiment
Director, Information Resources Outreach and Liaison
AAMC

Heather Sacks
Director, Planning & Administrative Affairs
AAMC

Grace Huang, M.D.
Director of Assessment Carl J. Shapiro Institute for Education and Research
Harvard Medical School and Beth Israel Deaconess Medical

Overview

Simulation is arguably the most prominent innovation in medical education over the past 15 years. Events such as the creation of an academic society dedicated to simulation, the inauguration of a simulation journal, unprecedented Agency for Healthcare Research and Quality grant awards totaling $5 million, and the proliferation of simulation-based literature and research have all heralded the promise of simulation as a keystone of health profession education and patient safety. It is commonly asserted, albeit with limited substantive data, that every hospital and other health professional training institution has either a simulation center, simulation equipment, or a simulation-based educational program. Since the Institute of Medicine released *To Err Is Human: Building a Safer Health System* in 2000 patient safety and medical errors have been the focus of many national initiatives. Simulation has the potential to revolutionize health care and address the patient safety issues if appropriately utilized and integrated into the educational and organizational improvement process.[i]

A significant amount of research evidence supports the benefits of simulation.[ii] Simulation is a well-established tool for training personnel in aviation, the military, and industry and is rapidly being transferred to medicine. A glimpse of simulation integration into medical education is seen in the LCME Part II Medical School Questionnaire, which indicates a 19% increase in computer simulation use over the last 7 years. However, the extent to which simulation technology is available and used in academic medicine has not previously been assessed. Catalogues of simulation activities have been, to date, largely voluntary or limited in scope.

The AAMC (Association of American Medical Colleges), working jointly with the Society for Simulation in Healthcare (SSH), the Association for Standardized Patient Educators (ASPE), and the American Association of Colleges of Nursing (AACN) developed a survey to better understand how medical schools and teaching hospitals are using simulation for education and assessment and determine the operational impact of simulation at AAMC-member institutions.[iii]

Purpose of the Survey

The purpose of the survey was to assess the current state of simulation in medical education by defining how and where institutions are using simulation for academic purposes. The survey provided an opportunity to develop a framework for operational attributes of simulation programs and centers utilized by the academic medical community. Although used to assess AAMC-member medical schools and teaching hospitals, the survey was designed in collaboration with other organizations with the intent that it could be easily modified for use with other communities.

Methodology

For purposes of the survey, simulation was defined as a method used in health care education to replace or amplify real patient experiences with scenarios designed to replicate real health encounters, using lifelike mannequins, physical models, standardized patients, or computers. A full listing of definitions used in the survey can be found in Appendix A.

The survey was distributed to 133 AAMC-member medical schools and 263 teaching hospitals January through March of 2010. Responses for 14 institutions that replied for more than one program were combined and 3 duplicate responses were removed. The combined cohort used for analysis included 90 (68% response rate) medical schools and 64 (24% response rate) teaching hospitals. Three hospitals indicated they are in the planning stages therefore did not complete the entire survey. Not all organizations responded to all questions. In some cases, a non-response was because the medical school or teaching hospital does not provide a particular service; in other cases, the respondent did not know the answer. A list of participating medical schools and teaching hospitals may be found in Appendix B.

Learner Audience and Content

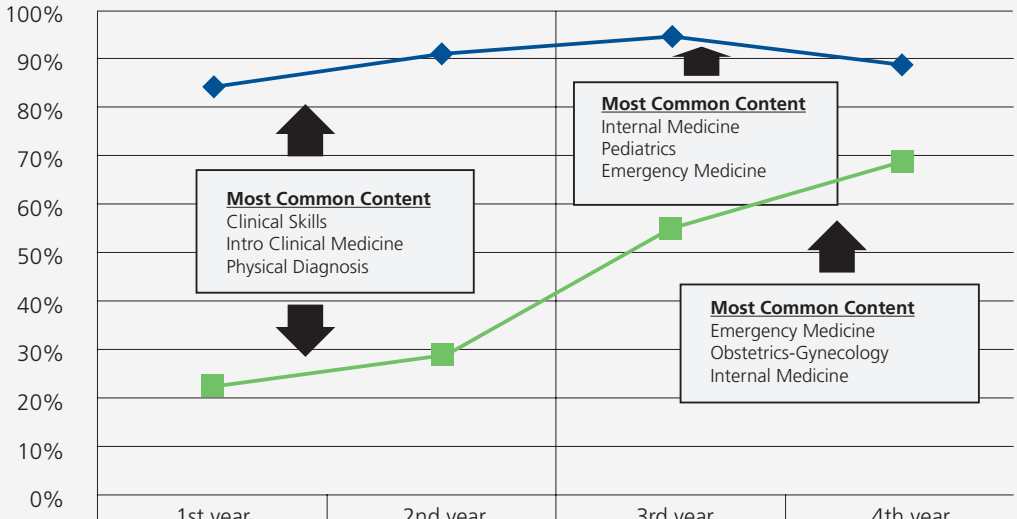
Several questions in the survey sought to gauge the target audience for simulation, which included medical students in an M.D.-degree granting program, medical students in a D.O.-degree program, residents, fellows, and physicians. This section also inquired about other health care professionals and non-health-related professionals that use the same simulation facility.

Participants were asked to select from a list of content topics in four areas: preclinical, clerkship, residency, and subspecialty. Medical schools indicated teaching content through all four stages. Hospitals indicated content mainly in residency and subspecialty topics. Throughout all the content areas, the most common content areas using simulation as a learning modality are internal medicine, emergency medicine, obstetrics-gynecology, pediatrics, surgery, and anesthesiology.

Respondents were asked to identify simulation utilization by year during the four-year undergraduate medical education program. Figure 1 shows all 90 medical schools responding indicated they use simulation at some point during all four years of undergraduate medical education. All 64 teaching hospitals indicated that they provide simulation-based education for medical students at some point in the four years. Medical schools indicated the use of simulation fairly consistently across all four years. Teaching hospitals indicated the use of simulation with medical students primarily during the third and fourth years.

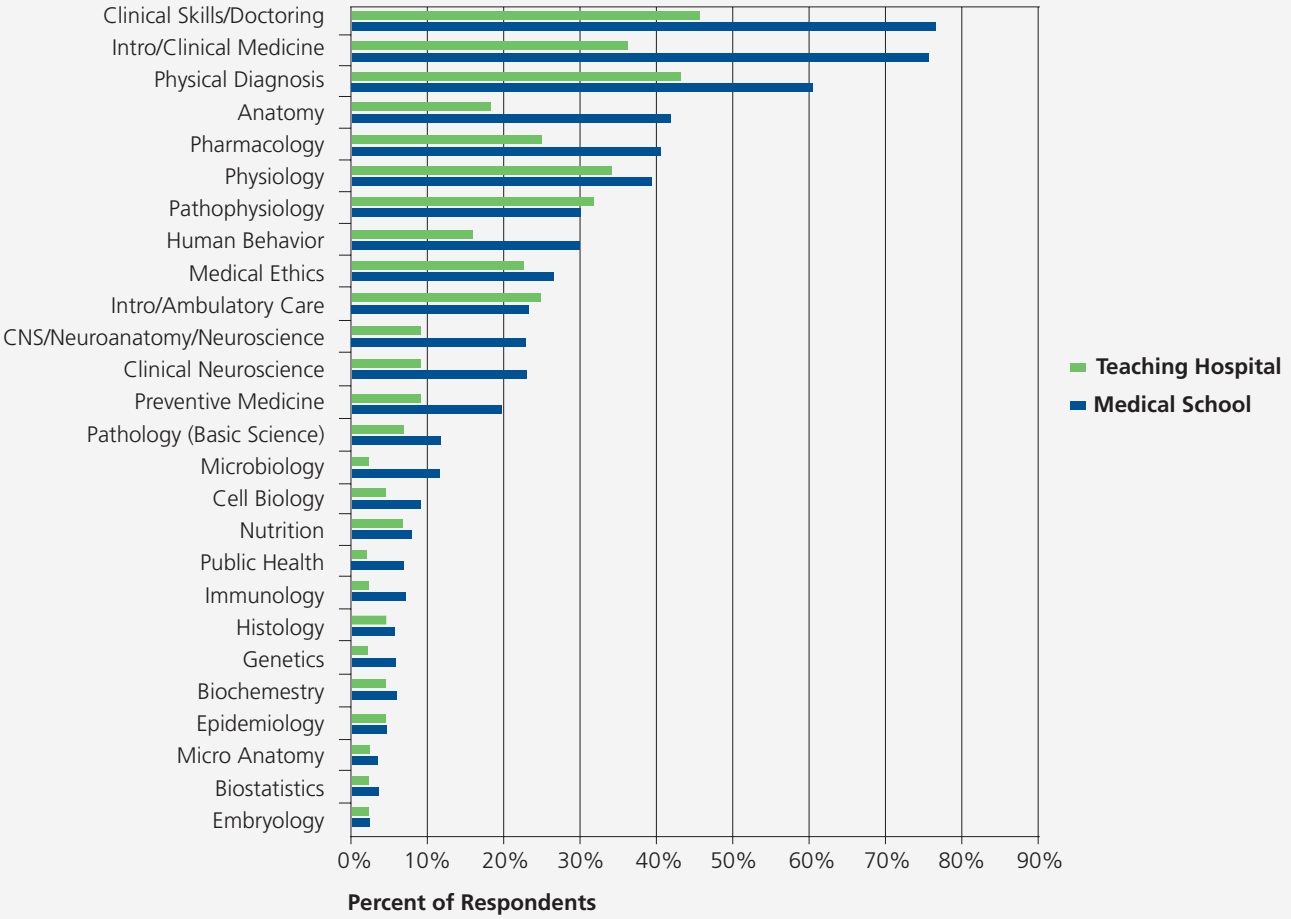
The most often cited preclincial content was similar for both medical schools and teaching hospitals. There was a slight variation in the clerkship content priorities between medical schools and teaching hospitals.

