3.1 Medical Simulation Practices 2010 Survey Results

Medical Simulation Practices
2010 Survey Results

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Abstract. Medical Simulation Centers are an essential component of our learning infrastructure to prepare doctors and nurses for their careers. Unlike the military and aerospace simulation industry, very little has been published regarding the best practices currently in use within medical simulation centers. This survey attempts to provide insight into the current simulation practices at medical schools, hospitals, university nursing programs and community college nursing programs. Students within the MBA program at Saint Joseph's University conducted a survey of medical simulation practices during the summer 2010 semester. A total of 115 institutions responded to the survey. The survey results discuss overall effectiveness of current simulation centers as well as the tools and techniques used to conduct the simulation activity.

1.0 Introduction

This paper investigates who, what, where, how and why medical simulation is practiced in the United States today. There are many questions to ask and this paper provides insight into the initial answers to these questions. Very little data has been published on the general effectiveness and best practices used in medical simulation today. A few simulation center directories have been published but these only provide insight where simulation is used but lack insight into

- how simulation is being done,
- what patient models are used,
- how simulation centers are funded,
- what simulation processes are considered to be the highest priority,
- what are considered to be the most urgent needs for success
- and, most importantly, are the medical simulation centers meeting expectations.

I serve as an Adjunct Professor at Saint Joseph's University and teach a MBA class entitled "Developing Decision Making Competencies" each semester. The course content includes the study of simulation techniques to facilitate decision making. During my summer 2010 class we decided to gather actual data on the use of medical simulation at medical schools, nursing schools (both major university and community college levels) and hospitals to see what was the state of the practice regarding medical simulation.

2.0 Scope

The survey was sent to the deans or directors of 700 institutions and we received 115 responses to our survey.

The number of institutions that responded to this survey are as follows:

Institution Type	Quantity
Medical Schools	8
Hospitals	24
Community College Nursing	25
University Nursing	58
Total	115

2.1 Survey Content

The survey collected the following information for each simulation center:

How effective is your simulation center?
 Needs Improvement
 Meets Expectations
 Exceeds Expectations
Simulation Center Size
 Small = 1 to150,
 Medium =151 to 300,
 Large = more than 300 learners
Simulation Experience
 Less than 2 years
 2 to 5 years
 More than 5 years
Patient Model Used
 Standardized Patient (yes/no)
 High Fidelity Simulators
  Laerdal / METI / Gaumard
 Virtual Reality Application (yes/no)
Simulation Management
 Paper based or automated systems
Simulation Process Priority
 Rank each of the 6 steps listed
 Planning / Scheduling / Recording
 Debriefing / Assessment / Reporting
 (1 most important, 6 least important)

Select which is the most urgent need
        Standardized Scenario Content
        Return on Investment Case Studies
        Lower Cost Simulation Solutions
What is the annual cost of running your simulation center?
        $0 to $50,000
        $50,001 to $200,000
        $200,001 to $400,000
        Over $400,000
How do you fund your simulation center?
        Grants (yes/no)
        Strategic Donors (yes/no)
        Operational Budget (yes/no)
Do you share your simulation center with others? (yes / no / interested)
Do you include team training in your simulation scenarios? (yes / no / interested)
Do you model Electronic Health Records in your simulated scenarios? (yes/no)
Do you use video of recorded simulations during debriefing? (yes/no)

3.0 Survey Results

3.1 Simulation Center Effectiveness

The survey results show that the majority of simulation centers meet or exceed management expectations. Two areas that require further investigation are community college nursing programs where 35% of responses indicate that their simulation center needs improvement and medical schools where 62% indicate improvement is needed. Given the small sample size for medical schools (8) the high percentage can be misleading – more medical school data should be collected to explore this result.

EE = Exceeds Expectations
ME = Meets Expectations
NI = Needs Improvement

Sim Center Effectiveness	EE	ME	NI
Medical Schools	13%	25%	62%
Hospitals	36%	41%	23%
Community College Nursing	30%	35%	35%
University Nursing	25%	53%	22%

Fig 3.1 Simulation Center Effectiveness

3.2 Simulation Center Experience

Medical simulation has been actively used at most medical schools for over 5 years. Over 78% of university nursing programs have had established simulation centers in place for 2 or more years. Hospitals show an even distribution over the three experience levels. Community college nursing program results show that over 82% of these simulation centers have been in place for 5 years or less.

