Simulation in Fellowship Education

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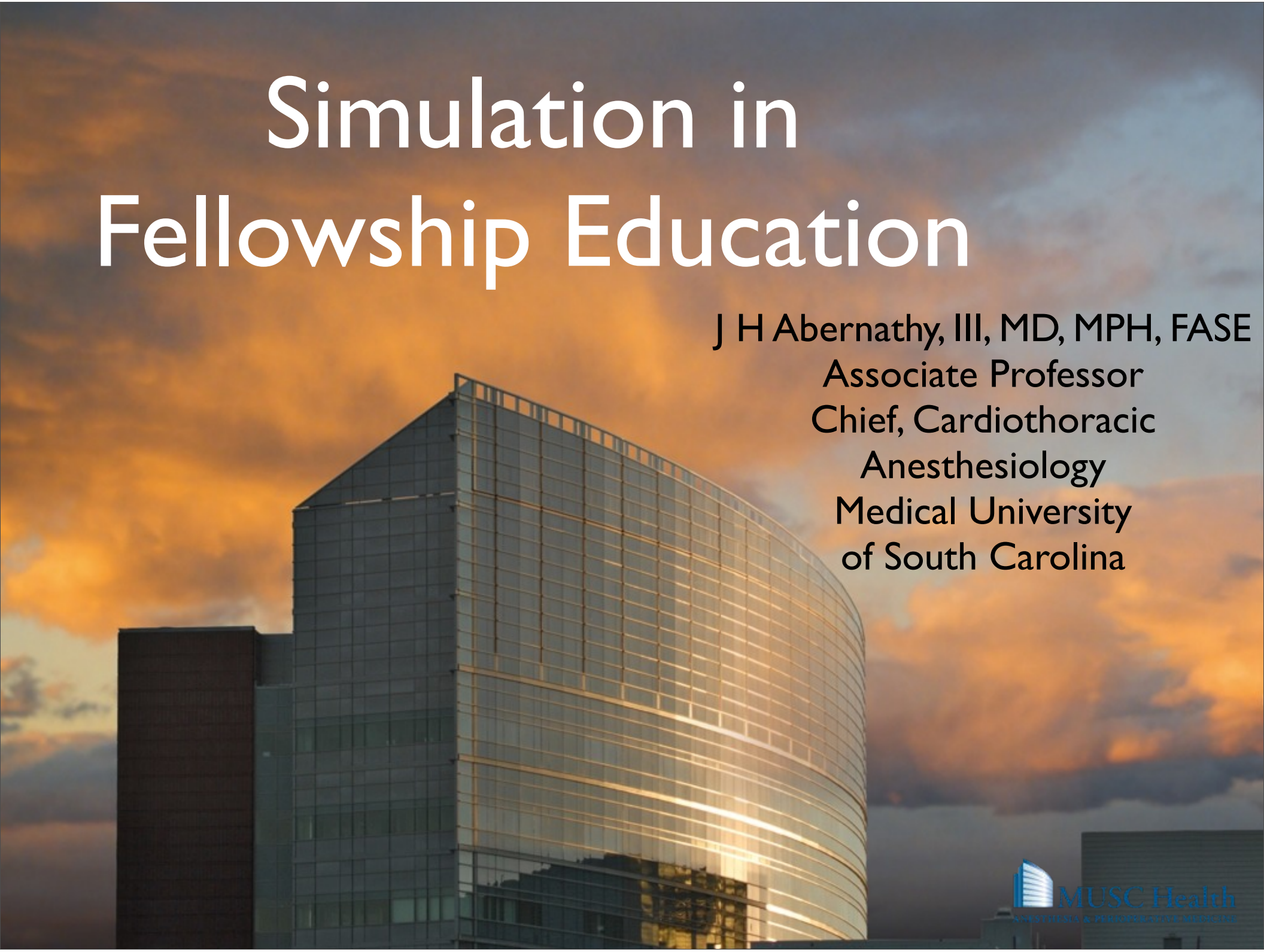

Disclosures

pharMEDium - speaker

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Yes, more disclosures

There are no data that just look at fellows

What I am going to tell you applies to medical students, residents, fellows and maybe your children

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google.com

"We were in simulators the week before"

Jeff Skyles

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Do you have a simulator training program for:

1) Residents

2) Fellows

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Do you believe simulator training improves clinical performance?

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Rationale for simulation

Where simulation is today in education and assessment

Types of Simulators

Creation of a scenario

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How they learn

- Learners are not receptacles of knowledge, they uniquely learn
- About creating meaning for each individual
- Most happens implicitly from complex interactions
- Direct experience shapes understanding
- Occurs best in the context of compelling "presenting problems"
- Require active reflection

Simulation is a good way to teach

- Expect perfect patient outcomes
- Rare events can become frequent

Gallagher. Intern Anesthes Clinics. Vol 48(3), 83-99

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Simulation Sessions Uncover Weaknesses

- Challenge residents / fellows in difficult scenarios that are rare.
- Identifies gaps in training and experience.

Gallagher. Intern Anesthes Clinics. Vol 48(3), 83-99

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Simulation is a reliable way to teach

- Much work has proven the efficacy of simulation
- With structured feedback, residents learn more than without

Gallagher. Intern Anesthes Clinics. Vol 48(3), 83-99

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Do you believe simulators can help teach the "soft competencies" (professionalism, practice-based learning, or interpersonal and communication skills)?

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ACGME states "It's the only way to go"

- Incorporation of competency based training in ALL core competencies.
- Medical Knowledge, patient care, interpersonal and communication skills.
- Professionalism, practice-based learning, systems-based practice

Gallagher. Intern Anesthes Clinics. Vol 48(3), 83-99

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ACGME and Competencies

1 = most desirable
2 = next best method
3 = potentially applicable

Version 1.1 September 2000

ACGME Competencies: Suggested Best Methods for Evaluation

		Evaluation Methods												
Competency	**Required Skill**	**Record Review**	**Chart Stim. Recall**	**Check-list**	**Global Rating**	**SP**	**OSCE**	**Simula-tions & Models**	**360° Global Rating**	**Port-folios**	**Exam MCQ**	**Exam Oral**	**Procedure or Case Logs**	**Patient Survey**
Patient Care	Caring and respectful behaviors			3		1			2					1
	Interviewing			1		2	1		3					
	Informed decision-making		1	2			2					2		
	Develop & carry out pt. Management plans	2	1	2	3			2	3					
	Counsel & educate pt's. & families			3		1	1		2					1
	Performance of procedures a) Routine physical exam			2		1	1							
	b) Medical procedures			1	3			1	2				3	
	Preventive health services	1				2	1			3			2	
	Work within a team			3	3				1					

Circa 2000

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ACGME and Competencies

Patient Care	Develop and Cary out management Skills	2
	Perform Medical Procedures	1
Medical Knowledge	Investigatory & analytical thinking	2
	Knowledge & application of basic sciences	2

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ACGME and Competencies

Practice-Based Learning	Analyze own practice for needed improvements	3
Interpersonal & Communication Skills		
Professionalism	Ethically Sound Practice	2
Systems-Based Practice		

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Practice-based learning and improvement

Surgeon challenges the anesthesia provider's cancelation of a case.

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Professionalism

Discover a colleague with substance abuse problem and see how the fellow handles it

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Systems-based Practice

It's 5 pm at a surgery center and the last patient is having chest pain

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Skills-Based Training

Simulation Training and Its Effect on Long-Term Resident Performance in Central Venous Catheterization

C. Christopher Smith, MD;
Grace C. Huang, MD;
Lori R. Newman, MEd;
Peter F. Clardy, MD;
David Feller-Kopman, MD;
Michael Cho, MD;
Trustin Ennacheril, MD;
Richard M. Schwartzstein, MD

Introduction: Simulation is a safe alternative to practicing procedural skills on patients. However, few published studies have examined the long-term effect of simulation technology on bedside procedures such as central venous catheter (CVC) insertion.
Methods: To determine whether simulation-based teaching improves procedural comfort, performance, and clinical events in CVC insertion, over traditional methods of procedural teaching, and to assess the long-term effect of this training, we conducted a prospective, randomized controlled trial with 53 postgraduate year-1 and postgraduate year-2 medical residents at a tertiary-care teaching hospital. At the start of the study, we assessed all residents' procedural comfort and previous training and experience with CVCs. We then measured their baseline performance in placing CVCs on simulators, using a validated assessment tool (pretest). For the intervention group, we reassessed performance immediately after simulation training (posttest). All subjects then placed actual CVCs as clinically indicated while on their medical intensive care unit rotations, under the supervision of critical care faculty. We measured clinical events associated with these CVCs. After their medical intensive care unit rotations, we reassessed CVC insertion skills on simulators and procedural comfort of all subjects (delayed posttest).
Results: Intervention subjects demonstrated a significant improvement in skills immediately after simulation training. At delayed posttesting, performance diminished somewhat in the intervention subjects and was not significantly different from control subjects; however, a significant increase over pretest scores persisted in both groups.
Conclusions: A CVC insertion simulation course improves procedural skills. These skills decline over time, and simulation conferred no long-term additional benefit over traditional methods of procedural teaching.
(*Sim Healthcare* 5:146–151, 2010)

Key Words: Resident supervision, Procedures, Central venous catheters, Simulation, Patient safety.

Sim Healthcare 5:146-151, 2010

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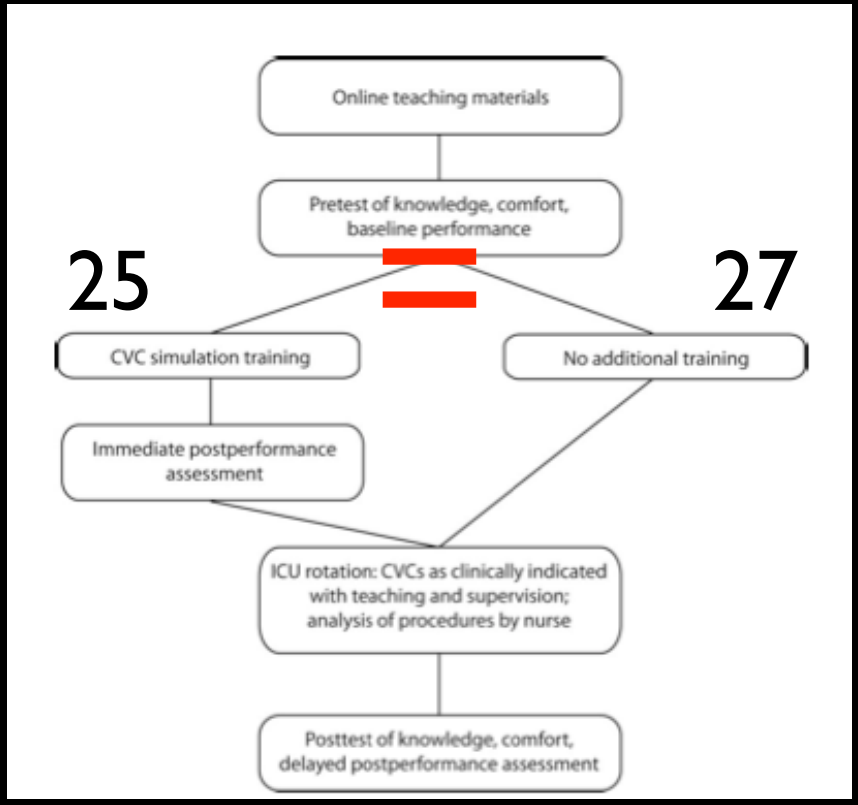
CVL Training