Figure 1. Simulation Use with Medical Students



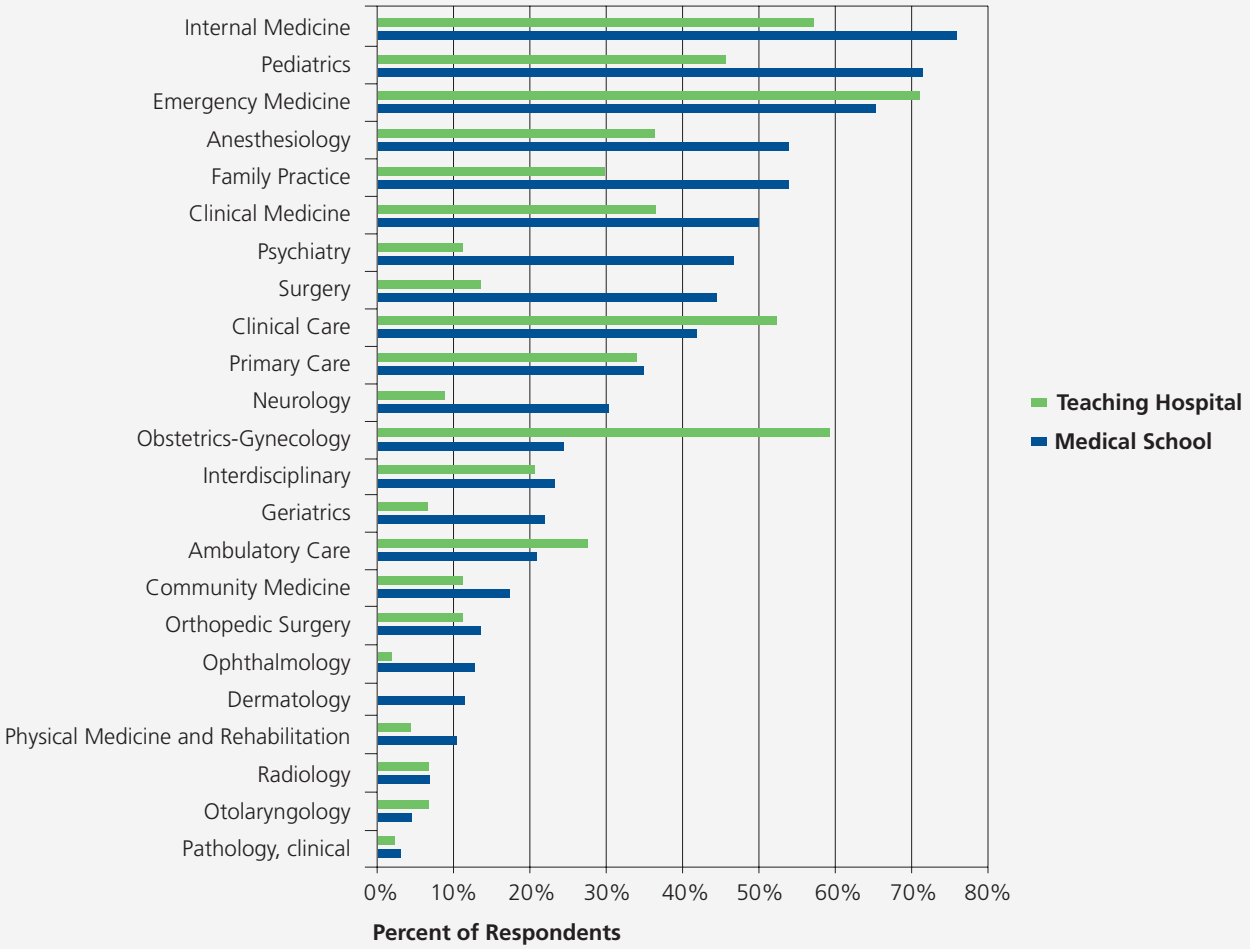
	1st year	2nd year	3rd year	4th year
Medical School	84%	91%	94%	89%
Teaching Hospital	22%	28%	55%	69%

Figure 2. Preclinical Content



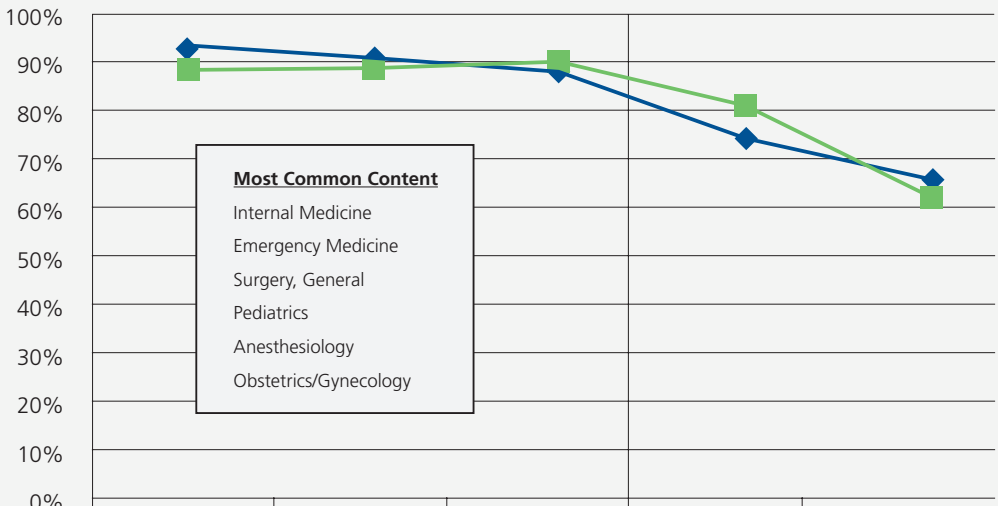
Participants were asked to indicate all preclinical content areas where simulation is used. In the preclinical courses, simulation was most often used for both medical schools and teaching hospitals in the areas of clinical skills/doctoring, intro/clinical medicine, and physical diagnosis. Eighty-six of the 90 participating medical schools indicated they use simulation content in the courses at the preclinical level. Forty-four of 64 participating teaching hospitals indicated they use simulation content at the preclinical level as depicted in Figure 2. At the preclinical stage, there is strong emphasis on using simulation to build medical knowledge.

Figure 3. Clerkship Content



Participants were asked to indicate all clerkship content areas where simulation is used. In the clerkship coursework, 86 of the participating 90 medical schools indicated they use simulation, while 44 of the 64 hospitals responded they use simulation (Figure 3). The most common clerkship content areas for medical schools are internal medicine, pediatrics, and emergency medicine. Teaching hospitals indicated emergency medicine, obstetrics-gynecology, and internal medicine as the most common clerkship content areas utilizing simulation.

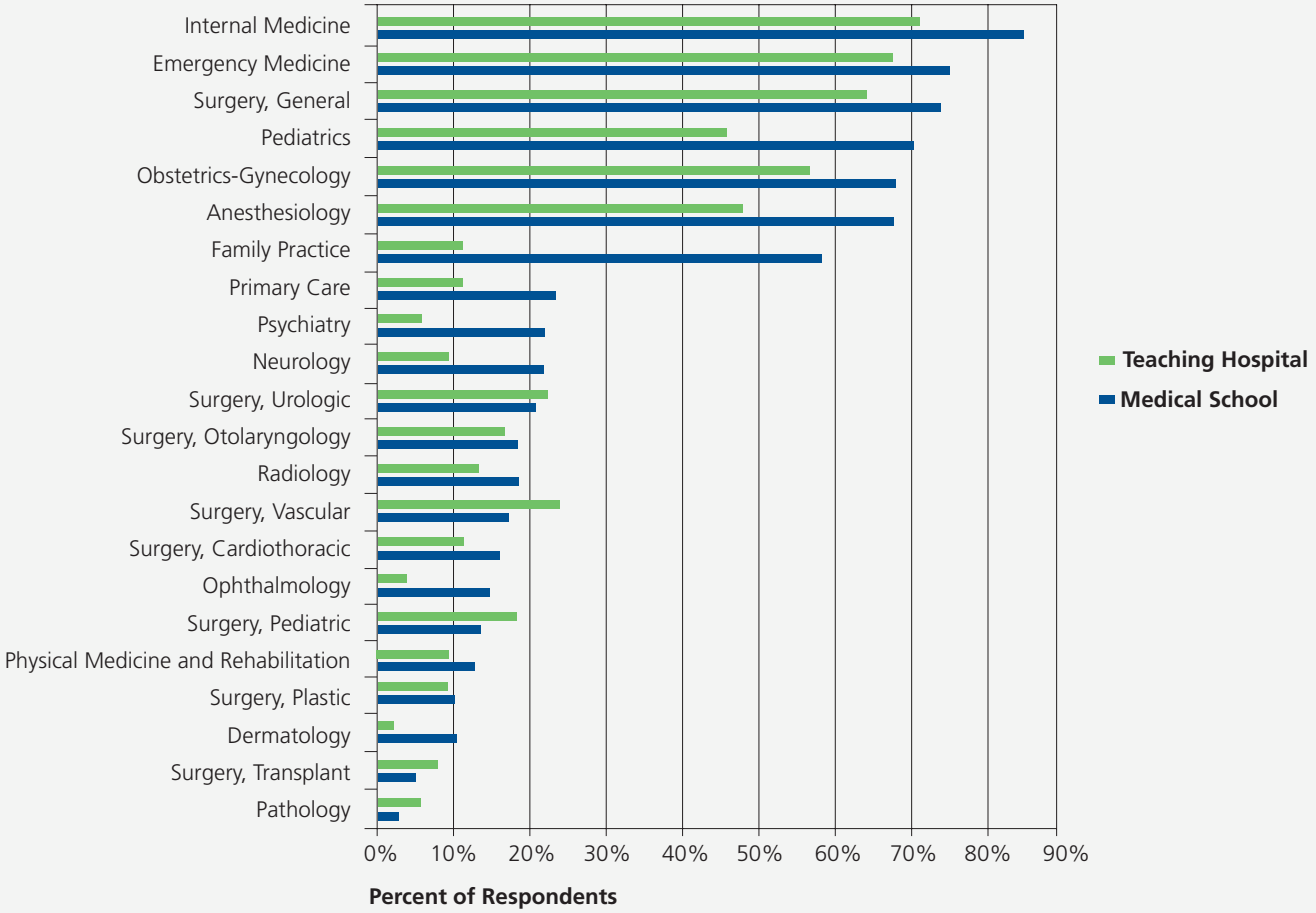
Figure 4. Simulation Use with Residents



	1st year	2nd year	3rd year	4th year	5th year
Medical School	93%	91%	89%	74%	66%
Teaching Hospital	89%	89%	91%	81%	63%

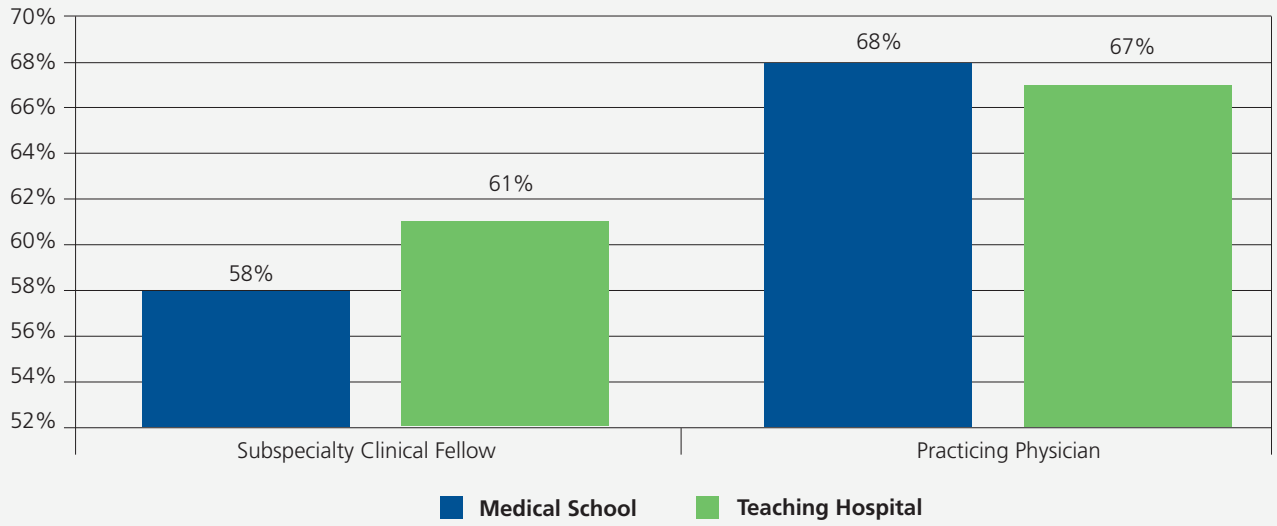
Participants were asked to indicate where simulation is used in residency training. Of the 90 participating medical schools, 83 indicated some use of simulation across a five-year span of residency education and 55 of the 64 participating teaching hospitals indicated use of simulation (Figure 4). Both medical schools and teaching hospitals show similar high levels of simulation use for residency training across the first three years. The use of simulations declines through the third and fourth years at both medical schools and teaching hospitals.