<2 = less than 2 years
2 – 5 = between 2 and 5 years
5+ = more than 5 years

Sim Center Experience	<2	2 - 5	5+
Medical Schools	13%	25%	62%
Hospitals	32%	32%	37%
Community College Nursing	30%	52%	17%
University Nursing	22%	40%	38%

Fig 3.2 Simulation Center Experience

3.3 Sim Center Size (# Learners)

Survey results show that hospitals typically support more learners than medical schools, university nursing and community college nursing programs. More than 70% of hospitals, university nursing and community college nursing centers had more than 150 learners.

As we started receiving the survey results we realized that our range of possible values did not account for very large simulation centers. A few centers commented that they had significantly more than 300 learners.

S = less than 150 learners
M = between 150 and 300 learners
L = more than 300 learners

Sim Center Size	S	M	L
Medical Schools	0%	63%	37%
Hospitals	21%	21%	58%
Community College Nursing	30%	48%	22%
University Nursing	24%	42%	34%

Fig 3.3 Number of Learners

3.4 Simulation Process Priority

Medical schools, hospitals, university nursing and community college nursing programs all demonstrated the same the survey results when asked what simulation processes were the most important. Clearly planning and debriefing processes are considered to be the highest priority.

Recording simulation activity on video and reporting were not considered as important which was a little surprising when considering these components constitute evidence of competency and provide support for longitudinal studies.

Ranking 1 = highest priority to 6 = lowest priority

Simulation Process	Average Ranking
Planning	1.8
Scheduling	3.3
Recording	4.3
Debriefing	2.1
Assessment	3.8
Reporting	4.7

Fig 3.4 Simulation Process Priority

3.5 Patient Models Used
The survey also asked each institution what patient models were used. It was interesting to see that almost all institutions used a combination of standardized patient, high fidelity simulators, and/or virtual reality training aids. Clearly, high fidelity simulators are used in almost all centers. We expected to see higher results for the use of Standardized Patients in community college nursing programs. The lower results may be associated with the relatively high cost of managing a Standardized Patient program.

SP = standardized patients
HFS = Laerdal, METI and/or Gaumard simulator
VR = virtual reality application

Sim Center	SP	HFS	VR
Medical Schools	75%	88%	50%
Hospitals	46%	96%	38%
Community College Nursing	26%	96%	22%
University Nursing	47%	96%	40%

Fig 3.5 Patient Models by Sim Center Type

3.6 High Fidelity Simulator Use
For those institutions using high fidelity simulators we asked specifically what vendors supplied the simulators that were used in their center. Laerdal clearly is the market share leader across the surveyed institutions. With the exception of medical

schools, Gaumard appears to have secured the second market share position. It will be interesting to watch these market share statistics over time as each vendor introduces new simulator models.

L = Laerdal   M = METI   G = Gaumard

Sim Center	L	M	G
Medical Schools	86%	57%	29%
Hospitals	78%	43%	52%
Community College Nursing	96%	21%	29%
University Nursing	89%	29%	58%

Fig 3.6 High Fidelity Simulators

3.7 Mix of High Fidelity Simulators
Very few simulation centers use simulators from just one vendor. The following paragraphs detail how often each vendor's simulator products were used at the same institution along with other vendor's products.

Medical Schools
Laerdal only	43%
Laerdal and METI	14%
Laerdal and Gaumard	0%
Laerdal, METI and Gaumard	29%
METI only	14%
METI and Gaumard	0%
Gaumard only	0%

Hospitals
Laerdal only	26%
Laerdal and METI	4%
Laerdal and Gaumard	31%
Laerdal, METI and Gaumard	17%
METI only	17%
METI and Gaumard	5%
Gaumard only	0%

Community College Nursing
Laerdal only	54%
Laerdal and METI	17%
Laerdal and Gaumard	21%
Laerdal, METI and Gaumard	4%
METI only	0%
METI and Gaumard	0%
Gaumard only	4%

University Nursing
Laerdal only	29%
Laerdal and METI	9%
Laerdal and Gaumard	40%
Laerdal, METI and Gaumard	11%
METI only	4%
METI and Gaumard	5%
Gaumard only	2%

3.8 Simulation Management

Institutions were asked whether they used a paper based management approach for their simulation center or did they use automated simulation management solution (either a collection of products or an integrated systems). Surprisingly, more than half of the community college nursing programs surveyed are still using paper based management approaches.