RCT

PGY 1 & 2

Sim Healthcare 5:146-151, 2010

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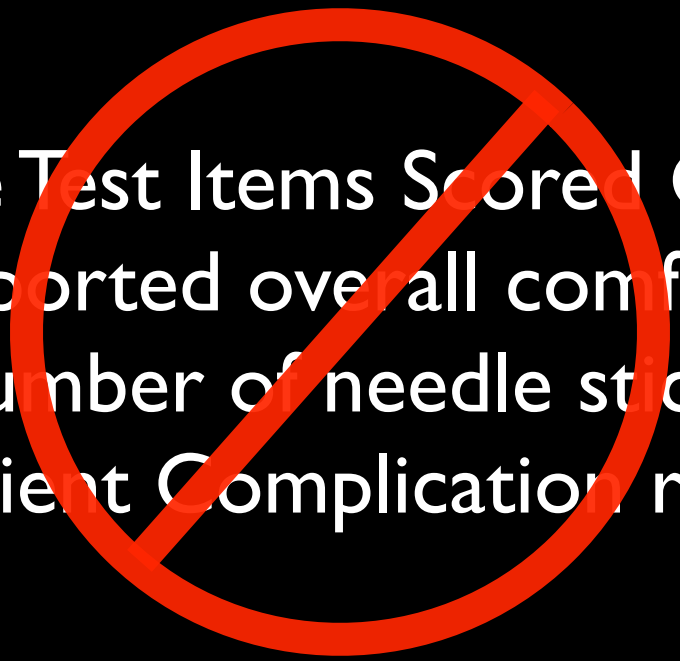
CVL Training



Cognitive Test Items Scored Correctly
Reported overall comfort
Number of needle sticks
Patient Complication rate

Sim Healthcare 5:146-151, 2010

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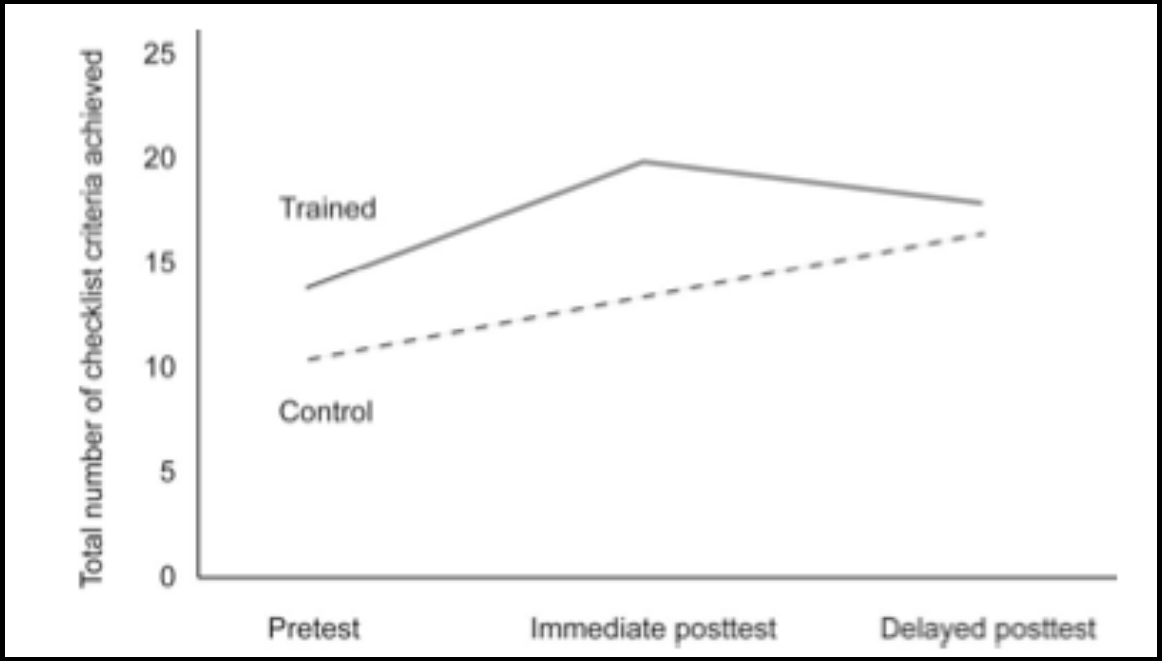
CVL Training



Sim Healthcare 5:146-151, 2010

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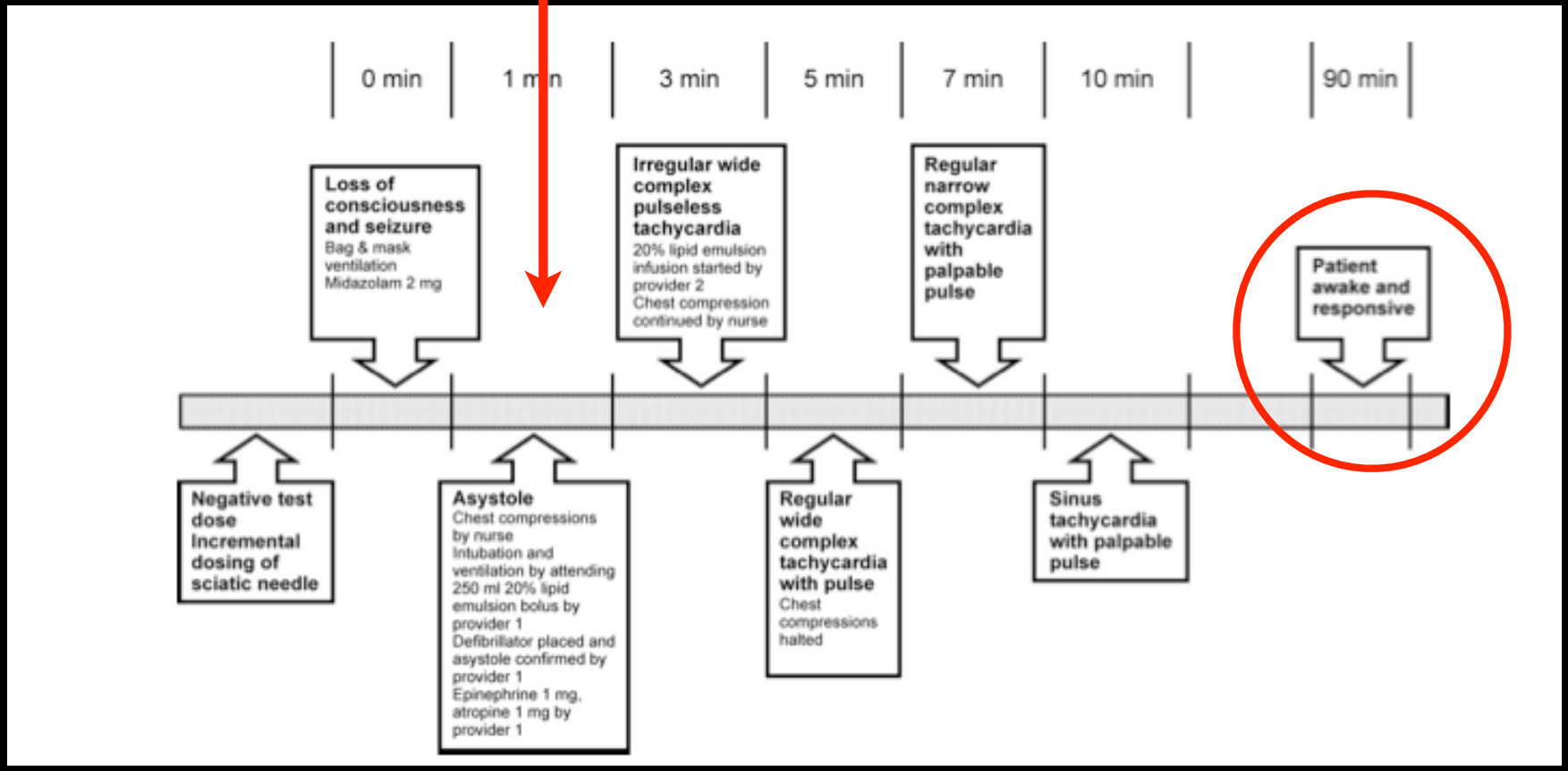
Intralipid Started



Smith HM. A&A. 2008. 106(5)

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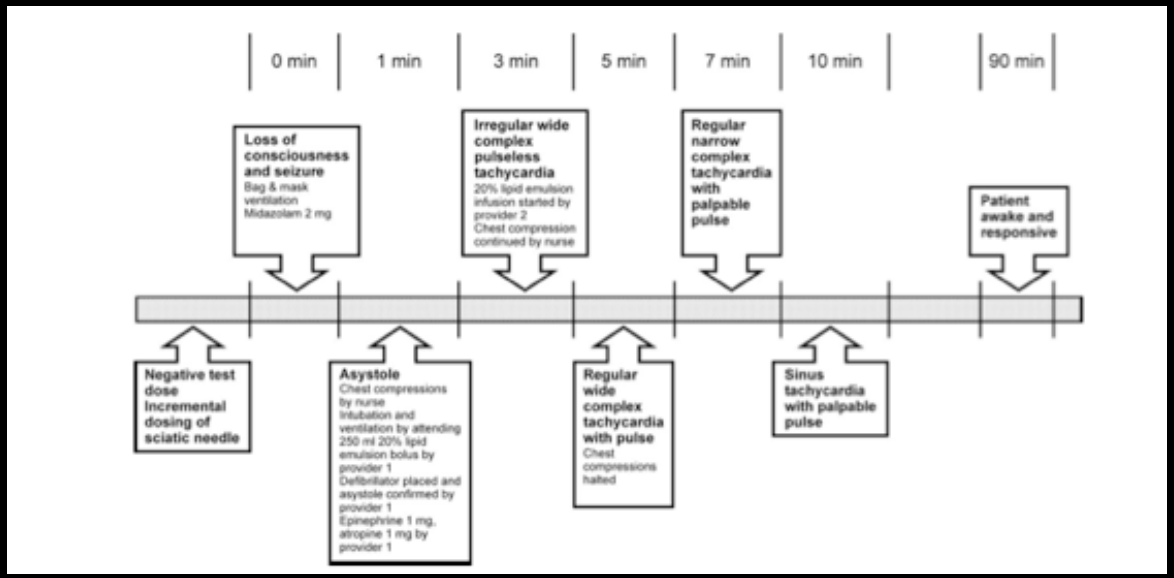
Simulation