Figure 5. Resident Content



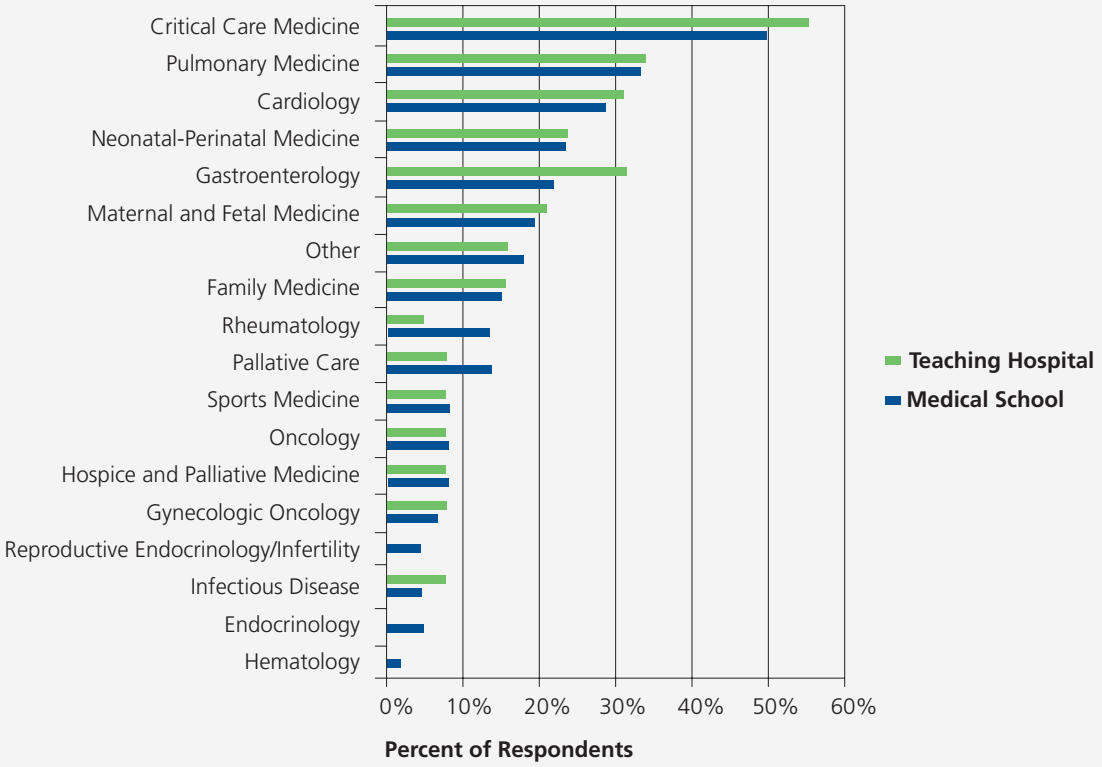
Participants were asked to indicate all content areas where simulation is used. In the residency program coursework, 83 of the 90 participating medical schools indicated the use of simulation; while 55 of 64 of participating teaching hospital indicated the use of simulation (Figure 5). Medical schools indicated most residency teaching that uses simulation takes place in internal medicine, emergency medicine, general surgery, and pediatrics content areas. Teaching hospitals indicated similar content priorities with obstetrics-gynecology more common than pediatrics.

Figure 6. Subspecialty and Physician Training Use of Simulation



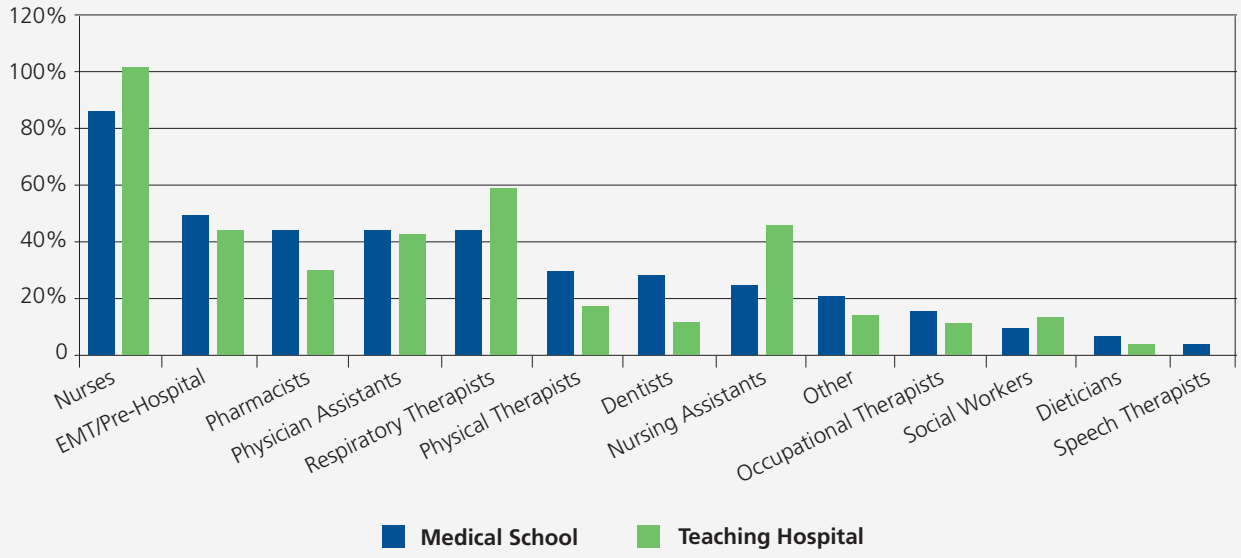
Participants were asked to note if they used simulation for subspecialty and practicing physician training. Of the respondents, 52 of 90 medical schools and 39 of 64 teaching hospitals indicated use of simulation for subspecialty clinical fellows' training. Use of simulation for practicing physicians is taking place at 61 of 90 medical schools and 43 of 64 teaching hospitals that reported data (Figure 6).

Figure 7. Subspecialty Content



Participants were asked to indicated all content areas in subspecialty training where simulation is used. In the subspecialty fellowship content coursework section, 72 of the 90 participating medical schools and 38 of the 64 reporting teaching hospitals indicated use of simulation (Figure 7). The survey did not ask respondents about coursework or continuing education content for practicing physicians. The "Other" content included pediatric emergency medicine, oral surgery, surgical critical care, urogynecology, and wilderness medicine.

Figure 8. Other Health Professionals



Respondents were asked to note other health professionals who take part in simulation programs at either the medical school or teaching hospital. Eighty-four of 90 medical schools and 54 of 64 teaching hospitals responded that other health professionals participated in simulation initiatives (Figure 8). The most common roles listed in the "Other" category were nurse practitioners and nurse anesthetists. Respondents also indicated several nonclinical roles that use simulation including chaplains, genetic counseling, risk management, volunteers, and industry.

Use of Simulation for Education and Assessment

Through a series of questions, the survey attempted to assess the current state of simulation use for education and assessment. The questions used the Accreditation Council for Graduate Medical Education (ACGME) competencies of medical knowledge, patient care, interpersonal communication skills, professionalism, practiced-based learning and improvement, and system-based practice along with four additional skills: psychomotor tasks, leadership, team training, and critical thinking/decision making. These categories were examined for multidisciplinary and interprofessional teaching models as well as uses for education, assessment, and research. This section reveals that simulation is still very much a learning tool to develop and assess skills of learners, and has not yet evolved into an organizational improvement tool.

Figures 9-14 are visual representations of the associated tables to illustrate the penetration of simulation across the competencies for each area of use. The center of the graph represents 0 percent and the percentages increase by 20 percent as the rings progress outward with the outside ring representing 100 percent.

Figure 9. Medical School Use of Simulation

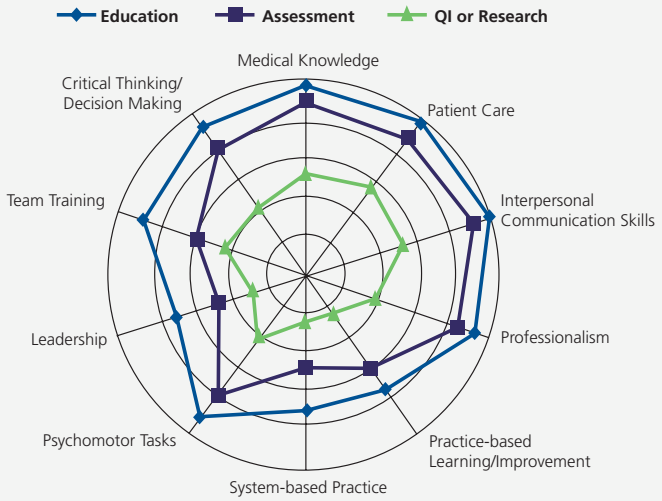


Table 1. Medical School Use of Simulation

	Education	Assessment	QI or Research
Medical knowledge	(86) 96%	(80) 89%	(46) 51%
Patient care	(88) 98%	(78) 87%	(50) 56%
Interpersonal communication skills	(88) 98%	(81) 90%	(47) 52%
Professionalism	(83) 92%	(75) 83%	(34) 38%
Practice-based learning/ improvement	(65) 72%	(53) 59%	(22) 24%
System-based practice	(63) 70%	(42) 47%	(22) 24%
Psychomotor tasks	(81) 90%	(68) 76%	(37) 41%
Leadership	(62) 69%	(41) 46%	(25) 28%
Team training	(78) 87%	(52) 58%	(40) 44%
Critical thinking/ Decision making	(82) 91%	(72) 80%	(38) 42%
Overall Usage	86%	71%	40%

Medical schools were asked to indicate if simulation was used across three domains: education, assessment, and quality improvement or research (Figure 9). All 90 respondents answered this question. Overall responses demonstrate simulation is largely used for educational purposes at a usage rate of 86 percent, across all competencies; less so for assessment at 71 percent; and much less frequently for quality improvement and research at only 40 percent (Table 1). As illustrated in figure 9 the medical school markers for education and assessment approach the outer edge of the circle indicating close to 100 percent usage of simulation across many of the competencies that represent core undergraduate learning. As the markers move closer to the center

this indicates less usage of simulation although this may also represent less focus within the medical school on certain competencies. The markers for quality improvement and research remain grouped around the center of the graph indicating simulation is less often used for these purposes. Responses indicate schools are using simulation often across four of the ACGME competencies of medical knowledge, patient care, interpersonal communication skills, and professionalism for education and assessment.