Considering the effort that is associated with planning, scheduling, assessing student performance and reporting, the lack of automation may be a limiting factor in the effective use of medical simulation at community colleges.

Sim Center	Paper based	Automated
Medical Schools	50%	50%
Hospitals	29%	71%
Community College Nursing	54%	46%
University Nursing	24%	76%

Fig 3.8 Simulation Management

3.9 Most Urgent Need

The survey asked institutions to select which of three items was the most urgent need for growth in use of medical simulation. The three options included (1) the need for standardized simulation scenario content, (2) proven return on investment (ROI) studies, and (3) lower cost for simulation technology. Hospitals and community college nursing programs identified standardized simulation scenario content as the most urgent need where university nursing programs seek proven ROI studies so they can justify the expansion of their simulation centers.

C = Standardized scenario content
R = Proven ROI Case Studies
L = Lower cost simulation solutions

Sim Center	C	R	L
Medical Schools	0%	62%	38%
Hospitals	46%	37%	17%
Community College Nursing	48%	13%	39%
University Nursing	33%	43%	24%

Fig 3.9 Most Urgent Need by Institution Type

3.10 EMR Simulation

Electronic Medical Records and Electronic Health Records systems will be an important element for learners to practice with as part of their simulation experience.

Most institutions want to practice in a generic EMR system environment so their learners can effectively operate with any commercial EMR implementation.

Based on the survey results it is clear that the majority of simulation centers recognize the need for EMR training.

Yes = plan to simulate EMR systems in 2010
No = No plans to simulate EMR use

Sim Center	Yes	No
Medical Schools	63%	37%
Hospitals	71%	29%
Community College Nursing	70%	30%
University Nursing	92%	8%

Fig 3.10 EMR Simulation by Institution Type

3.12 Sharing your Simulation Center

Creating and operating a simulation center requires a significant investment. We have observed a growing trend for institutions to share their simulation centers with outside users. This survey asked each institution whether they were actively sharing their center, had no interest in sharing or were not currently sharing their center but had interest in exploring this option.

Medical schools and hospitals appear to be actively engaged in sharing their simulation resources. Both university and community college nursing programs have significant interest in exploring the benefits of sharing their simulation center resources.

With automated simulation management systems that provide accounting records for chargeback and separate tracking of 3rd party simulation planning, scheduling, assessment and reporting, sharing a simulation center is now easily accomplished.

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Sim Center	Yes	No	I
Medical Schools	63%	12%	25%
Hospitals	54%	8%	38%
Community College Nursing	13%	26%	61%
University Nursing	34%	21%	45%

Fig 3.12 Sharing Sim Center Resources

3.13 Team Training

The ability to clearly and concisely communicate is as important as the technical skills learned in medical schools and nursing schools. As the survey results show, the majority of simulation centers understand the importance of team communication and have, or intend to have, team training incorporated into their programs.

There are many approaches to team training. The TEAMSTEPPS framework (http://teamsstepps.ahrq.gov) is an example of the team training programs that are being implemented in both government and commercial institutions.

Community college nursing programs are slightly behind in the adoption of team training practices but even in this case 78% of these institutions are focused on team training.

Sim Center	Yes	No	I
Medical Schools	63%	12%	25%
Hospitals	84%	4%	12%
Community College Nursing	61%	22%	17%
University Nursing	67%	7%	26%

Fig 3.13 Team Training

3.14 Use of Video during Debriefing

As we observed in the simulation process priority discussion in section 3.4, debriefing is a very high priority component to medical simulation.

Almost every center that I have met has identified debriefing to be the richest learning experience for the learner. Given that debriefing is very important it is interesting to see different approaches regarding how debriefing is conducted.

Until recently, video of simulation activity was captured on VHS tapes and use of video for debriefing was not very compelling. With the introduction of digital audio video systems that can provide rapid access to video and the ability to bookmark key time tagged events the use of video to effectively support debriefing is now possible.

Survey results that show 30 to 40% of the institutions are not using video for debriefing. The question remains whether this is due to an older video system or a process preference to debrief simulation activity without video.

Sim Center	Yes	No
Medical Schools	62%	38%
Hospitals	67%	33%
Community College Nursing	70%	30%
University Nursing	68%	32%

Fig 3.14 Use of Video for Debriefing

3.15 Funding Sim Center Operations

The survey asked institutions what their annual cost was for operating their simulation center. Upon further review the survey should have clearly broken out the following costs

- to initially implement the center,
- the ongoing cost to support the simulator technology,
- the ongoing cost to cover standardized patients,
- and the cost for internal simulation center staff.