Weeks Prior

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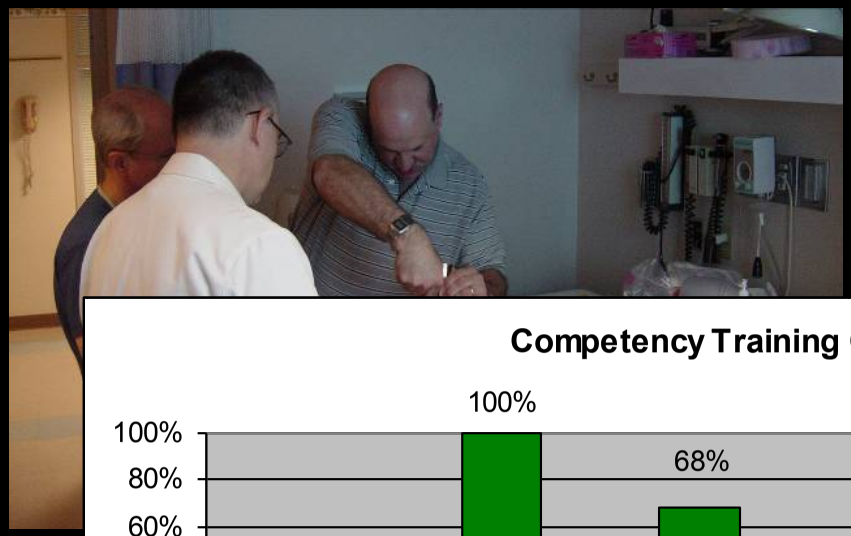
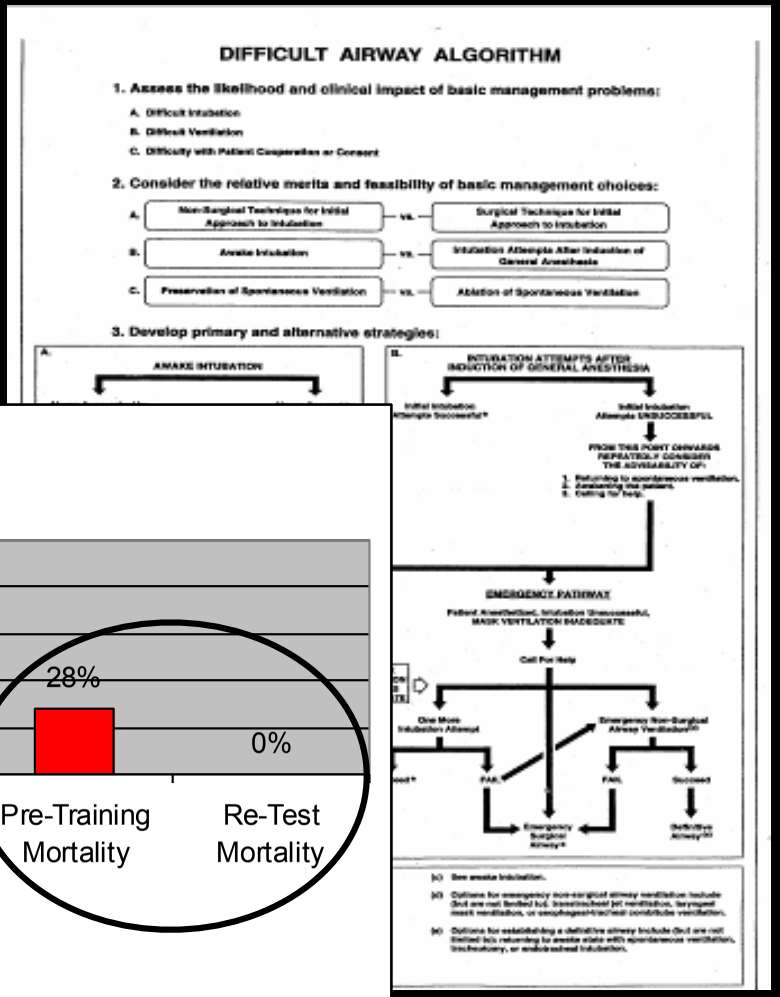
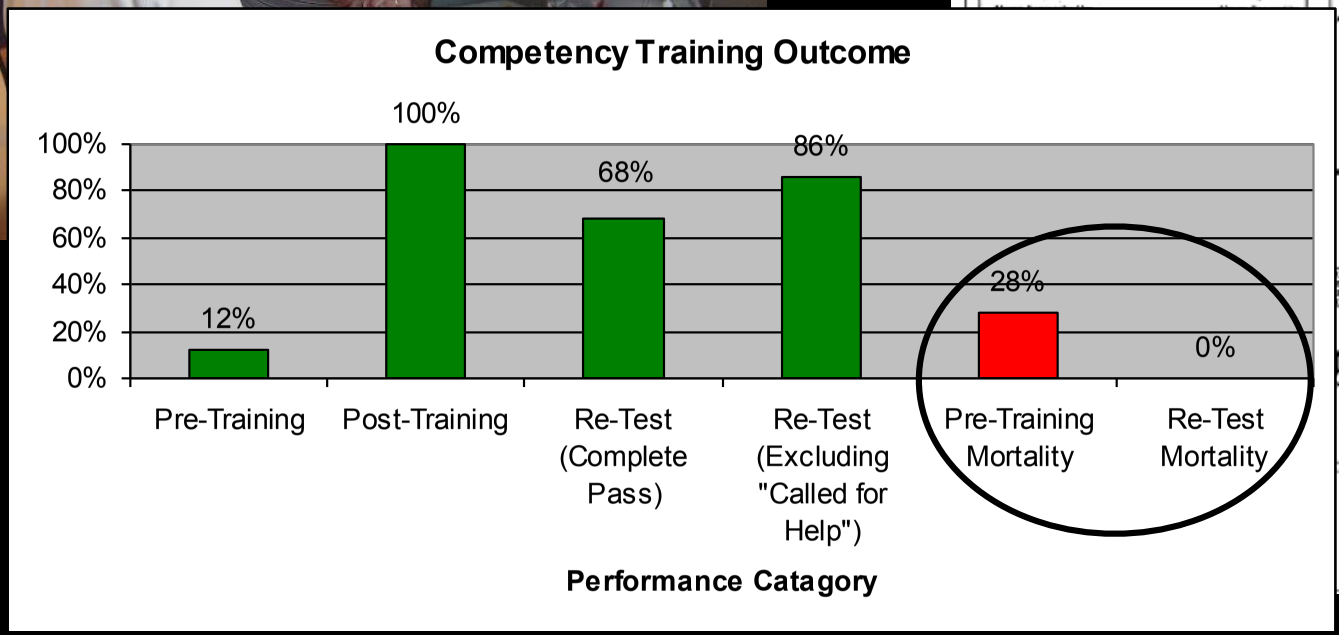
Difficult Airway Management







MUSC unpublished data

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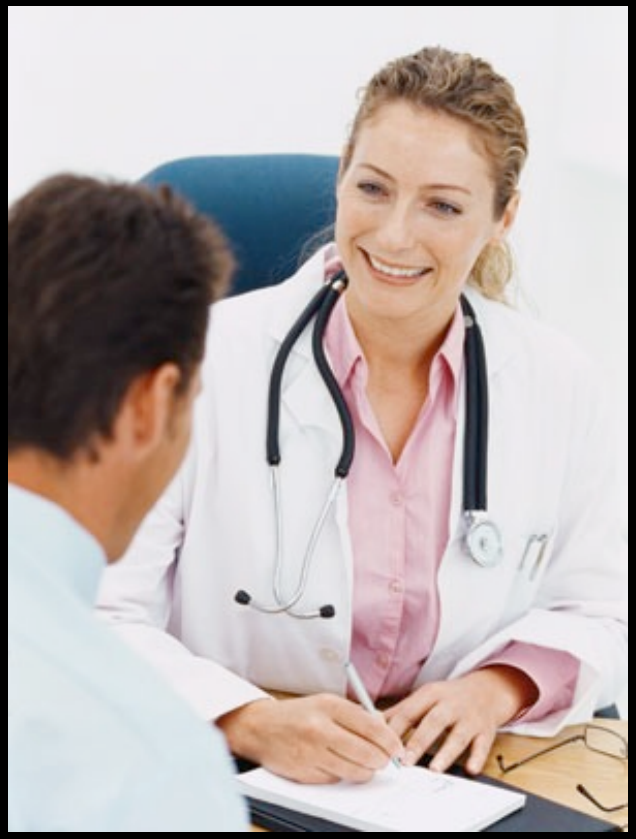
Interpersonal-Communication Skills



Interviewed patient with prostate cancer scheduled for a CVL

Patient has a DNR order

Subject takes over case

Sim Healthcare 4:70-76, 2009

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Oh, yeah, you saw this coming

Pneumothorax → Chest Tube (1)

Hypotension and new ST elevations → Unresponsive Intubation (2)

V-Fib → CPR (3) Shock (4) IABP (5)

Sim Healthcare 4:70-76, 2009

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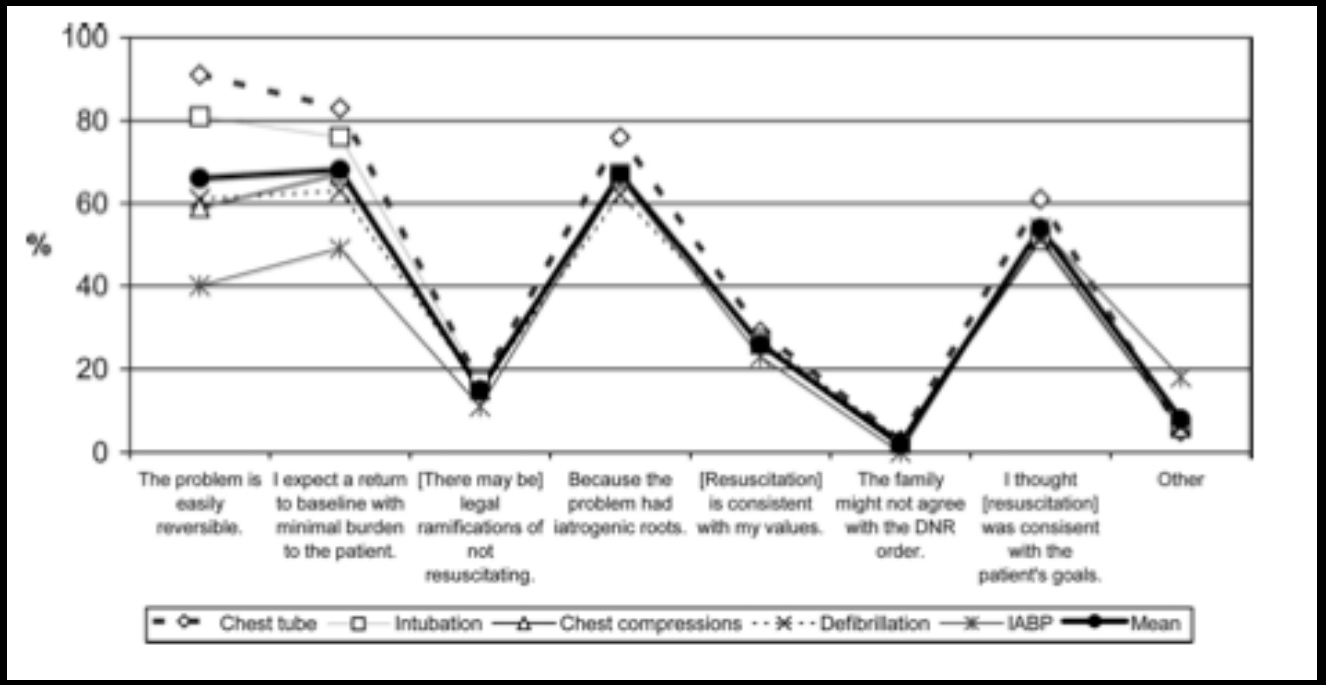

Sim Healthcare 4:70-76, 2009

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"Simulation of perioperative DNR orders is a useful way to elicit anesthesiologists' actions in the heat of the moment, which may bring us closer to understanding why anesthesiologists act as they do."