Figure 10. Teaching Hospital Use of Simulation

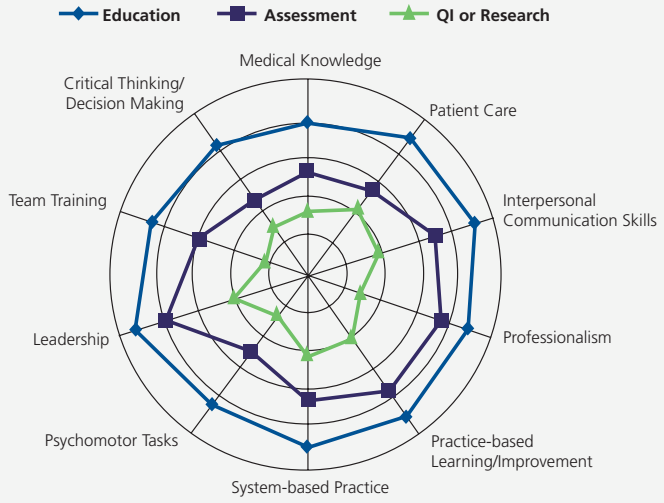


Table 2. Teaching Hospital Use of Simulation

	Education	Assessment	QI or Research
Medical knowledge	(50) 78%	(34) 53%	(21) 33%
Patient care	(57) 89%	(35) 55%	(28) 44%
Interpersonal communication skills	(59) 92%	(44) 69%	(25) 39%
Professionalism	(57) 89%	(47) 73%	(19) 30%
System-based practice	(58) 91%	(47) 73%	(26) 41%
Practice-based learning/ improvement	(57) 89%	(41) 64%	(27) 42%
Psychomotor tasks	(53) 83%	(31) 48%	(16) 25%
Leadership	(59) 92%	(48) 75%	(25) 39%
Team training	(54) 84%	(36) 56%	(14) 22%
Critical thinking/ Decision making	(52) 81%	(30) 47%	(19) 30%
Overall Usage	87%	61%	34%

Teaching hospitals were asked to indicate how simulation was used across the three domains of education, assessment, and quality improvement or research (Figure 10). All 64 respondents answered this question. Similar to medical schools, overall responses demonstrate simulation is largely used for educational purposes at 87 percent average usage across all competencies, less so for assessment at 61 percent, and much less frequently for quality improvement and research at only 34 percent (Table 2). Figure 10 points out that teaching hospitals have a slightly different competencies focus than medical schools. The teaching hospital markers for education approach the outer edge of the circle, indicating close to 100 percent usage, appear toward the lower right demonstrating more emphasis on practice-based learning/improvement and system-based practice. Assessment markers are located in the mid-range of the circle indicating less focus on this use of simulation than medical schools. Similar to medical schools quality improvement and research remain near the center indicating limited use of simulation for these purposes. Responses indicate teaching hospitals are using simulation often for education across four of the ACGME competencies of patient care, interpersonal communication skills, professionalism, and system-based practice. Teaching hospital use of assessment varied across the competencies most often used for assessing professionalism and system-based practice. Also of note was the use of simulation for teaching and assessing leadership.

Table 3. Simulation for Assessment in Medical Schools

	Feedback	Evaluation	Validation/ Certification	Remediation
Medical knowledge	(83) 93%	(74) 83%	(29) 33%	(54) 61%
Patient care	(82) 92%	(69) 78%	(22) 25%	(47) 53%
Interpersonal communication skills	(86) 97%	(69) 78%	(20) 22%	(52) 58%
Professionalism	(82) 92%	(60) 67%	(13) 15%	(39) 44%
Practice-based learning/ improvement	(57) 64%	(33) 37%	(10) 11%	(22) 25%
System-based practice	(59) 66%	(31) 35%	(9) 10%	(16) 18%
Psychomotor tasks	(76) 85%	(57) 64%	(30) 34%	(41) 46%
Leadership	(57) 64%	(22) 25%	(8) 9%	(13) 15%
Team training	(64) 72%	(28) 31%	(11) 12%	(10) 11%
Critical thinking/ Decision making	(72) 81%	(54) 61%	(21) 24%	(37) 42%
Overall Usage	81%	56%	19%	37%

The survey explored the use of simulation for assessment purposes in more detail by asking what types of assessment utilized simulation: feedback, evaluation, validation/ certification, and remediation (Figure 11). On average, medical schools use simulation for assessment to provide feedback (81 percent of the time), evaluation (56 percent), remediation (37 percent), and validation/certification (19 percent) (Table 3). As the feedback indicators in figure 11 illustrate interpersonal communication skills and medical knowledge are where simulation is applied. Evaluation is most often seen with medical knowledge, patient care, and interpersonal communication skills. Simulation is used for remediation most often related to medical knowledge and interpersonal communication skills. Validation/certification is the lest often use of simulation in medical schools as indicated by its location near the center of the graph.

Figure 11. Simulation Use for Assessment in Medical Schools

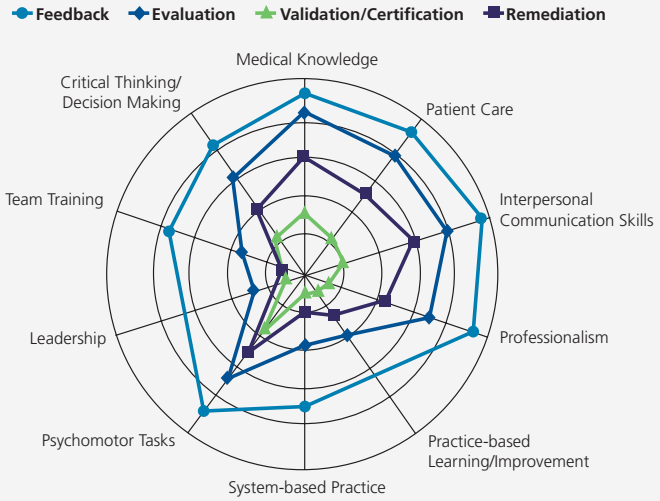
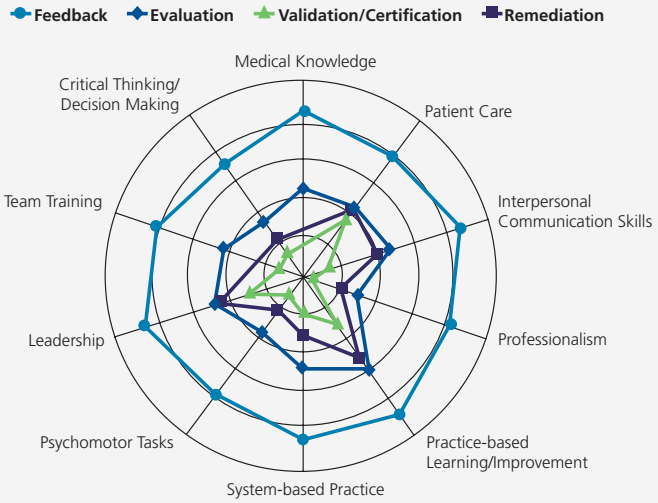


Table 4. Simulation for Assessment in Teaching Hospitals

	Feedback	Evaluation	Validation/ Certification	Remediation
Medical knowledge	(53) 85%	(28) 45%	(9) 15%	(15) 24%
Patient care	(48) 77%	(28) 45%	(22) 35%	(27) 44%
Interpersonal communication skills	(53) 85%	(29) 47%	(9) 15%	(24) 39%
Professionalism	(49) 79%	(18) 29%	(3) 5%	(12) 19%
Practice-based learning/ improvement	(54) 87%	(36) 58%	(19) 31%	(32) 52%
System-based practice	(52) 84%	(28) 45%	(10) 16%	(19) 31%
Psychomotor tasks	(47) 76%	(22) 35%	(7) 11%	(13) 21%
Leadership	(53) 85%	(29) 47%	(17) 27%	(28) 45%
Team training	(49) 79%	(27) 44%	(7) 11%	(16) 26%
Critical thinking/ Decision making	(44) 71%	(21) 34%	(8) 13%	(14) 23%
Overall Usage	81%	43%	18%	32%

Figure 12. Simulation Use for Assessment in Teaching Hospitals



Teaching hospitals use simulation as an assessment tool most often for feedback, followed by evaluation, remediation, and validation/certification similar to medical schools (Figure 12). However, the competency priorities vary at teaching hospitals from those of medical schools. As figure 12 illustrates there is less focus on evaluation, and remediation as those markers appear grouped near the center of the graph, and feedback use is more evenly distributed across the competencies. This could be attributed to teaching hospitals having different educational objectives and more diverse learner communities participating in simulation initiatives. The most common competencies assessed to provide feedback are practice-based learning/improvement, medical knowledge, and interpersonal communication skills (Table 4). The most common uses for evaluation are for practice-based learning, interpersonal communication skills, and leadership.

Simulation Use in Multidisciplinary and Interprofessional Environments

Simulation has proven to not only be an effective method to develop skills, but can also provide an environment conducive to team-based learning (Gaba 2004). At a time when health care is moving to team-based models of care coordination, it is important to fully leverage the impartial environment of simulation to allow learners the opportunity to hone their communication and collaboration skills.

Figure 13. Competencies Taught in Multidiciplinary Environments

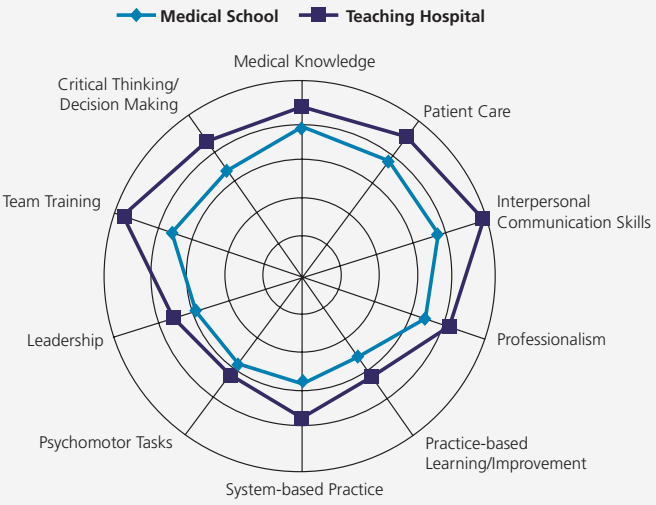


Table 5. Competencies Taught in Multidisciplinary Simulation Environments

	Medical School	Teaching Hospital
Medical knowledge	(49) 54%	(35) 61%
Patient care	(47) 52%	(36) 63%
Interpersonal communications skills	(46) 51%	(39) 68%
Professionalism	(42) 47%	(32) 56%
Practice-based learning/ improvement	(32) 36%	(25) 44%
System-based practice	(35) 39%	(29) 51%
Psychomotor tasks	(36) 40%	(25) 44%
Leadership	(36) 40%	(28) 49%
Team training	(45) 50%	(39) 68%
Critical thinking/Decision making	(42) 47%	(34) 60%
Overall Usage	46%	56%

Participants were asked to indicate all of the competencies taught using simulation in a multidisciplinary environment (Figure 13). All participating medical schools (90) responded to this question, while 89 percent (57) of the teaching hospitals responded (Table 5). On average, the teaching hospitals engage in more multidisciplinary training using simulation. The most common uses of multidisciplinary simulation training are for patient care, interpersonal communication skills, team training, and critical thinking competencies as indicated by there location near the outer ring of the graph in figure 13.