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As currently implemented, the survey shows that medical schools report the highest annual cost for operating their simulation center, followed by university nursing programs, community college nursing programs and hospitals.

Sim Center	< 50K	50K to 200K	200K to 400K	Over 400K
Medical Schools	12%	25%	25%	38%
Hospitals	49%	23%	5%	23%
Community College Nursing	52%	30%	13%	5%
University Nursing	33%	49%	12%	6%

Fig 3.15 Annual Sim Center Funding

3.16 Funding Sources

We asked institutions if they used strategic donors, grants, and/or use their operational budgets to fund their simulation centers. Fig 3.16 shows that strategic donors are used more frequently at university nursing programs and hospitals. Grants are used heavily by all institution types except medical schools. Operating budget funding for simulation is used heavily by all institutions. It would have been interesting to see how institutions would have described the percent of funds that were obtained from each of these funding sources.

Sim Center	Strategic Donor	Grants	Op Budget
Medical Schools	14%	29%	100%
Hospitals	45%	73%	77%
Community College Nursing	30%	70%	61%
University Nursing	50%	66%	72%

Fig 3.16 Funding Sources

4.0 Conclusion

Medical simulation offers significant value to institutions as they prepare learners for their careers. Simulation is a well defined discipline in the military and aerospace industries where standards and best practices have been established over many years. Medical simulation tools and techniques are relatively new but great progress has been made in a relatively short time.

Standards organizations are actively work to bring medical simulation institutions together to share best practices. This survey was an initial attempt to capture how medical simulation is being practiced in 2010. As we received survey responses from institutions we realized that we would have asked questions in a slightly different way and asked more questions to gain additional insight into how and why an institution conducts simulation as they do.

This paper only discussed the high level results of this medical simulation survey. More detailed data analysis – for example how simulation center effectiveness varied by size of institution, types of patient models used, simulation management approaches - is currently underway. The results will be posted at www.vista-analytics.com in mid October 2010.

5.0 Acknowledgements

Medical Simulation Practices - 2010 Survey

To improve the understanding of current
medical simulation practice at medical schools,
hospitals and nursing schools.

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Period of Performance:	May – July 2010
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Full Disclosure

Business Analytics Representative to
Society for Simulation in Healthcare
Technology and Standards Committee

VP Business Development
Education Management Solutions
No institution specific survey data was shared with EMS.
EMS has access to the same publicly available survey results as described in this report and at survey web site:
 www.vista-analytics.com/project/medsimsurvey2010.

Survey Process Overview

700 institutions were selected.
Deans or Simulation Center Directors at each institution were identified.
Only one contact at each institution was identified.
Confidentiality of responses was ensured.
All survey results are de-identified.
Each student was given a specific set of contacts (roughly 35)
115 survey responses were received.

My apologies to those who prefer Healthcare Simulation as the name for the simulation activities that they are conducting. In this report Medical Simulation is intended to include Healthcare Simulation as well.

Medical Simulation Practices
Survey Questions

Each institution was asked to identify:

Location	Number of Learners
Years of Experience	Patient Models (SP, SIM, VR)
Simulation Management Approach	Simulation Process Priorities
Most Urgent Need	Annual Budget
Sources of Funds	3rd Party Use (Sharing)
Team Training	Use of Video for Debriefing
EMR Simulation	Plans for 2010

Institutions that responded included:

8	Medical Schools
58	University Nursing Programs
25	Community College Nursing Programs
24	Hospitals

115	Total Institutions

Institutions rated the effectiveness of their simulation centers:
Exceeds expectations (EE)
Meets expectations (ME)
Needs Improvement (NI)

Simulation Center Effectiveness	EE	ME	NI
Medical Schools	13%	25%	62%
Hospitals	36%	41%	23%
Community College Nursing	30%	35%	35%
University Nursing	25%	53%	22%

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How many years have you conducted medical simulation at your institution?