Sim Healthcare 4:70-76, 2009

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Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomized controlled trials

Smith. BMJ. 2003

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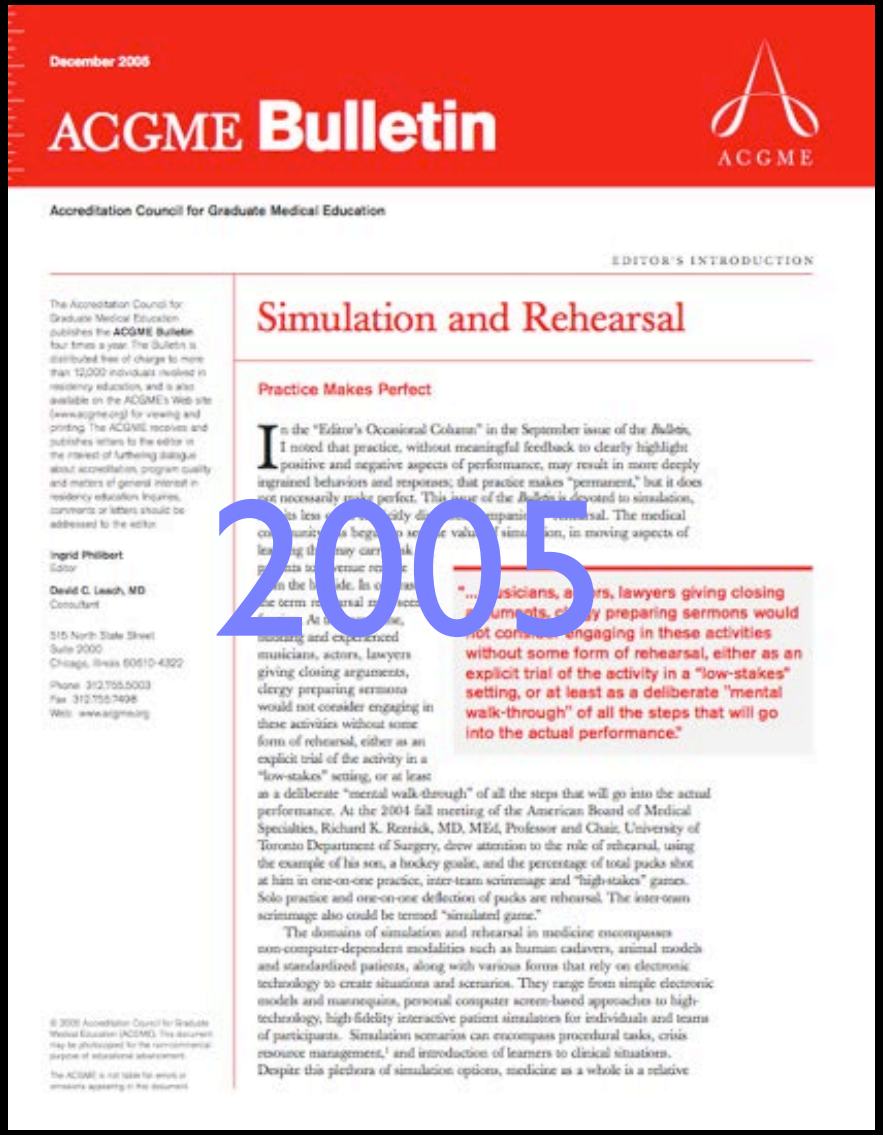
Where does this leave us?



December 2005

ACGME Bulletin

ACGME

Accreditation Council for Graduate Medical Education

EDITOR'S INTRODUCTION

Simulation and Rehearsal

Practice Makes Perfect

In the "Editor's Occasional Column" in the September issue of the *Bulletin*, I noted that practice, without meaningful feedback to clearly highlight positive and negative aspects of performance, may result in more deeply ingrained behaviors and responses; that practice makes "permanent," but it does not necessarily make perfect. This issue of the *Bulletin* is devoted to simulation, [illegible] less [illegible] companied [illegible] rehearsal. The medical [illegible] a beginning [illegible] value [illegible] simulation, in moving aspects of [illegible] to [illegible] in the [illegible]. In the [illegible] the term [illegible] seen [illegible]. At [illegible], [illegible] and experienced musicians, actors, lawyers giving closing arguments, clergy preparing sermons would not consider engaging in these activities without some form of rehearsal, either as an explicit trial of the activity in a "low-stakes" setting, or at least as a deliberate "mental walk-through" of all the steps that will go into the actual performance. At the 2004 fall meeting of the American Board of Medical Specialties, Richard K. Reznick, MD, MEd, Professor and Chair, University of Toronto Department of Surgery, drew attention to the role of rehearsal, using the example of his son, a hockey goalie, and the percentage of total pucks shot at him in one-on-one practice, inter-team scrimmage and "high-stakes" games. Solo practice and one-on-one deflection of pucks are rehearsal. The inter-team scrimmage also could be termed "simulated game."

> "... musicians, actors, lawyers giving closing arguments, clergy preparing sermons would not consider engaging in these activities without some form of rehearsal, either as an explicit trial of the activity in a "low-stakes" setting, or at least as a deliberate "mental walk-through" of all the steps that will go into the actual performance."

The domains of simulation and rehearsal in medicine encompasses non-computer-dependent modalities such as human cadavers, animal models and standardized patients, along with various forms that rely on electronic technology to create situations and scenarios. They range from simple electronic models and mannequins, personal computer screen-based approaches to high-technology, high-fidelity interactive patient simulators for individuals and teams of participants. Simulation scenarios can encompass procedural tasks, crisis resource management,[1] and introduction of learners to clinical situations. Despite this plethora of simulation options, medicine as a whole is a relative

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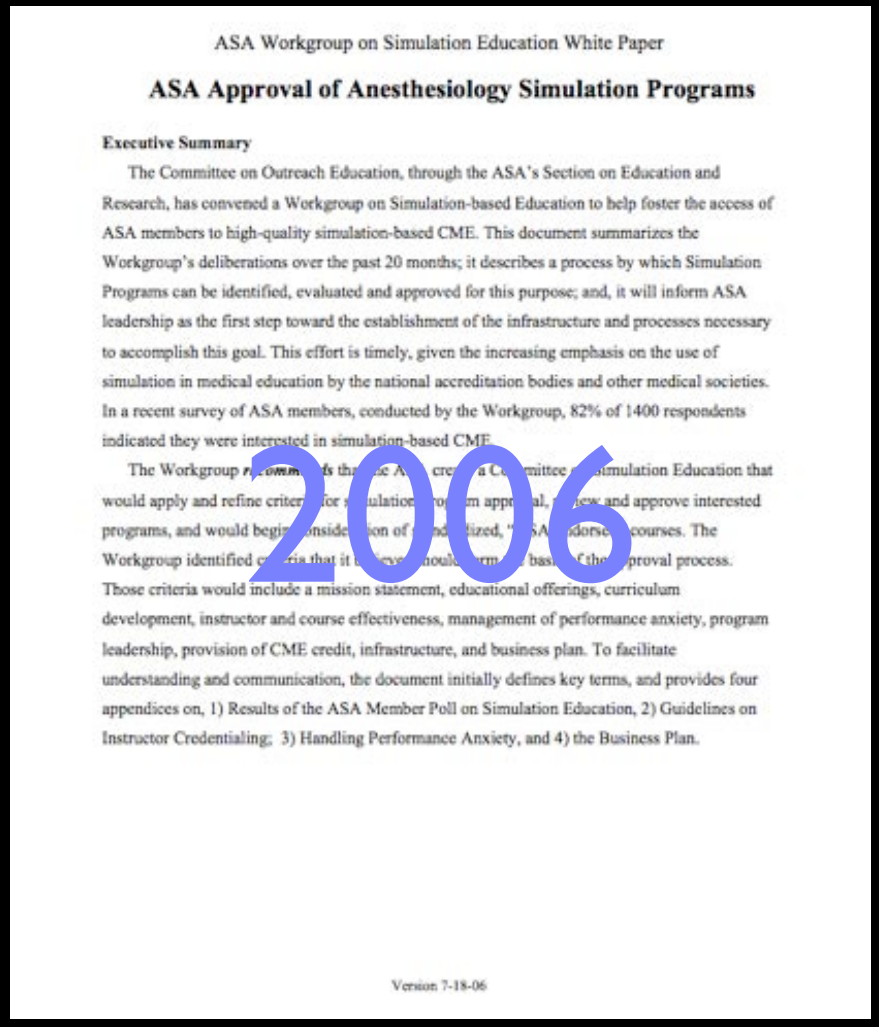
2005



ASA Workgroup on Simulation Education White Paper

ASA Approval of Anesthesiology Simulation Programs

Executive Summary

The Committee on Outreach Education, through the ASA's Section on Education and Research, has convened a Workgroup on Simulation-based Education to help foster the access of ASA members to high-quality simulation-based CME. This document summarizes the Workgroup's deliberations over the past 20 months; it describes a process by which Simulation Programs can be identified, evaluated and approved for this purpose; and, it will inform ASA leadership as the first step toward the establishment of the infrastructure and processes necessary to accomplish this goal. This effort is timely, given the increasing emphasis on the use of simulation in medical education by the national accreditation bodies and other medical societies. In a recent survey of ASA members, conducted by the Workgroup, 82% of 1400 respondents indicated they were interested in simulation-based CME.

The Workgroup [illegible] the [illegible] cre[illegible] a Co[illegible]mittee [illegible]imulation Education that would apply and refine criter[illegible]or [illegible]ulation [illegible]rogram appr[illegible]al, [illegible]ew and approve interested programs, and would begi[illegible]onside[illegible]on of [illegible]d[illegible]ized, "[illegible]SA [illegible]ndorse[illegible] courses. The Workgroup identified c[illegible]ria that it [illegible]ecom[illegible]should [illegible]rm [illegible] bas[illegible] of the [illegible]pproval process. Those criteria would include a mission statement, educational offerings, curriculum development, instructor and course effectiveness, management of performance anxiety, program leadership, provision of CME credit, infrastructure, and business plan. To facilitate understanding and communication, the document initially defines key terms, and provides four appendices on, 1) Results of the ASA Member Poll on Simulation Education, 2) Guidelines on Instructor Credentialing; 3) Handling Performance Anxiety, and 4) the Business Plan.

Version 7-18-06

2006

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ABA MOCA

Diplomates Certified in 2004

Full Year in MOCA Cycle		1	2	3	4	5	6	7	8	9	10
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Part I - Professional Standing (PS)	Maintain unrestricted, unexpired medical license in US or Canada. All licenses held must be unrestricted.										
Part II - Lifelong Learning and Self-Assessment (LLSA)	350 Total Credits, Max 70/year, Min 250 Category 1										
Part III - Cognitive Examination (CE)	Earn LLSA Exam Prerequisite (200 Credits)							Pass Cognitive Examination			
Part IV - Practice Performance Assessment and Improvement (PPAI)						Attestation	Case Evaluation or Simulation Education				

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ABA MOCA

American Society of Anesthesiologists
Endorsed Program
Simulation Education Network

Frequently Asked Questions About Simulation Courses Offered for Part IV MOCA® Credit

MOCA is a registered certification mark of The American Board of Anesthesiology, Inc.