Figure 14. Competencies Taught in Interdisciplinary Environments

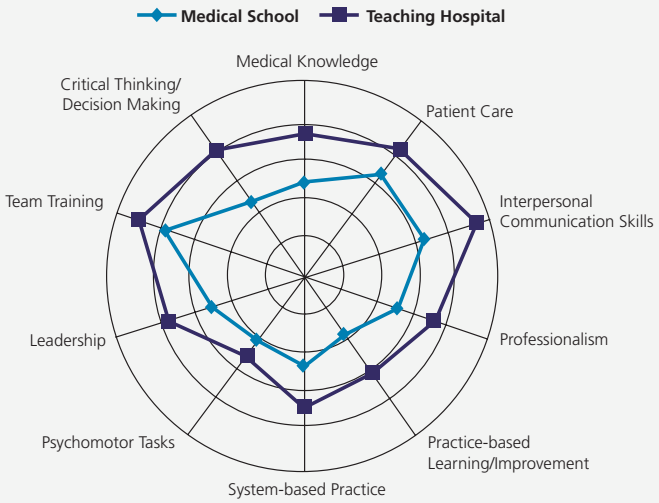


Table 6. Competencies Taught in an Interdisciplinary Simulation Environment

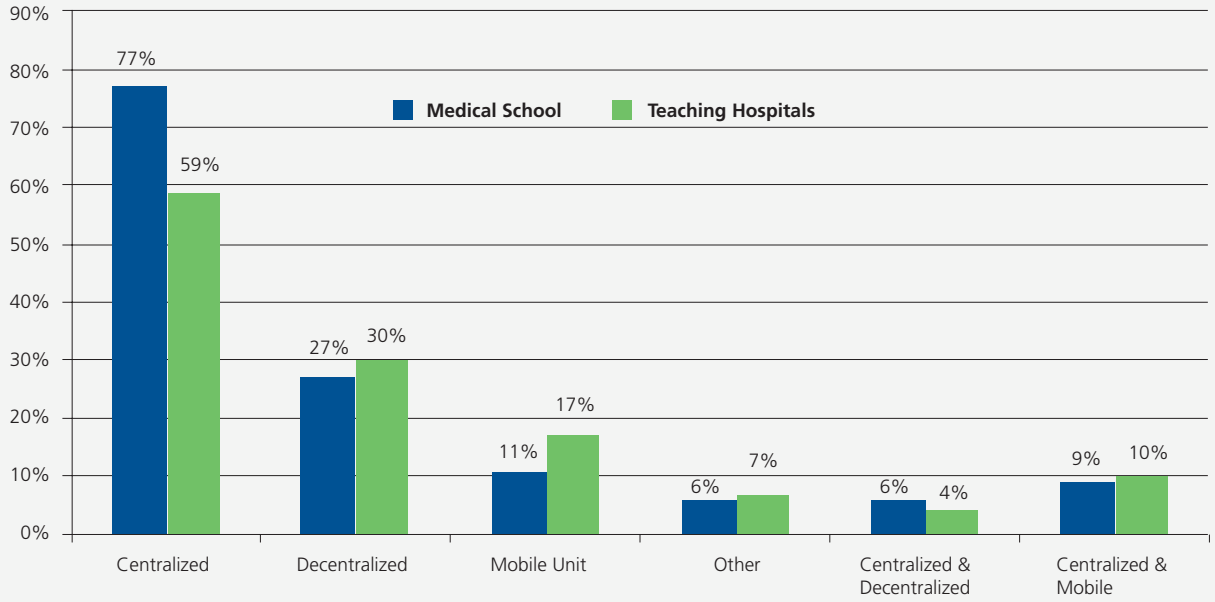
	Medical School	Teaching Hospital
Medical knowledge	(40) 44%	(38) 67%
Patient care	(53) 59%	(42) 74%
Interpersonal communications skills	(53) 59%	(48) 84%
Professionalism	(41) 46%	(37) 65%
Practice-based learning/ improvement	(30) 33%	(31) 54%
System-based practice	(37) 41%	(35) 61%
Psychomotor tasks	(32) 36%	(26) 46%
Leadership	(44) 44%	(37) 65%
Team training	(60) 67%	(46) 81%
Critical thinking/Decision making	(38) 42%	(41) 72%
Overall Usage	47%	67%

Participants were asked to indicate all of the competencies taught in an interdisciplinary environment (Figure 14). Of the participating institutions, 91 percent of medical schools responded to this question and 89 percent of teaching hospitals responded (Table 6). On average, teaching hospitals engage in simulation activities for interprofessional training more often than medical schools. As figure 14 illustrates, the most common competencies addressed in interprofessional training are interpersonal communication skills and team training.

Operations and Facilities

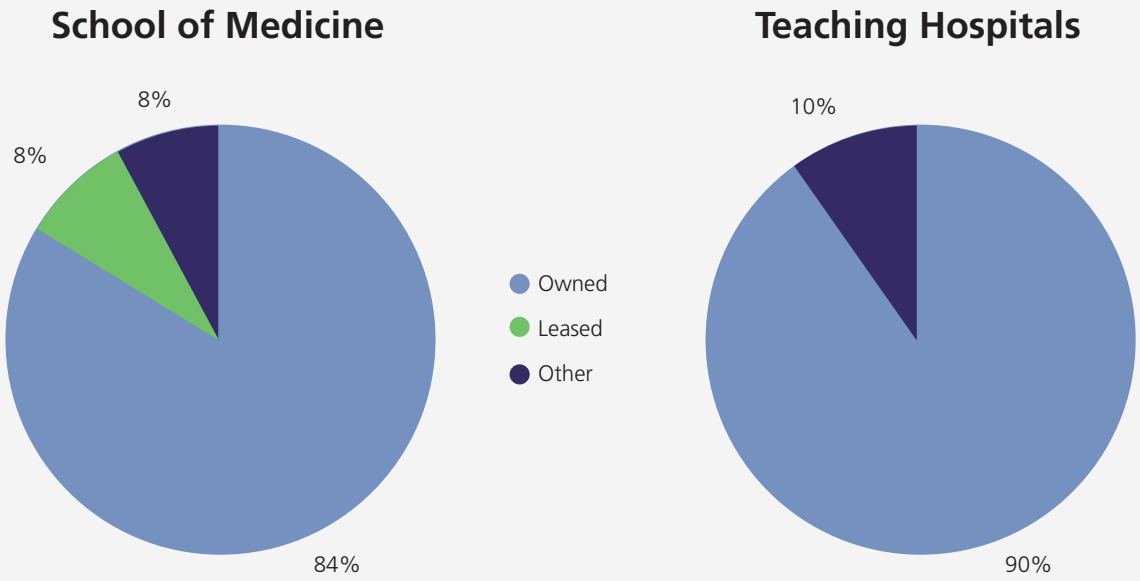
Making the investment in simulations has the potential to involve a significant amount of resources – financial and operational. Medical schools and teaching hospitals may need to make critical decisions about investment in facilities, equipment (purchasing, renting, maintaining, replacing), and staffing. The following section summarizes the operations and facilities of simulation activity at medical schools and teaching hospitals, including the space used, facility ownership, finances, staffing, and types of simulation used.

Figure 15. Simulation Facility Location



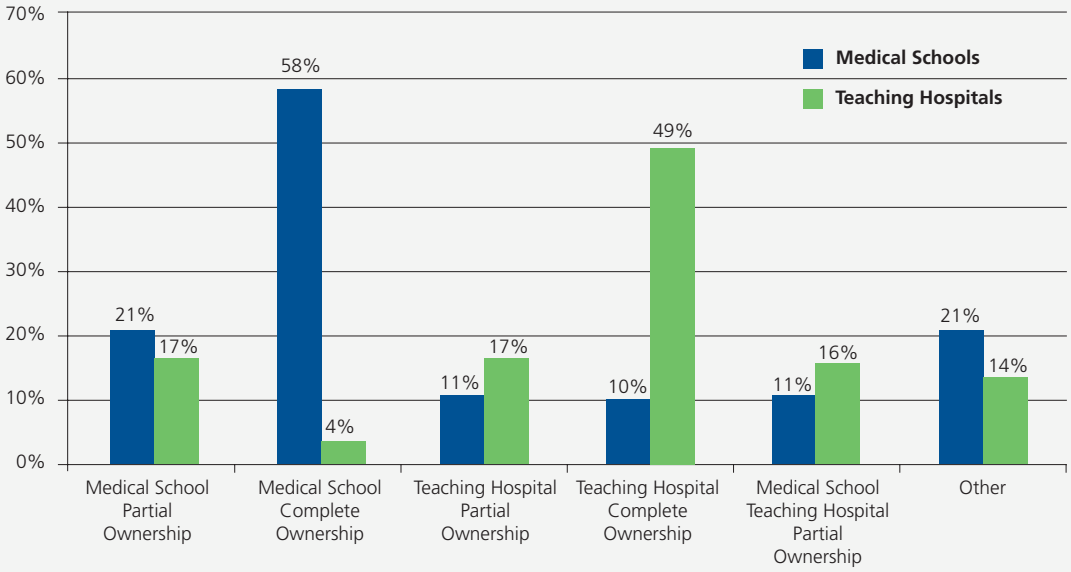
Participants were asked to note whether their simulation facility was centralized, decentralized, located in a mobile unit, or other. Eighty-eight medical schools and 61 teaching hospitals responded to this question (Figure 15). The majority of medical schools and teaching hospital participants noted that their simulation facilities were centralized—that is, the vast majority of simulation activities (excepting in situ activities) takes place in a single, physical location. For the medical schools and teaching hospitals that reported their simulation facilities were decentralized, the vast majority of simulation activities (excepting in situ activities) take place in various noncontiguous physical locations. Participants had the option to select as many options that applied to their simulation facility locations: centralized, decentralized, mobile unit, or other. The percentages reported in Figure 15 represent the percent of medical school and teaching hospital participants that indicated the type(s) of facilities for their simulation programs or centers. Explanations for "Other" include multiple centers or programs, centers in development, and in situ simulation locations.

Figure 16.



The majority of both medical schools and teaching hospitals own their simulation facilities. Only a few medical schools indicated leasing (8%) and a small number of both medical schools (8%) and teaching hospitals (10%) have other arrangements. Participants that noted "Other" include multiple centers where one is owned and another isn't; the state system of higher education owns the facility; ownership is through the central campus or in the university system; or the simulation center equipment is owned but the space is leased. Of the participating institutions, 85 medical schools and 58 teaching hospitals responded to this question (Figure 16).

Figure 17. Facility Ownership



Participants were asked to select all of the ownership scenarios of the simulation facility that applied: whether the medical school had complete or partial ownership over their simulation facility, whether the teaching hospital had complete or partial ownership over their simulation facility, or other scenarios. The majority of medical schools and hospitals reported that they had complete ownership of their simulation facility. The "Other" responses included departmental ownership, ownership by another school within the central university, and the state owned the facility. Examples of "Other" for teaching hospitals include ownership by GME and academic affairs offices, risk management, and the health care system. Eighty-eight medical schools and 57 teaching hospitals responded to this question (Figure 17).

Rooms and Square Footage

Participants were asked to estimate the number of each type of room dedicated to simulation and the estimated total square footage of each type of room, if known (Tables 7 and 8). The survey also collected data on other rooms not included in the list of specific rooms. For the purposes of this report, "Other" was removed from the median and average count of rooms. Only specified rooms were included in the counts. In general, dedicated simulation space at medical schools was greater than that available to teaching hospitals. Of note, medical schools appear to have more dedicated exam rooms and offices whereas teaching hospitals use more mixed-use spaces. This might be attributed to the more prevalent need for assessment, such as clinical skills exams, in medical schools and a more team-based multidisciplinary training space need at teaching hospitals.