0 to 2 years
2 to 5 years
More than 5 years

Simulation Center Experience	<2	2 - 5	5+
Medical Schools	13%	25%	62%
Hospitals	32%	32%	37%
Community College Nursing	30%	52%	17%
University Nursing	22%	40%	38%

Rate the priority of each of the following simulation processes (1 = highest, 6 = lowest)

	Mean	Std Dev
Planning	1.8	1.1
Scheduling	3.3	1.6
Recording	4.3	1.5
Debriefing	2.1	1.3
Assessment	3.8	1.4
Reporting	4.7	1.3

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What Patient Models Do You Use?
Standardized Patients (SP)
High Fidelity Simulators (SIM)
Virtual Reality Applications (VR)

Note: An institution could reply they any combination of these patient models

Simulation Center	SP	SIM	VR
Medical Schools	75%	88%	50%
Hospitals	46%	96%	38%
Community College Nursing	26%	96%	22%
University Nursing	47%	96%	40%

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If using a High Fidelity Simulator what type do you use?
Laerdal (L), METI (M), Gaumard(M)
Note: An institution could reply they any combination of these simulators.

	Medical Schools	Hospitals	University Nursing	Community College Nursing
Laerdal	86%	78%	89%	96%
METI	57%	39%	24%	21%
Gaumard	29%	48%	53%	29%

If using a High Fidelity Simulator what type do you use?
Laerdal (L), METI (M), Gaumard(M)
Note: An institution could reply they any combination of these simulators.

	Medical Schools	Hospitals	University Nursing	Community College Nursing
Laerdal only	43%	26%	29%	54%
Laerdal and METI	14%	4%	9%	17%
Laerdal and Gaumard	0%	31%	40%	21%
Laerdal, METI and Gaumard	29%	17%	11%	4%
METI only	14%	17%	4%	0%
METI and Gaumard	0%	5%	5%	0%
Gaumard only	0%	0%	2%	4%

How are you managing your simulation center operations?
Paper based vs Using a collection of simulation management tools

Simulation Center	Paper based	Automated
Medical Schools	50%	50%
Hospitals	29%	71%
Community College Nursing	54%	46%
University Nursing	24%	76%

Of the following three choices ... what is your most urgent need ?

Standardized simulation scenario content (C)
Proven ROI Studies (R)
Lower cost simulation solutions (L)

Simulation Center	C	R	L
Medical Schools	0%	62%	38%
Hospitals	46%	37%	17%
Community College Nursing	48%	13%	39%
University Nursing	33%	43%	24%

Have you incorporated EMR / EHR use into your simulation scenarios? Yes / No

Simulation Center	Yes	No
Medical Schools	63%	37%
Hospitals	71%	29%
Community College Nursing	70%	30%
University Nursing	92%	8%

Do you allow 3rd Parties to Use Your Simulation Center?

Yes (Y)
No (N)
Not currently but interested (I)

Simulation Center	Yes	No	I
Medical Schools	63%	12%	25%
Hospitals	54%	8%	38%
Community College Nursing	13%	26%	61%
University Nursing	34%	21%	45%

Do you use video of recorded simulations during debriefing?

Yes (Y)
No (N)

Simulation Center	Yes	No
Medical Schools	62%	38%
Hospitals	67%	33%
Community College Nursing	70%	30%
University Nursing	68%	32%

What are the annual costs (US $) to operate your simulation center?

Simulation Center	< 50K	50K to 200K	200K to 400K	Over 400K
Medical Schools	12%	25%	25%	38%
Hospitals	49%	23%	5%	23%
Community College Nursing	52%	30%	13%	5%
University Nursing	33%	49%	12%	6%

Where do you obtain the funds to operate your simulation center?

Institutions were allowed to select more than one funding source.

Simulation Center	Strategic Donor	Grants	Operating Budget
Medical Schools	14%	29%	100%
Hospitals	45%	73%	77%
Community College Nursing	30%	70%	61%
University Nursing	50%	66%	72%

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Additional analysis results available at
www.vista-analytics.com/projects/medsimsurvey2010

Does perceived simulation center effectiveness vary by:
Simulation Center Size
Patients Models Used
Annual Budget
Years of Experience

The website referenced above will allow additional institutions to
complete a survey representing their current operations.

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Summary Comments

The survey collected what simulation centers are doing but not why they chose
a specific approach. More insight into best practices would be useful.

Medical Schools are not adequately represented.
This group likely has a wealth of experience to share with other institutions.

Is perceived effectiveness closely related to simulation center quality?
Do we have an unbiased measurement of quality for a simulation center?
If we agree on these metrics we could start meaningful work on ROI studies.

It would be very useful to start collecting survey statistics on an annual basis to
explore how the practice of medical simulation evolves over time.