1.	Why is simulation part of ABA recertification (MOCA)?	The American Board of Medical Specialties requires the American Board of Anesthesiology (ABA) to include practice performance assessment and improvement in Part IV of the Maintenance of Certification (MOC). The ABA recognizes simulation training as an innovative approach to assess a physician's clinical and teamwork skills in managing critical events and included it in the Part IV Maintenance of Certification in Anesthesiology (MOCA®) requirements.
2.	Why simulation?	There are relatively few learning forms that help anesthesiologists maintain clinical competence in ways that impact patient care. Many simulation programs now deliver this form of learning. There is a belief that simulation will be valuable for anesthesiologists to refresh and assess their life-saving skills.
3.	How much will it cost?	Each simulation program sets fees based on local costs, number and type of support personnel, and other course-specific costs.
4.	Why are MOCA-compliant courses only offered at specific simulation centers?	To ensure high-quality learning experiences that meet the simulation requirements of MOCA Part IV the ABA requested that the American Society of Anesthesiologists (ASA) establish standards and endorse simulation centers that meet those standards. Simulation-based courses fulfill one requirement of MOCA Part IV. Please consult the ABA website, www.theABA.org, for a list of all MOCA requirements.
5.	Are there core aspects common to all simulation courses that meet ABA requirements?	The ASA Committee on Simulation Education, in conjunction with the ABA, has established core curricular components for all simulation courses that are taken to satisfy ABA requirements. These include: • A minimum of six hours of total course instruction • Active participation in realistic simulation scenarios • Post-scenario peer debriefing

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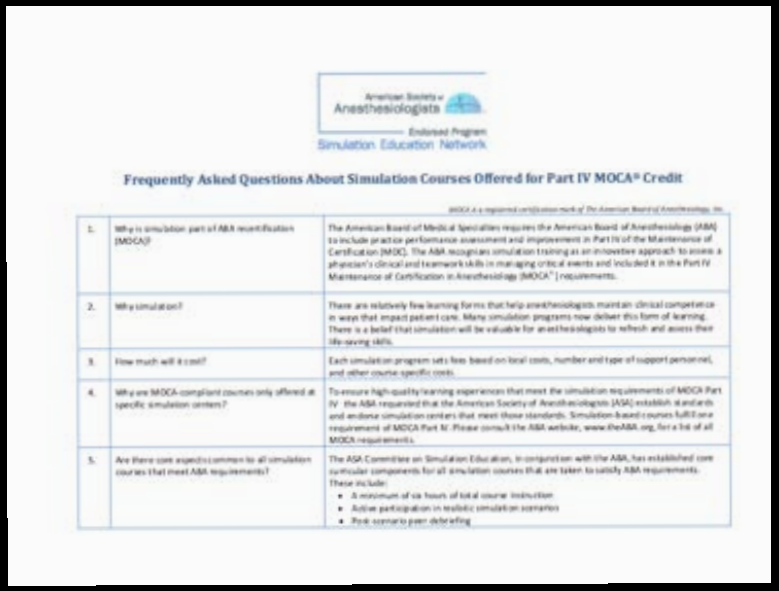

American Society of Anesthesiologists
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For the MOCA-SUBS program simulation is the only option for ABA Diplomates certified or re-certified in a subspeciality after January 1, 2010

There are relatively few forms that help anesthesiologists maintain clinical competence in ways that impact patient care…. There is a belief that simulation will be valuable for anesthesiologists to refresh and assess their life-saving skills.

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ASA Simulation Centers

www.asahq.org (2010)

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Assessment?

John Boulet &
David Murray

Anesthesiology 2010

Simulation-based Assessment in Anesthesiology

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Do you currently have the knowledge and resources to build simulation into your education program?

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Types of Simulators

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Interaction	Physiology	Used for Teaching
Screen-based	No Physiology	Knowledge
Hardware-based	Script-controlled	Cognitive skills
Virtual reality-based	Model-Controlled	Psychomotor skills

Cumin, Merry. Anaesthesia, 2007(62),151-162

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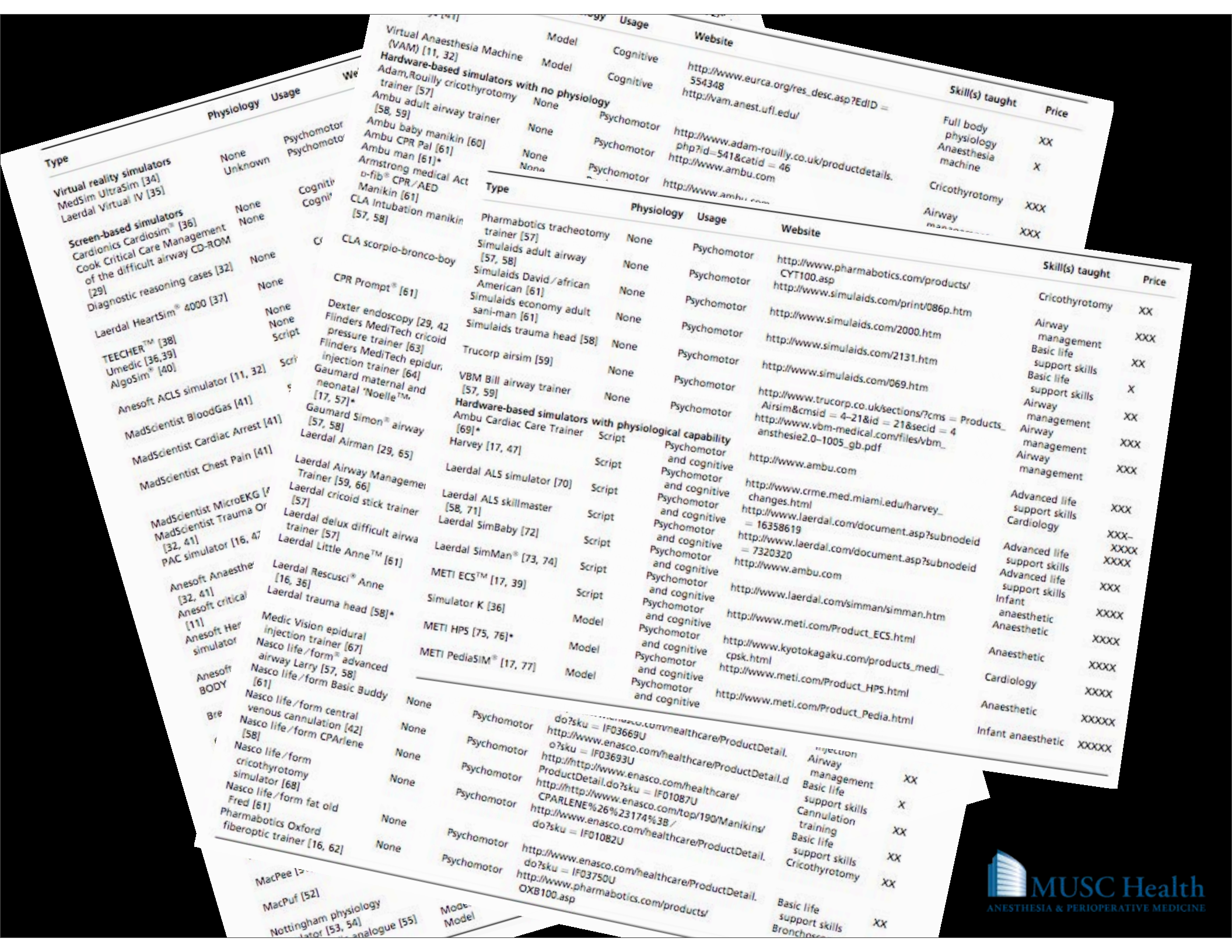

Type	Physiology	Usage	Website	Skill(s) taught	Price
Virtual reality simulators					
MedSim UltraSim [34]	None	Psychomotor		Full body physiology	XX
Laerdal Virtual IV [35]	Unknown	Psychomotor		Anaesthesia machine	X
Screen-based simulators					
Cardionics Cardiosim® [36]	None	Cognitive		Cricothyrotomy	XXX
Cook Critical Care Management of the difficult airway CD-ROM [29]	None	Cognitive		Airway management	XXX
Diagnostic reasoning cases [32]	None				
Laerdal HeartSim® 4000 [37]	None				
TEECHER™ [38]	None				
Umedic [36,39]	Script				
AlgoSim® [40]	Script				
Anesoft ACLS simulator [11, 32]					
MadScientist BloodGas [41]					
MadScientist Cardiac Arrest [41]					
MadScientist Chest Pain [41]					
MadScientist MicroEKG [4					
MadScientist Trauma Or					
[32, 41]					
PAC simulator [16, 47					
Anesoft Anaesthe					
[32, 41]					
Anesoft critical					
[11]					
Anesoft Her					
simulator					
Anesoft					
BODY					
Bre					

Type	Physiology	Usage	Website	Skill(s) taught	Price
Virtual Anaesthesia Machine (VAM) [11, 32]	Model	Cognitive	http://www.eurca.org/res_desc.asp?EdID = 554348		
	Model	Cognitive	http://vam.anest.ufl.edu/		
Hardware-based simulators with no physiology					
Adam,Rouilly cricothyrotomy trainer [57]	None	Psychomotor	http://www.adam-rouilly.co.uk/productdetails.php?id=541&catid = 46	Cricothyrotomy	XXX
Ambu adult airway trainer [58, 59]	None	Psychomotor	http://www.ambu.com	Airway management	XXX
Ambu baby manikin [60]	None	Psychomotor			
Ambu CPR Pal [61]					
Ambu man [61]*					
Armstrong medical Act					
o-fib® CPR/AED					
Manikin [61]					
CLA Intubation manikin [57, 58]					
CLA scorpio-bronco-boy					
CPR Prompt® [61]					
Dexter endoscopy [29, 42					
Flinders MediTech cricoid pressure trainer [63]					
Flinders MediTech epidur injection trainer [64]					
Gaumard maternal and neonatal 'Noelle™' [17, 57]*					
Gaumard Simon® airway [57, 58]					
Laerdal Airman [29, 65]					
Laerdal Airway Manageme Trainer [59, 66]					
Laerdal cricoid stick trainer [57]					
Laerdal delux difficult airwa trainer [57]					
Laerdal Little Anne™ [61]					
Laerdal Rescusci® Anne [16, 36]					
Laerdal trauma head [58]*					
Medic Vision epidural injection trainer [67]					
Nasco life/form® advanced airway Larry [57, 58]					
Nasco life/form Basic Buddy [61]	None	Psychomotor	do?sku = IF03669U	Airway management	XX
Nasco life/form central venous cannulation [42]	None	Psychomotor	http://www.enasco.com/healthcare/ProductDetail.o?sku = IF03693U	Basic life support skills	X
Nasco life/form CPArlene [58]	None	Psychomotor	http://http://www.enasco.com/healthcare/ProductDetail.do?sku = IF01087U	Cannulation training	XX
Nasco life/form cricothyrotomy simulator [68]	None	Psychomotor	http://http://www.enasco.com/top/190/Manikins/CPARLENE%26%23174%3B/	Basic life support skills	XX
Nasco life/form fat old Fred [61]	None	Psychomotor	http://www.enasco.com/healthcare/ProductDetail.do?sku = IF01082U	Cricothyrotomy	XX
Pharmabotics Oxford fiberoptic trainer [16, 62]	None	Psychomotor	http://www.enasco.com/healthcare/ProductDetail.do?sku = IF03750U	Basic life support skills	XX
MacPee [			http://www.pharmabotics.com/products/OXB100.asp		
MacPuf [52]					
Nottingham physiology		Mode			
[53, 54]		Model			
analogue [55]					