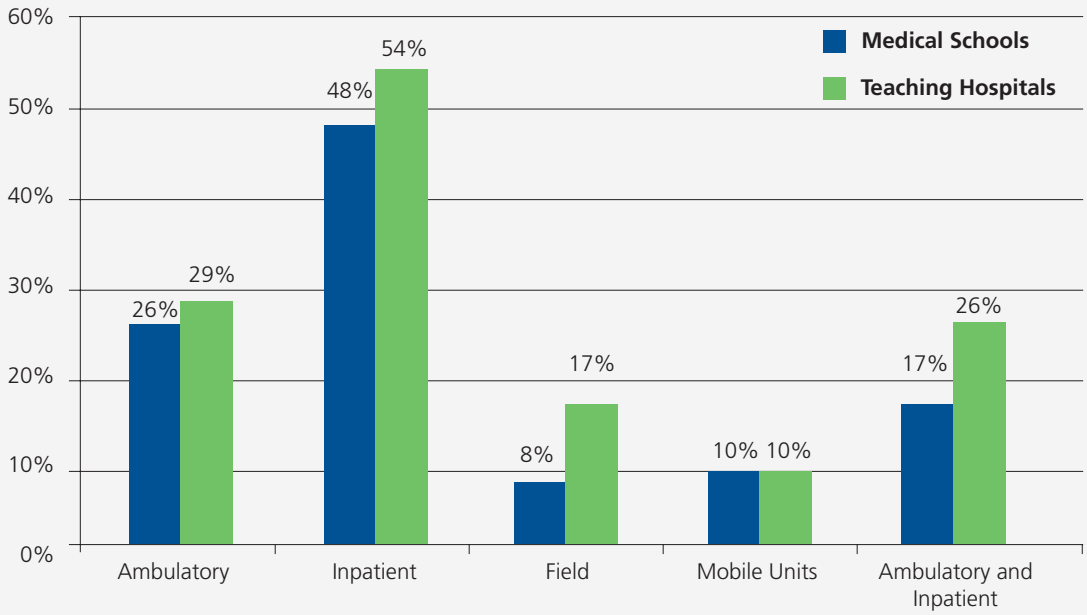
Table 7. Medical Schools Rooms and Space					
Type of Room	**Number of Rooms**			**Square Footage**	
Debrief	n=59	Median: 2	n=37	Median:	400
		Average: 2.69		Average:	774.78
Training/Scenario	n=70	Median: 3	n=46	Median:	850
		Average: 4.16		Average:	1,524.54
Exam/Standardized patient room	n=67	Median: 12	n=38	Median:	1,225
		Average: 12.76		Average:	1,737
Partial task trainer/procedure	n=58	Median: 2	n=31	Median:	600
		Average: 2.29		Average:	963.48
Office	n=67	Median: 4	n =42	Median:	429
		Average: 4.72		Average:	731.67
Observation	n=48	Median: 1	n=29	Median:	400
		Average: 2.60		Average:	543.69
Control Room	n=72	Median: 1	n=40	Median:	250
		Average: 2.42		Average:	403.95
Conference room/classroom	n=58	Median: 2	n=33	Median:	750
		Average: 2.54		Average:	1,067.58
Storage/equipment Room	n=67	Median: 2	n=40	Median:	500
		Average: 5.78		Average:	573.5
Mixed-use	n=38	Median: 1	n=25	Median:	500
		Average: 2.39		Average:	917.28
Total	n=81	Median: 27	n=53	Median:	4,650
		Average: 33.06		Average:	6,401.04

Table 8. Teaching Hospitals Rooms and Space					
Type of Room	**Number of Rooms**			**Square Footage**	
Debrief	n=35	Median: 1	n=24	Median:	422.5
		Average: 1.83		Average:	542.58
Training/Scenario	n=41	Median: 2	n=28	Median:	791.5
		Average: 2.66		Average:	1294.68
Exam/Standardized patient room	n=20	Median: 5.5	n=14	Median:	807
		Average: 6.20		Average:	962.57
Partial task trainer/procedure	n=32	Median: 1	n=18	Median:	600
		Average: 1.59		Average:	826.94

Table 8 (Continued)

Table 8. Teaching Hospitals Rooms and Space						
Office	n=36	Median:	2	N=24	Median:	314.5
		Average:	2.89		Average:	424
Observation	n=18	Median:	1	n=7	Median:	600
		Average:	1.67		Average:	774.29
Control room	n=30	Median:	1	n=18	Median:	250
		Average:	1.57		Average:	278.44
Conference room/classroom	n=31	Median:	1	n=19	Median:	1000
		Average:	2.10		Average:	2,936.32
Storage/equipment room	n=32	Median:	2	n=21	Median:	400
		Average:	2.28		Average:	520.43
Mixed-use	n=15	Median:	2	n=13	Median:	800
		Average:	2.27		Average:	1,464.62
Total	n=51	Median:	11	n=37	Median:	2,100
		Average:	13.75		Average:	4,973

Figure 18. In Situ Space



In situ simulation refers to simulation activities that take place in the point of health care delivery, such as ambulatory and inpatient rooms; out in the field; or in mobile units. Figure 18 represents the percentage of medical schools and teaching hospitals that reported they have in situ simulation activities and the types of in situ space. Fifty-seven medical schools and 43 teaching hospitals responded to this question.

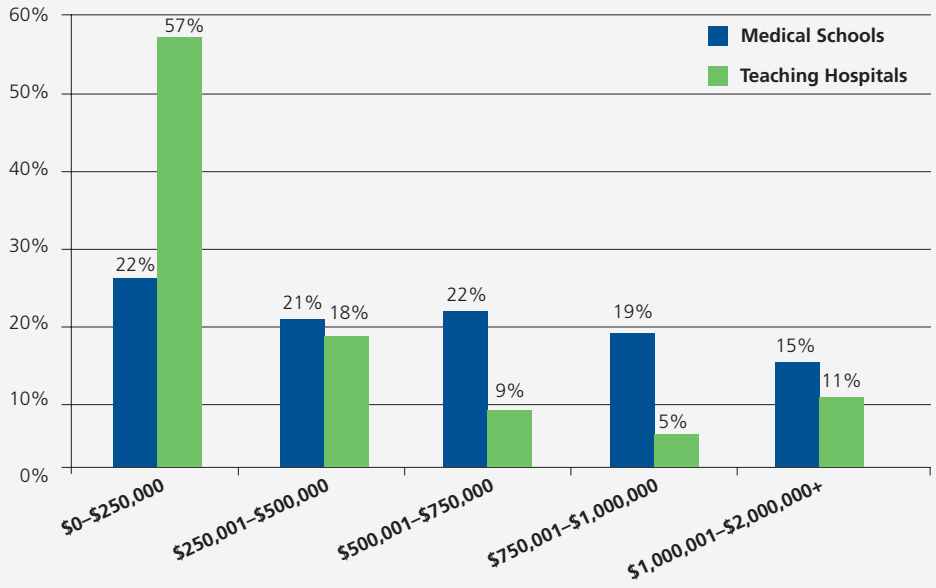
Finance and Staffing

Table 9. Funding Sources		
Source	**Medical School**	**Teaching Hospitals**
Medical school	87%	22%
Nursing school	22%	9%
Teaching hospital	32%	51%
University	17%	3%
Government, state	11%	3%
Government, federal	3%	6%
Grants/foundation	40%	25%
Philanthropy	26%	16%
For-profit entities	6%	1%
Revenue generated by courses and service to individuals and groups	33%	17%
Other (departments, practice plan, risk management)	13%	16%
Medical school & teaching hospital	28%	17%
Medical school & nursing school	21%	--
Medical school & grants/foundation	36%	--
Medical school & philanthropy	26%	--
Medical school & revenue generated by courses and service to individuals and groups	32%	--
Teaching hospital & grants/foundation	--	22%
Teaching hospital & philanthropy	--	14%
Teaching hospital & revenue generated by courses and service to individuals and groups	--	14%

Participants were asked to select all of the different sources of financing for their simulation center. The majority of medical schools reported that their simulation center was financed by the medical school. Other financing models included grants/foundation (40 percent of participating schools); medical school in combination with grants/foundations (36 percent); revenue generated by courses and service to individuals and groups (32 percent); and teaching hospitals. For the teaching hospital participants, the majority reported that the hospital financed their simulation program (51 percent). A quarter of participating hospitals reported their center was financed through grants/foundations. Eighty-seven medical schools and 55 teaching hospitals responded to this question (Table 9).

Annual Operating Expenses

Figure 19. Annual Operating Budget



Participants were asked to report on the annual operating budget for the most recent fiscal year (2009 for most respondents). For medical school respondents, there were a consistent number of participants in each budget category. For teaching hospitals, the majority of respondents reported that their operating expenses were under $500,000. The percentages in figure 19 reflect the 68 medical schools and 42 teaching hospitals that provided data to this question.

Participants were asked to indicate whether the following administrative components of the simulation center were included in the budget reported: compensation for faculty, compensation for contractors who work on an hourly basis, space rental/operation, and administrative cost. The majority of medical schools and teaching hospitals with simulation center budgets under $500,000 do not include many of these administrative components. However, for both medical schools and teaching hospitals with simulation budgets under $250,000, 80 percent of medical schools and 72 percent of teaching hospitals include administrative costs in this figure. For medical schools and teaching hospitals that reported their simulation budgets between $250,001 and $500,000, 100 percent of medical schools and 88 percent of teaching hospitals reported that their budgets also include administrative costs. Also, for medical schools in this budget range, 79 percent of respondents also include compensation for contractors who work on an hourly basis.

Staffing

Participating medical schools and teaching hospitals were asked to report the total full-time equivalency (FTE) personnel for their simulation initiative. FTEs were calculated based on a 40-hour work week over the course of the full fiscal year.

Table 10. Overall Staffing	
Medical schools	Count of responding schools: 70
	Median: 5
	Average: 8.1
Teaching hospitals	Count of responding hospitals: 50
	Median: 2
	Average: 3.4

Participants were asked to report the number of unique people, total FTEs paid through the simulation program budget, and total FTEs supported externally (e.g., by a department) based on the positions most closely affiliated with simulation activities. The total respondents for each category are listed in Tables 11 and 12. Descriptions of each position may be found in Appendix A.

Table 11. Simulation Positions in Medical Schools						
Position	Unique People		Total FTEs Paid Through Simulation Program Budget		Total FTEs Supported Externally	
Administrators	N=52	Average: 1.43 Median: 1	N=43	Average: 1.2 Median: 1	N=9	Average: .94 Median: 1
Course director	N=25	Average: 3.08 Median: 1.5	N=7	Average: 1.3 Median: 1	N=10	Average: 6.1 Median: 1.25
Curriculum authors	N=17	Average: 6.59 Median: 2	N=5	Average: 1.8 Median: 2	N=5	Average: 3.06 Median: 1
Director of the program	N=61	Average: 1.36 Median: 1	N=40	Average: .8 Median: 1	N=17	Average: .87 Median: 1
Educator	N=24	Average: 2.11 Median: 1	N=13	Average: 1.25 Median: 1	N=8	Average: 1.44 Median: 1
Instructor/trainers/facilitators	N=31	Average: 7.95 Median: 3	N=14	Average: 2.42 Median: 2.5	N=9	Average: 5.01 Median: 2
Operations manager	N=41	Average: 1.2 Median: 1	N= 34	Average: 1.08 Median: 1	N=10	Average: 1 Median: 1
Research/statistician/psychometrician	N=13	Average: 2.77 Median: 1	N=5	Average: 1.34 Median: 1	N=8	Average: 3.72 Median: 1
Simulation technician/IT	N=50	Average: 1.82 Median: 1	N=36	Average: 1.52 Median: 1	N=13	Average: 1.1 Median: 1
SP trainer/educator	N=40	Average: 1.9 Median: 1	N=26	Average: 1.6 Median: 1	N=9	Average: 1.39 Median: 1
Total	**N=70**	**Average: 12.79 Median: 6.25**	**N=59**	**Average: 4.94 Median: 4**	**N=31**	**Average: 7.18 Median: 3**

Table 12. Simulation Positions in Teaching Hospitals						
Position	Unique People		Total FTEs Paid Through Simulation Program Budget		Total FTEs Supported Externally	
Administrators	N=21	Average: 1.1 Median: 1	N=17	Average: 084 Median: 1	N=9	Average: 1.37 Median: .75
Course director	N=14	Average: 8.6 Median: 4	N=5	Average: 1.06 Median: 1	N=10	Average: 4.9 Median: 1.5
Curriculum authors	N=12	Average: 3 Median: 2	N=6	Average: .75 Median: .88	N=5	Average: .5 Median: .53
Director of the program	N=32	Average: 1.18 Median: 1	N=27	Average: .76 Median: 1	N=13	Average: .53 Median: .5
Educator	N=17	Average: 7.47 Median: 2	N=10	Average: 1.3 Median: 1	N=7	Average: 7.5 Median: 1
Instructor/trainers/facilitators	N=21	Average: 8.38 Median: 3	N=9	Average: 1.56 Median: 1.5	N=12	Average: 1.65 Median: .89
Operations manager	N=16	Average: 1.03 Median: 1	N= 11	Average: .93 Median: 1	N=4	Average: 1.88 Median: 1
Research/statistician/psychometrician	N=8	Average: 2 Median: 2	N=5	Average: 1.3 Median: 1	N=5	Average: 1.04 Median: 1
Simulation technician/IT	N=19	Average: 1.75 Median: 1	N=19	Average: 1.5 Median: 1	N=6	Average: .65 Median: .75
SP trainer/educator	N=10	Average: 1.36 Median: 1	N=7	Average: 1.16 Median: 1	N=5	Average: .78 Median: .4
Total	N=40	**Average: 14.98 Median: 5**	**N=35**	**Average: 3.58 Median: 2.5**	**N=24**	**Average: 6.38 Median: 2.13**