Type	Physiology	Usage	Website	Skill(s) taught	Price
Pharmabotics tracheotomy trainer [57]	None	Psychomotor	http://www.pharmabotics.com/products/CYT100.asp	Cricothyrotomy	XX
Simulaids adult airway [57, 58]	None	Psychomotor	http://www.simulaids.com/print/086p.htm	Airway management	XXX
Simulaids David/african American [61]	None	Psychomotor	http://www.simulaids.com/2000.htm	Basic life support skills	XX
Simulaids economy adult sani-man [61]	None	Psychomotor	http://www.simulaids.com/2131.htm	Basic life support skills	X
Simulaids trauma head [58]	None	Psychomotor	http://www.simulaids.com/069.htm	Airway management	XX
Trucorp airsim [59]	None	Psychomotor	http://www.trucorp.co.uk/sections/?cms = Products_Airsim&cmsid = 4–21&id = 21&secid = 4	Airway management	XXX
VBM Bill airway trainer [57, 59]	None	Psychomotor	http://www.vbm-medical.com/files/vbm_ansthesie2.0–1005_gb.pdf	Airway management	XXX
Hardware-based simulators with physiological capability					
Ambu Cardiac Care Trainer [69]*	Script	Psychomotor and cognitive	http://www.ambu.com	Advanced life support skills	XXX
Harvey [17, 47]	Script	Psychomotor and cognitive	http://www.crme.med.miami.edu/harvey_changes.html	Cardiology	XXX–XXXX
Laerdal ALS simulator [70]	Script	Psychomotor and cognitive	http://www.laerdal.com/document.asp?subnodeid = 16358619	Advanced life support skills	XXXX
Laerdal ALS skillmaster [58, 71]	Script	Psychomotor and cognitive	http://www.laerdal.com/document.asp?subnodeid = 7320320	Advanced life support skills	XXX
Laerdal SimBaby [72]	Script	Psychomotor and cognitive	http://www.ambu.com	Infant anaesthetic	XXXX
Laerdal SimMan® [73, 74]	Script	Psychomotor and cognitive	http://www.laerdal.com/simman/simman.htm	Anaesthetic	XXXX
METI ECS™ [17, 39]	Script	Psychomotor and cognitive	http://www.meti.com/Product_ECS.html	Anaesthetic	XXXX
Simulator K [36]	Model	Psychomotor and cognitive	http://www.kyotokagaku.com/products_medi_cpsk.html	Cardiology	XXXX
METI HPS [75, 76]*	Model	Psychomotor and cognitive	http://www.meti.com/Product_HPS.html	Anaesthetic	XXXXX
METI PediaSIM® [17, 77]	Model	Psychomotor and cognitive	http://www.meti.com/Product_Pedia.html	Infant anaesthetic	XXXXX

cognitive

www.capnography.com

www.thoracic-anesthesia.com

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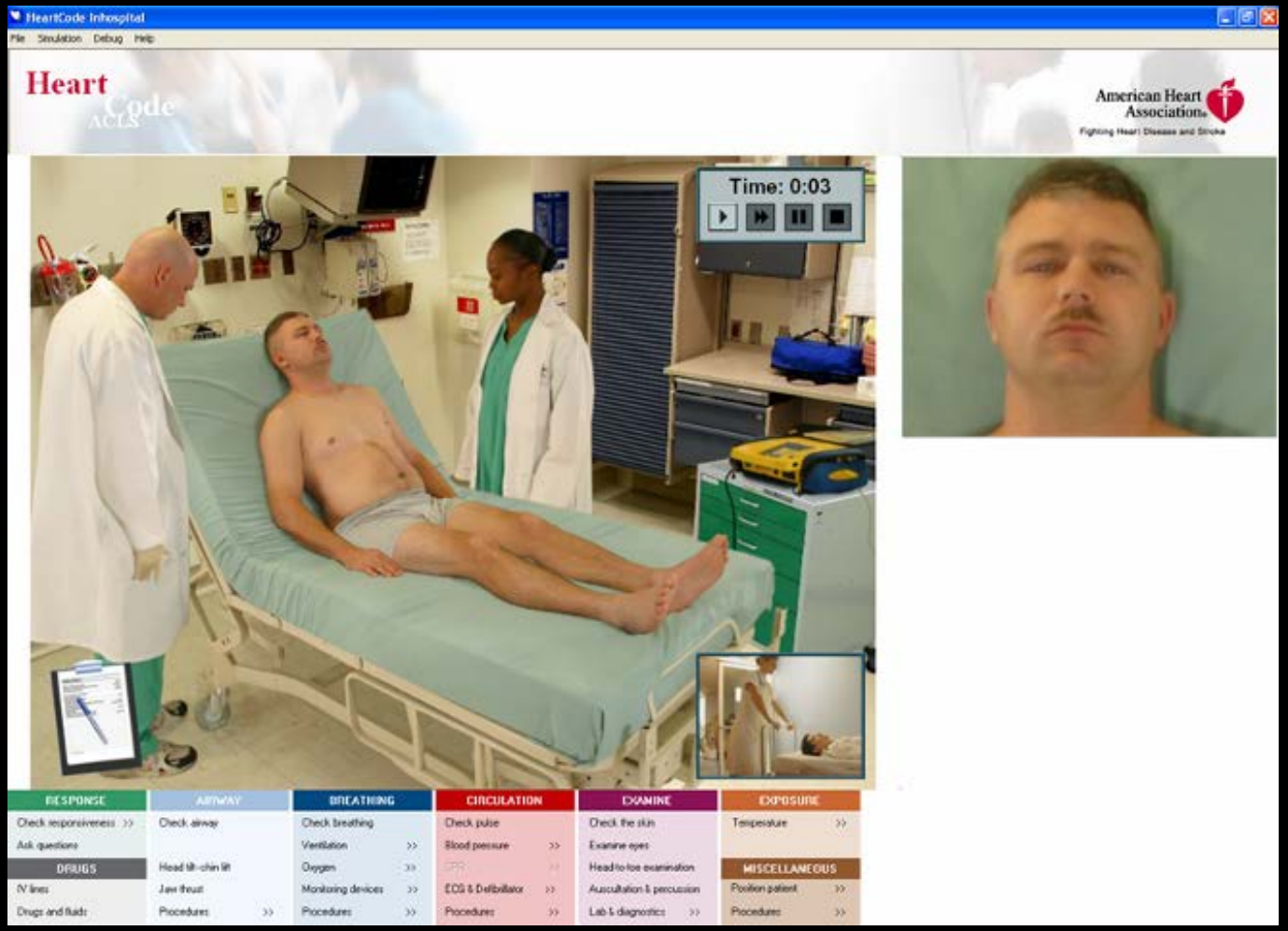
Screen, script, cognitive



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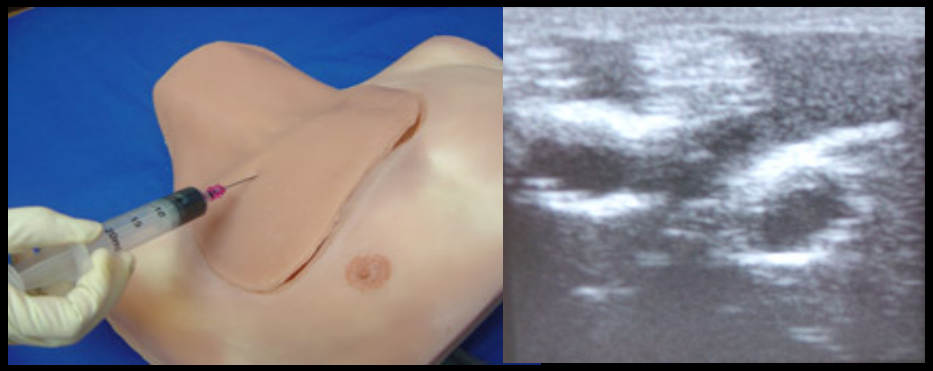
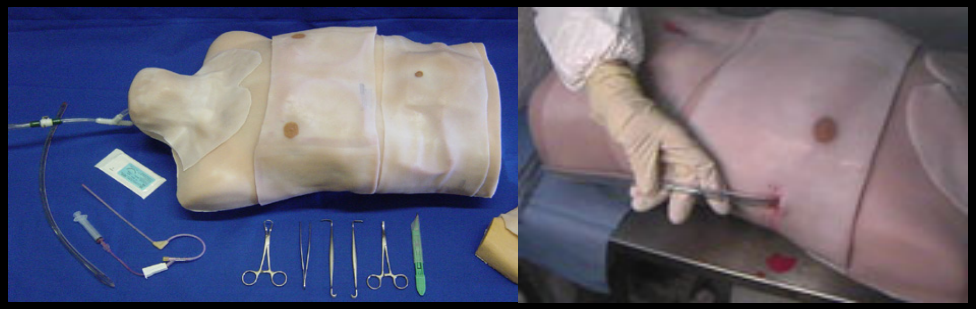
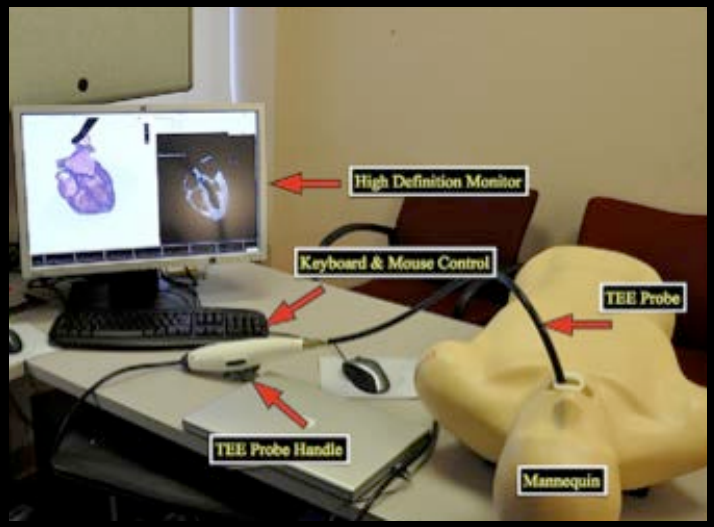
hardware, no physiology, psychomotor