Program Oversight and Usage

Table 13. Oversight of Simulation Initiative		
	Medical Schools	**Teaching Hospitals**
	N=90	N=64
Medical school	81%	22%
Health sciences center	16%	8%
Department/division within hospital	19%	67%
Hospital	16%	23%
University	19%	5%
School of nursing	9%	8%
Independent simulation center	--	6%
Other	11%	25%
Medical school/department or division within hospital	13%	16%
School of medicine & hospital	16%	8%
School of medicine & health sciences center	16%	5%
School of medicine & university	10%	3%
School of medicine & nursing	8%	6%
Department/division within hospital & other	--	14%
Department/Division within hospital & independent simulation center	--	6%

Participants were asked to indicate all of the entities that oversee their simulation initiatives. For participating medical schools, the majority oversee their own simulation activities independently or in collaboration with the hospital, departments, or the health sciences center. In some cases, a specific department or the university oversees the medical school's simulation program. For participating teaching hospitals, the majority of entities that oversee the simulation program are housed in specific departments or divisions. There are also a few hospitals that oversee the hospital-based simulation program and the medical school-based simulation program. Examples of "Other" for medical schools include: other colleges (non-nursing) at the university, the state higher education system, and the library (Table 13).

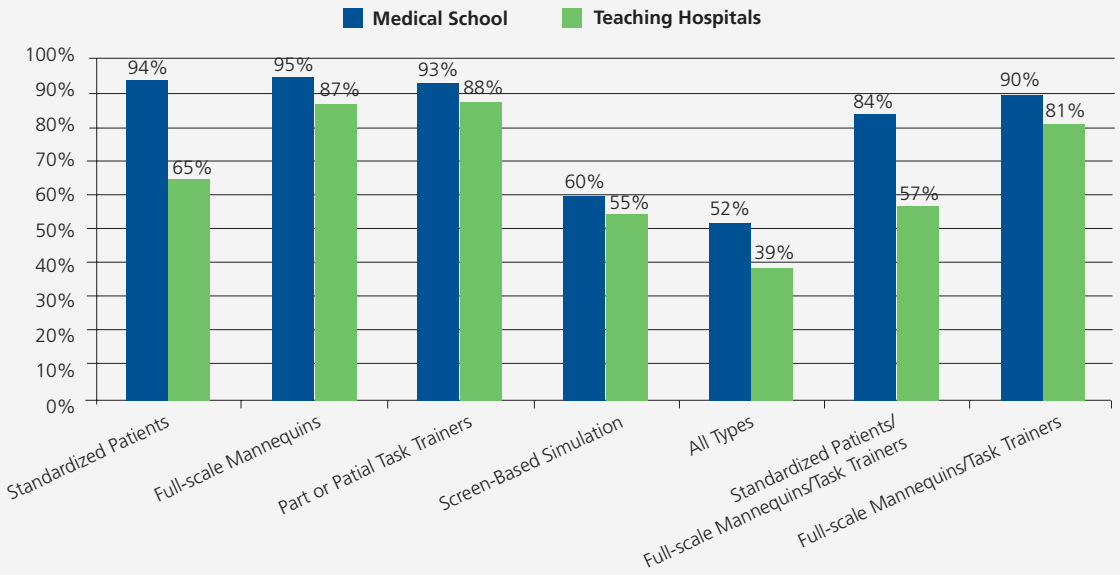
Table 14. Simulation Program Usage					
	Count	Mean	25th Percentile	Median	75th Percentile
Unique Learners in 12-month Period					
Medical schools	72	1,504.26	425	800	1,364.5
Teaching hospitals	51	1,509.39	132.5	500	1,350
Contact Hours per Learner, per Year					
Medical schools	62	1,746.74	6.5	20	47.5
Teaching hospitals	44	798.19	5	11	127
Unique Sessions Available					
Medical schools	58	119.62	23.25	51	123.75
Teaching hospitals	40	123.88	28.75	42.5	107.5
Total Sessions in 12-month Period					
Medical schools	51	704.16	29.5	125	330
Teaching hospitals	35	821.94	88	212	451

Respondents were asked to indicate the number of unique learners as well as sessions in a 12-month period to highlight the usage of simulation at the medical school and teaching hospital. Responses to these questions varied a great deal and included a number of outliers, as evidenced by the broad differences in mean and median (Table 14). Contact hours were defined as the length of time a learner spends within a simulation-based curriculum, including instruction, structured practice, and debriefing/feedback. Sessions were defined as a single, noncontiguously scheduled simulation-based activity. For example, a course on pharmacology may include three separate simulation sessions over the course of six weeks.

Types of Simulation

Participants were asked to indicate what simulation equipment is available at their organization. Completing this section were 89 medical schools and 64 teaching hospitals. Several of the skills training equipment appear to be used more by medical schools than teaching hospitals. This might be attributed to the educational nature of this equipment being well suited for undergraduate medical education concepts.

Figure 20. Types of Simulation Used in Medical Education



Participants were asked to indicate all types of simulation used for medical education at their institution. Ninety medical schools and 61 teaching hospitals responded to this question. The majority of medical schools and teaching hospitals that reported they use full-scale mannequins also reported that they use part or partial task trainers. The majority of these respondents also indicated they use standardized patients. More than half of all school of medicine participants noted that they use all types of simulation (Figure 20).

Table 15. Standardized Patient Contact Hours					
	Count	Mean	25th Percentile	Median	75th Percentile
Medical schools	N=50	5,059.09	625	2,875	8,675
Teaching hospitals	N=22	1,602.96	20	160	1,950

There was wide variation in use of standardized patients in both medical schools and teaching hospitals. The greater use of this modality in medical schools may be associated with simulation facilities being used for clinical skills exams. The range for medical schools was from 5 hours to over 20,000 hours. The range for teaching hospitals was 8 hours to over 10,000 hours (Table 15).

Tables 16 through 30 indicate the types of simulation equipment available at medical schools and teaching hospitals. Of the participants, 89 medical schools and 64 teaching hospitals responded to this section of the survey.

Table 16. Full-Scale Mannequin	Medical School	Teaching Hospital
Adult, basic body	56%	47%
Adult, multiple characteristics, non-computerized	43%	36%
Adult, multiple characteristics, computerized	88%	78%
Pediatric, basic body	38%	33%
Pediatric, multiple characteristics, non-computerized	28%	30%
Pediatric, multiple characteristics, computerized	65%	47%
Infant, basic body	42%	36%
Infant, multiple characteristics, non-computerized	31%	23%
Infant, multiple characteristics, computerized	71%	55%
Other	12%	8%

Table 17. Vascular Access	Medical School	Teaching Hospital
Adult IV arm, peripheral/arterial	89%	72%
PICC line	30%	22%
Peds IV arm, peripheral/arterial	40%	31%
Infant IV arm, peripheral/arterial	35%	22%
Infant scalp vein	10%	9%
Cutdowns	13%	6%
Central venous access, internal jugular/subclavian	82%	67%
Intraosseous access, peds leg	46%	44%
Intraosseous access, adult (FAST I, etc.)	30%	28%
Arterial puncture, wrist	62%	38%
Femoral access	43%	28%
Other	7%	3%

Table 18. Genitourinary	Medical School	Teaching Hospital
Pelvis, birthing	63%	50%
Pelvis, birthing with force monitoring	36%	27%
Vaginal ultrasound-ectopic pregnancy	13%	13%
Urethral catherization, female	70%	48%
Urethral catherization, male	70%	50%
Prostate/rectal	58%	17%
Testes	35%	6%
Circumcision	3%	0%
Vasectomy	2%	0%
Cordocentesis	0%	3%
Pelvic trainer-bimanual exam/pap smear	61%	25%
Hysteroscope	4%	6%
Anal sphincter	10%	5%
Episiotomy	18%	14%

Table 19. Anatomical Replicas	Medical School	Teaching Hospital
Full-body skeleton	51%	31%
Solid body torso	26%	19%
Skeletal parts	39%	23%
Digestive system	24%	11%
Circulatory system	30%	11%
Respiratory system	29%	17%
Urinary system	25%	8%
Neurological system	21%	5%
Genitalia, male	38%	17%
Genitalia, female	42%	20%
Reproductive system	24%	16%
Muscle system	15%	5%
Endocrine system	12%	6%
Ophthalmic system	27%	6%
Dental	7%	0%

Table 20. Node Recognition-Ultrasound	Medical School	Teaching Hospital
Breast	53%	23%
Thyroid	9%	5%
Thoracentesis	28%	23%
Femoral access	29%	17%
Echocardiogram	11%	3%
Abdominal aortic aneurysm	4%	2%
Leg masses/DVT	6%	2%
Paracentesis	24%	16%
Amniocentesis	6%	5%
Sonohysterography	2%	0%
Sonosalpongography	2%	0%
Endovaginal	10%	2%

Table 21. Joint Injection	Medical School	Teaching Hospital
Knee	42%	25%
Shoulder	36%	22%
Elbow	22%	13%
Hand/Wrist	20%	9%

Table 22. Suturing	Medical School	Teaching Hospital
Practice pads, various types	78%	61%
Wound closure	65%	47%
Local anesthesia injection	38%	28%
Practice pads, various types	80%	52%

Table 23. Fundamentals of Laparoscopy Skills, Training Box, FLS Training	Medical School	Teaching Hospital
Training box, lighted, multiple ports	51%	2%
Free-standing lap trainer, surgical camera/light source	49%	38%

Table 24. Sound Recognition	Medical School	Teaching Hospital
Heart sounds	78%	52%
Lung sounds	72%	50%
Auscultation	72%	47%

Table 25. Trauma	Medical School	Teaching Hospital
ALS trainer	42%	38%
ATLS trainer	39%	41%
Various bleeding extremities for mannequins	48%	39%
Trauma bags	31%	36%
Crash carts	73%	63%
Defibrillators	75%	64%

Table 26. CPR Trainers, Torso, Various Types	Medical School	Teaching Hospital
CPR trainers, defibrillate	58%	66%
CPR full-body trainers	55%	55%
Code rhythm generator	75%	53%

Table 27. Airway Management	Medical School	Teaching Hospital
Difficult airway head	57%	58%
Airway head	75%	75%
Cricoid ET insertion, various types	57%	55%
Thoracentesis	47%	36%
Pneumothorax	55%	48%

Table 28. HEENT	Medical School	Teaching Hospital
Eye examinations	42%	9%
Ear examinations	39%	8%

Table 29. Miscellaneous	Medical School	Teaching Hospital
Hernia	8%	8%
Lumbar puncture	69%	44%
Nasogastric tube/Tracheostomy care	57%	30%
Ulcer staging	4%	8%

Table 30. Screen-based Virtual Reality	Medical School	Teaching Hospital
Laparoscopic skills	45%	39%
Cholecystectomy	26%	30%
Ventral hernia	8%	9%
Gastric bypass	7%	6%
Arthroscopy	8%	8%
Ophthalmic surgery	4%	2%
GI skills, endoscopy	30%	31%
Bronchoscopy	26%	28%
Endovascular skills	15%	16%
Cystoscopy	6%	2%
Interventional radiography skills, angiography/ percutaneous/catherization	7%	3%
IV access, adults	30%	20%
IV access, pediatric	22%	13%
IV access, infant	21%	9%

Appendix A

Definitions used for the AAMC Simulation Survey

Administrator is responsible for clerical functions, such as scheduling sessions.

Course Director is responsible for overseeing a series of simulation activities unified by a discrete set of educational objectives.

Curriculum Author creates simulation scenario, curriculum, educational goals, and/or debriefing methodology, relying on content expertise.

Educator is specialized in ensuring the educational soundness of simulation content; usually not a content expert.

Full-scale Mannequin is a life-sized robot that mimics various functions of the human body, including respiration, cardiac rhythms, and pulsation. It can be low-fidelity (having limited or no electronic inputs like Laerdal's Resusci Anne) or high-fidelity (connected to a computer that allows the robot to respond dynamically to user input, like METI's Human Patient Simulator).

FTE refers to full-time-equivalent personnel, not number of individuals employed. For the purposes of this survey, please calculate FTE based on a 40-hour work week over the course of the full fiscal year (or approximately 2,000 hours per year).

Hybrid Simulation is a the use of two or more simulation modalities. Examples include standardized patient with task trainer and other combinations.

Instructor/Trainers/Facilitator is responsible for running a simulation scenario.

In Situ Simulation activities take place at the point of health care delivery, such as patient rooms, clinic rooms, or in the community.

Operations Manager is responsible for the day-to-day functioning of the simulation program.

Program Director is responsible for overall direction, personnel management, and budget of a simulation program.

Researcher/Statistician/Psychometrician is responsible for research design and data analysis in simulation activities.

Screen-based Simulation is a program, exclusively computer-based, that allows learners to interview, examine, diagnose, and treat patients in realistic clinical scenarios. Examples include virtual patients, virtual environments, or physiologic simulations.

Simulation is a method used in health care education to replace or amplify real patient experiences with scenarios designed to replicate real health encounters, using lifelike mannequins, physical models, standardized patients, or computers.

Simulation technician/Specialist/IT support is responsible for running the technical and logistic aspects of simulations.

Simulation Facility is the physical space where the simulation takes place, excluding in situ simulation activities.

Simulation Program is a curriculum, whether informal or formal, using simulation as the primary modality to teach learners.

Standardized Patient is a person trained to portray a clinical scenario or an actual patient using his or her own history and physical exam findings for the instruction, assessment, or practice of skills in health care delivery.

Standardized Patient Trainer trainer is responsible for instructing standardized patients on standardized scripts.

(Part or Partial) Task Trainer is a physical model that simulates a subset of physiologic function to include normal and abnormal anatomy. Examples include IV arm, airway models, and virtual reality endoscopic devices.

Appendix B

Participating AAMC Medical Schools and Hospitals

Medical Schools	Teaching Hospitals
Albany Medical College	Advocate Christ Medical Center
Chicago Medical School at Rosalind Franklin University of Medicine & Science	Akron General Health Systems & Medical Center
Creighton University School of Medicine	Arkansas Children's Hospital
Dalhousie University Faculty of Medicine	Bannerhealth
Dartmouth Medical School	Baylor University Medical Center
Drexel University College of Medicine	Baystate Medical Center
East Tennessee State University James H. Quillen College of Medicine	Beth Israel Deaconess Medical Center
Eastern Virginia Medical School	BJC HealthCare
Emory University School of Medicine	Boston Medical Center
Florida State University College of Medicine	Brigham and Women's Hospital
George Washington University School of Medicine and Health Sciences	Carolinas HealthCare System
Georgetown University School of Medicine	Charleston Area Medical Center
Harvard Medical School	Children's Hospital of Philadelphia
Howard University College of Medicine	Cooper University Hospital
Jefferson Medical College of Thomas Jefferson University	Creighton University Medical Center
Loma Linda University School of Medicine	Crozer-Keystone Health System
Louisiana State University School of Medicine in New Orleans	Dayton Veterans Affairs Medical Center
Loyola University Chicago Stritch School of Medicine	Duke University Hospital
McGill University Faculty of Medicine	

Medical Schools

Medical University of South Carolina College of Medicine

Memorial University of Newfoundland Faculty of Medicine

Morehouse School of Medicine

New York Medical College

Northeastern Ohio Universities Colleges of Medicine and Pharmacy

Northwestern University The Feinberg School of Medicine

Oregon Health & Science University School of Medicine

Queen's University Faculty of Health Sciences

Penn State Milton S. Hershey Medical Center College of Medicine

Raymond and Ruth Perelman school of medicine at the University of Pennsylvania

Rush Medical College of Rush University Medical Center

San Juan Bautista School of Medicine

Stanford University School of Medicine

State University of New York Upstate Medical University

Texas A&M Health Science Center College of Medicine

Texas Tech University Health Sciences Center School of Medicine

The Brody School of Medicine at East Carolina University

The Commonwealth Medical College

The Ohio State University College of Medicine

The School of Medicine at Stony Brook University Medical Center

Tufts University School of Medicine

Teaching Hospitals

Geisinger Health System

Hamot Medical Center

HealthPartners, Inc.

Henry Ford Hospital

Johns Hopkins Hospital

Kaleida Health/Buffalo General Hospital

Loma Linda University Medical Center

Magee-Womens Hospital

Memorial Health University Medical Center

Memorial Medical Center

Methodist Dallas Medical Center

Methodist Health Care System & Hospital

Monmouth Medical Center

Mount Sinai Medical Center

Nationwide Children's Hospital, Inc.

NewYork-Presbyterian Hospital The University Hospital of Columbia and Cornell

NIH Clinical Center

North Shore-Long Island Jewish Health System

NYU Hospitals Center

Ochsner Clinic Foundation

Orlando Health

Medical Schools

Uniformed Services University of the Health Sciences F. Edward Hebért School of Medicine

Université de Montréal Faculty of Medicine

University of Alabama School of Medicine and Hospital

University of Alberta Faculty of Medicine and Dentistry

University of Arizona College of Medicine

University of Arkansas for Medical Sciences College of Medicine

University of California, Davis, School of Medicine

University of California, Irvine, School of Medicine

University of California, San Diego, Medical Center

University of California, San Francisco, School of Medicine

University of Central Florida College of Medicine

University of Cincinnati College of Medicine

University of Colorado Denver School of Medicine

University of Connecticut School of Medicine

University of Florida College of Medicine

University of Illinois College of Medicine

University of Iowa Roy J. and Lucille A. Carver College of Medicine

University of Maryland School of Medicine

University of Massachusetts Medical School

University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School

University of Minnesota Medical School

Teaching Hospitals

Pinnacle Health Hospitals

Reading Hospital and Medical Center

Regions Hospital

Santa Clara Valley Health and Hospital Systems

Shands Healthcare

St. Luke's Hospital

St. Vincent Hospitals and Health Services, Inc.

Staten Island University Hospital

SUNY Downstate Medical Center

Temple University Health System

UCSF Medical Center

University of California, Davis, Health System

University of Chicago Hospitals and Health System

University of Iowa Hospitals and Clinics

University of Kentucky Hospital

University of Maryland Medical Center

University of Michigan Health System

UPMC Presbyterian Shadyside

Wake Forest University Baptist Medical Center

Washington Hospital Center

Medical Schools

University of Mississippi School of Medicine

University of Missouri-Columbia School of Medicine

University of Nebraska College of Medicine

University of Nevada School of Medicine

University of New Mexico School of Medicine

University of North Carolina at Chapel Hill School of Medicine

University of Oklahoma College of Medicine

University of Puerto Rico School of Medicine

University of Rochester School of Medicine and Dentistry

University of Saskatchewan College of Medicine

University of South Carolina School of Medicine

University of South Florida College of Medicine

University of Tennessee Health Science Center College of Medicine

University of Texas Medical Branch School of Medicine

University of Texas Medical School at Houston

University of Texas Southwestern Medical Center at Dallas Southwestern Medical School

University of Utah School of Medicine

University of Vermont College of Medicine

University of Virginia School of Medicine

University of Washington School of Medicine

Teaching Hospitals

West Penn Allegheny Health System

Westchester Medical Center

William Beaumont Hospital

Women and Infants Hopsital of Rhode Island

Yale-New Haven Health System

Gundersen Lutheran Health Care

Mount Auburn Hospital

Newark Beth Israel Medical Center

Medical Schools

University of Wisconsin School of Medicine and Public Health

Virginia Commonwealth University School of Medicine

Virginia Tech Carilion School of Medicine

Wayne State University School of Medicine

Weill Cornell Medical College

West Virginia University School of Medicine

Wright State University Boonshoft School of Medicine

Washington University in St. Louis School of Medicine

Simulation Inventory Task Force

Association of American Medical Colleges (AAMC)

Grace Huang, M.D. (Consultant)
Director of Assessment
Carl J. Shapiro Institute for Education and Research
Harvard Medical School and Beth Israel Deaconess Medical

Morgan Passiment
Director, Information Resources Outreach and Liaison

Robby Reynolds, M.P.A.
Director, Educational Resources and Services

Heather Sacks
Director, Planning & Administrative Affairs

Michael Saleh
Project Specialist, MedEdPORTAL

American Association of Colleges of Nursing (AACN)

Julie Anderson, Ph.D., RN, CCRC
Associate Dean, College of Nursing
University of North Dakota

Society for Simulation in Healthcare (SSH)

Michael DeVita, M.D.
Associate Medical Director
UPMC Quality and Patient Safety
University of Pittsburgh School of Medicine

Mary Cantrell, M.A.
Director, Center for Clinical Skills Education
Medical Sciences College of Medicine
University of Arkansas

Kristina Stillsmoking, BS.N., M.Ed.
Director, Surgical Education and Research
Surgical Simulation Center
Baylor University Medical Center

Association of Standardized Patient Educators (ASPE)

Wendy Gammon, M.A., M.Ed.
Assistant Professor of Medicine
Director, UMASS Standardized Patient Program
Hoagland-Pincus Conference Center

Gayle Gliva-McConvey
Director, Theresa A. Thomas Professional Skills Teaching & Assessment Center
Eastern Virginia Medical School

Tamara L. Owens, M.Ed.
Director, Clinical Skills and Simulation Center
Howard University College of Medicine

Endnote

[i] Gaba DM. The future vision of simulation in health care. *Qual Saf Health Care.* 2004;13(Suppl 1):i2.

[ii] McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. *Med Educ*. 2010 Jan;44(1):50-63.

[iii] The AAMC represents all 134 accredited U.S. and 17 accredited Canadian medical schools; approximately 400 major teaching hospitals and health systems, including 62 Department of Veterans Affairs medical centers; and nearly 90 academic and scientific societies

References

Gaba DM. The future vision of simulation in health care. Qual Saf Health Care 2004;13(Suppl 1):i2–i10.

Kohn L., Corrigan J, Donaldson MS. To Err is Human: Building a Safer Health Care System. Washington, DC: National Academy Press; 2000.

McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. Med Educ. 2010 Jan;44(1):50-63.

Okuda Y, Bryson E, DeMaria S, et al. The utility of simulation in medial education: What is the evidence?. Mt Sinai J Med 2009; 76:330-343.

Association of
American Medical Colleges
2450 N Street, N.W., Washington, D.C. 20037-1127
T 202 828 0400 **F** 202 828 1125
www.aamc.org