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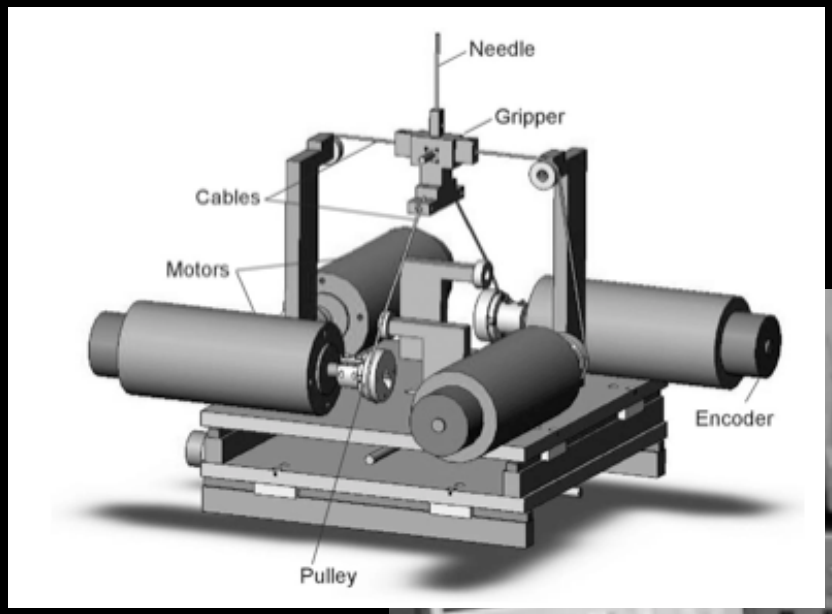
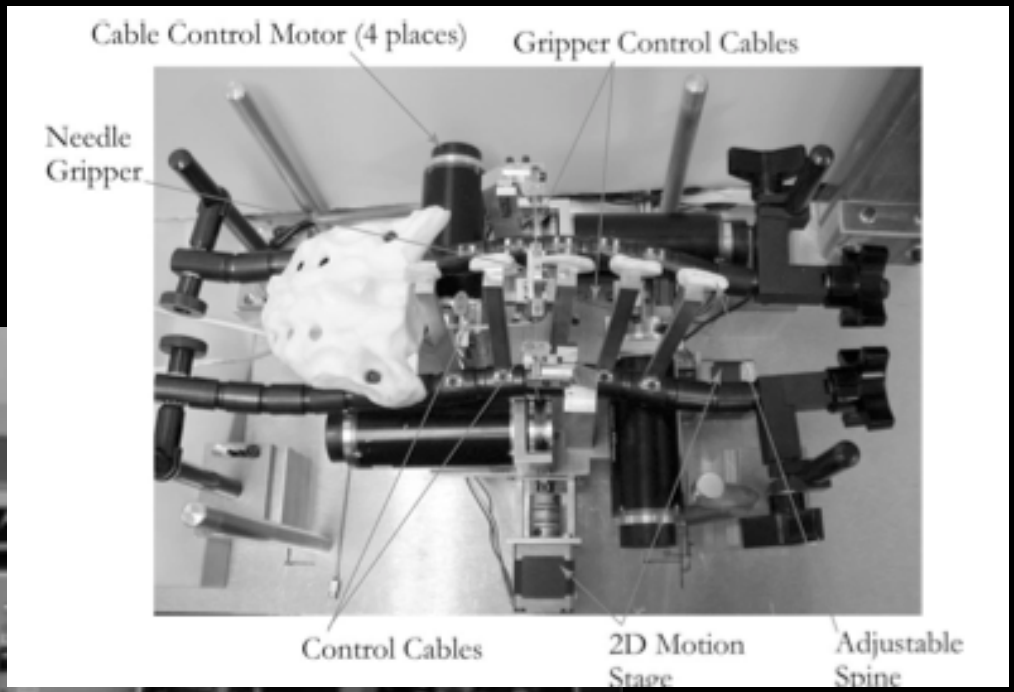
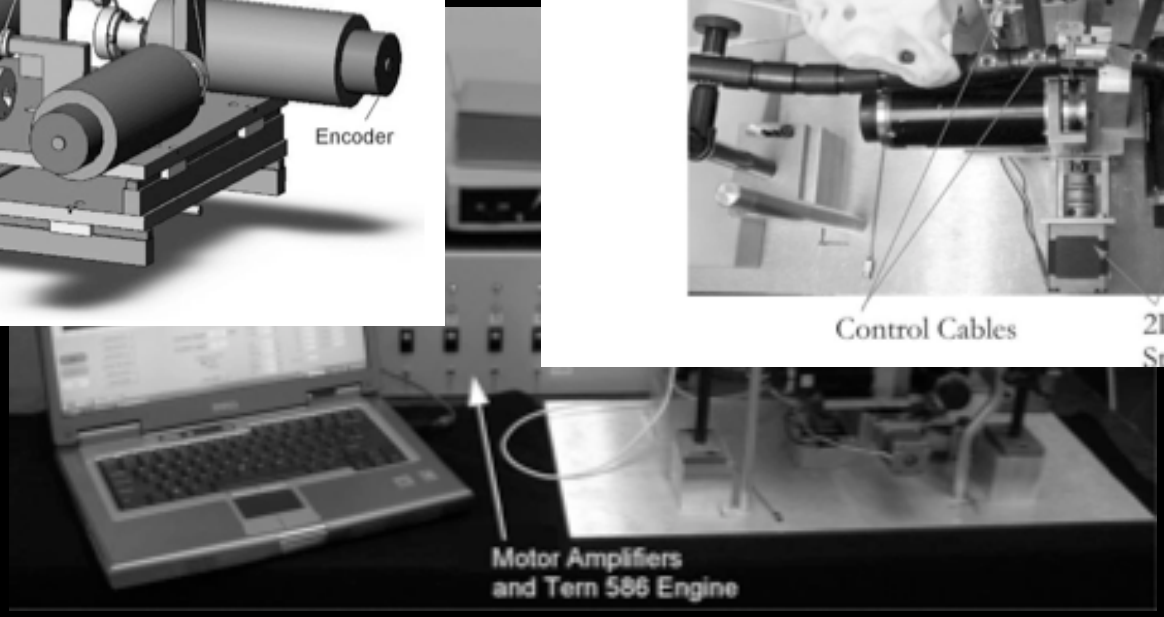
hardware, model controled, psychomotor







Magill. Sim Hlth Care. 2010. 5(3). 179-184

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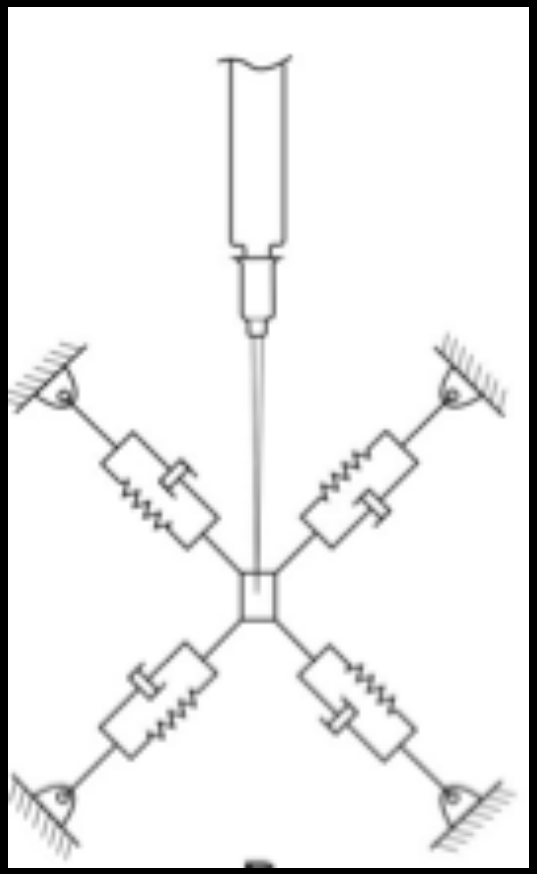

Dimensions of tissue layer

$K_{p,j}$ - elasticity

$K_{d,i}$ - drag

$T_{0,i}$ - mean tension

Alpha $_j$ - *transition time constant*

$T_{m,p}$, $T_{s,j}$ - texture properties

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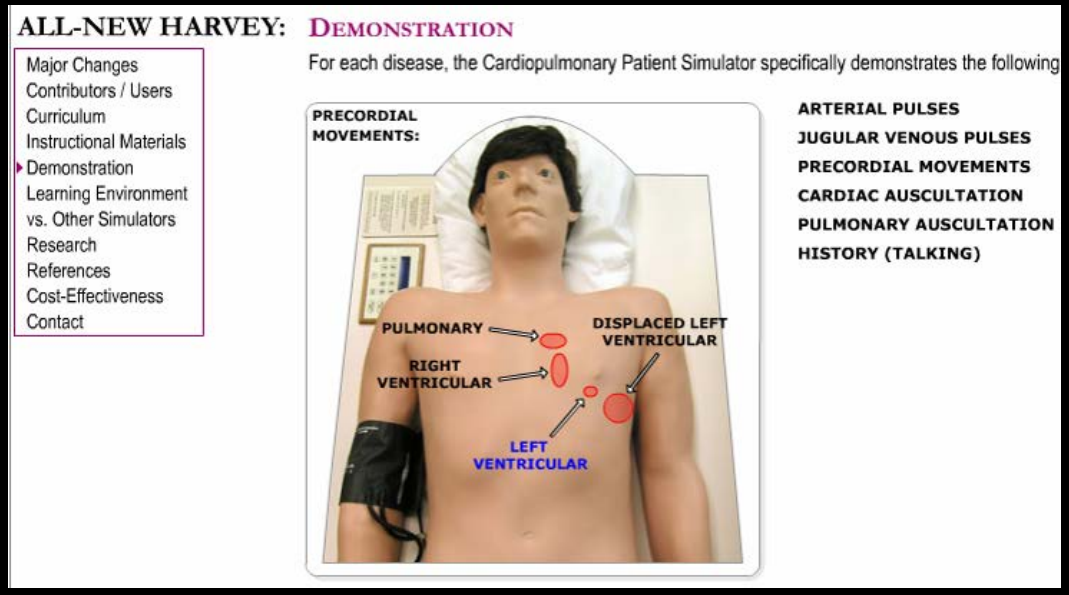
Hardware, script, physchomotor or cognitive

"High Fidelity"



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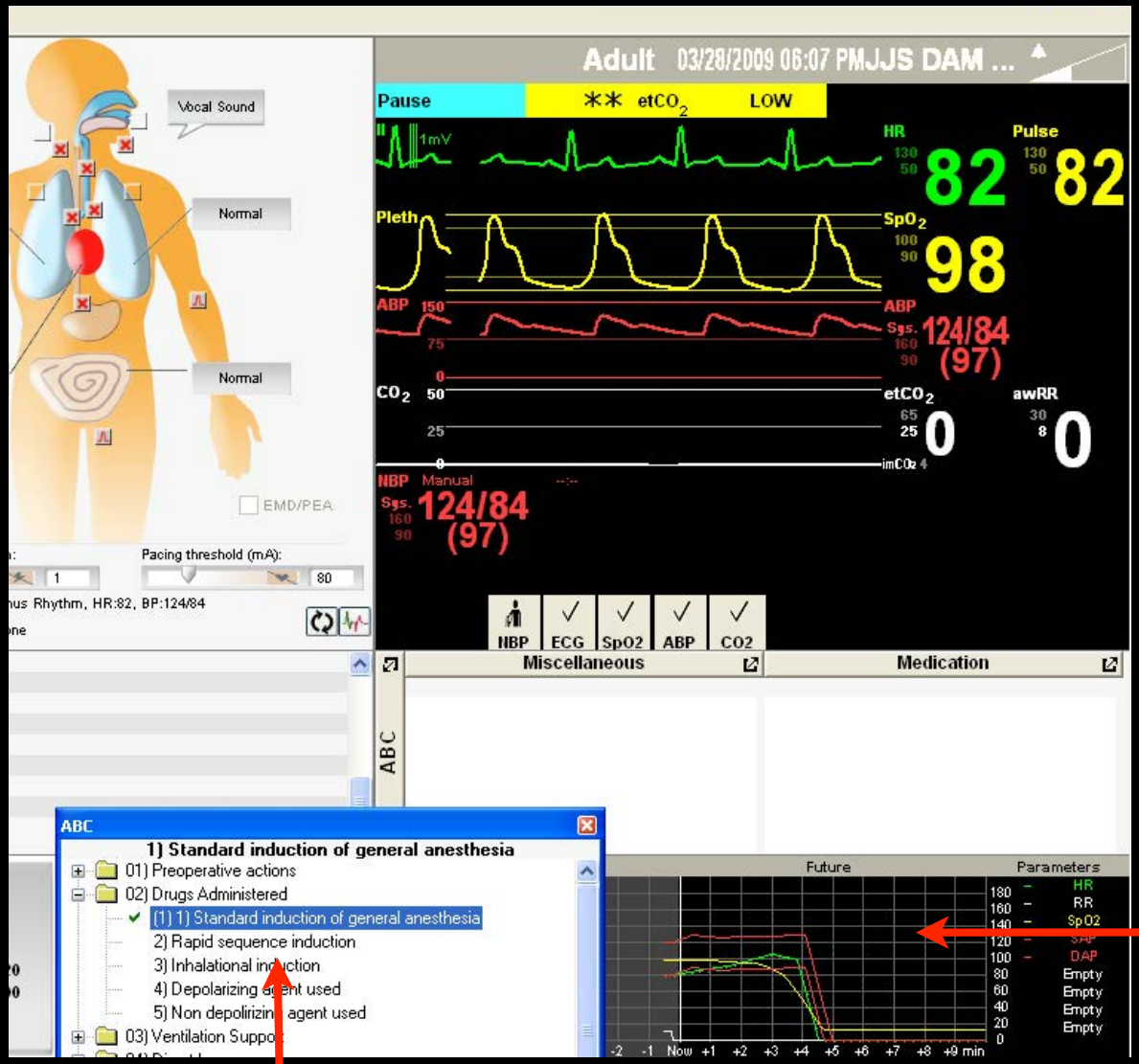

Scripted response

Induce GA

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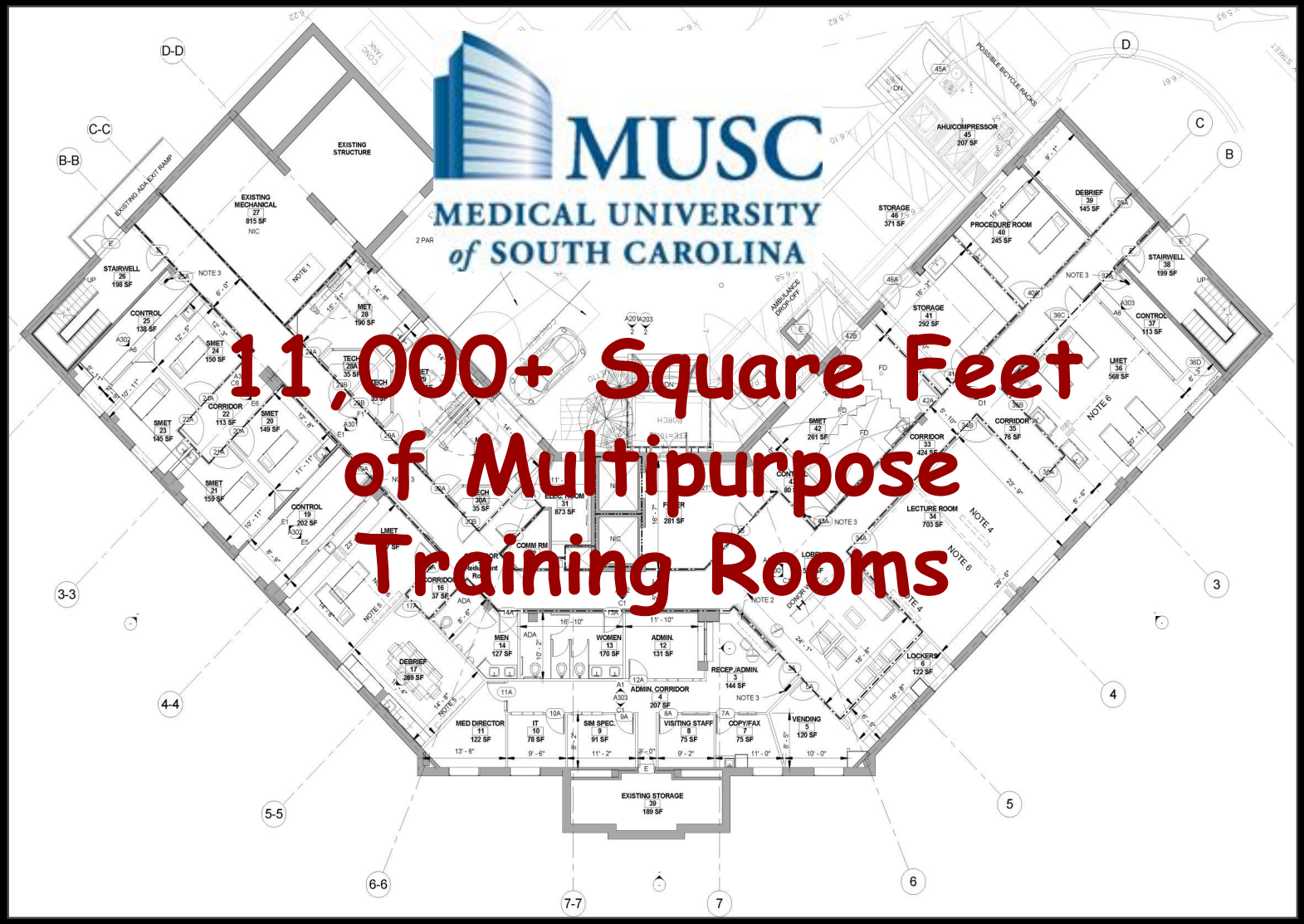

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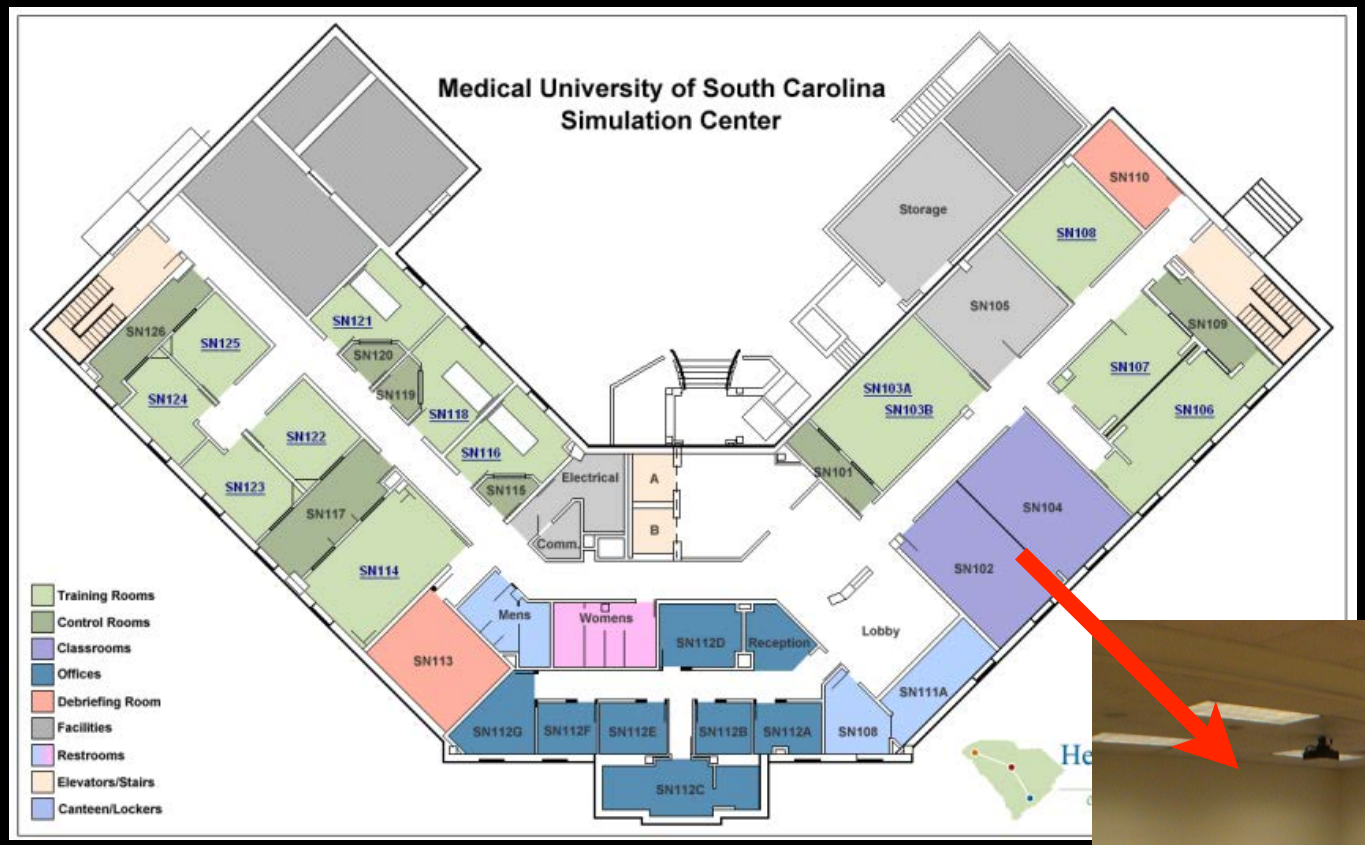

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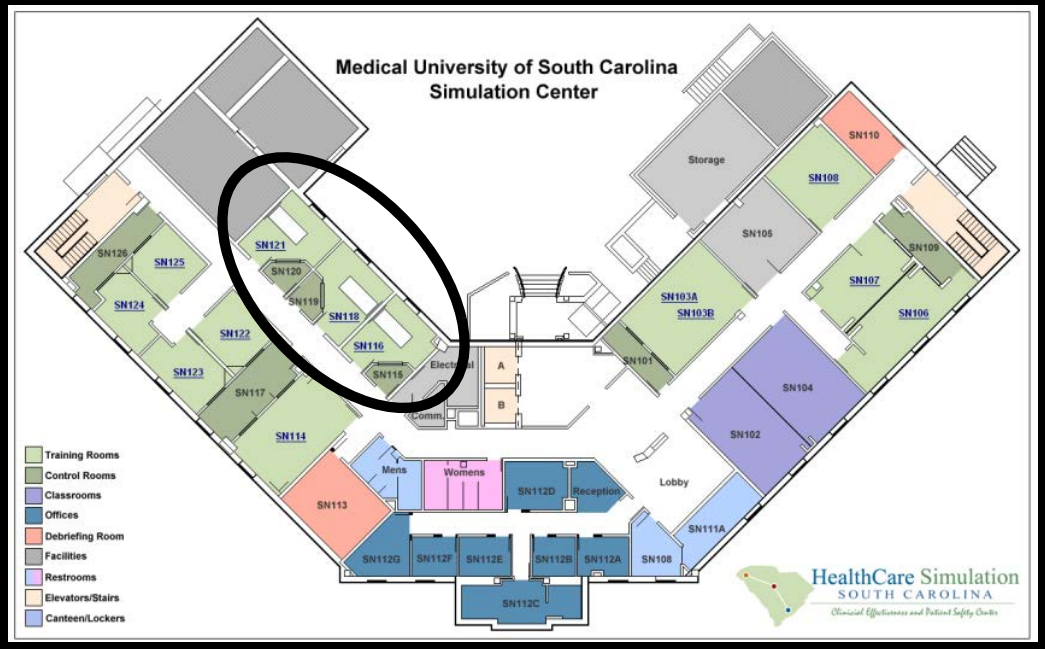

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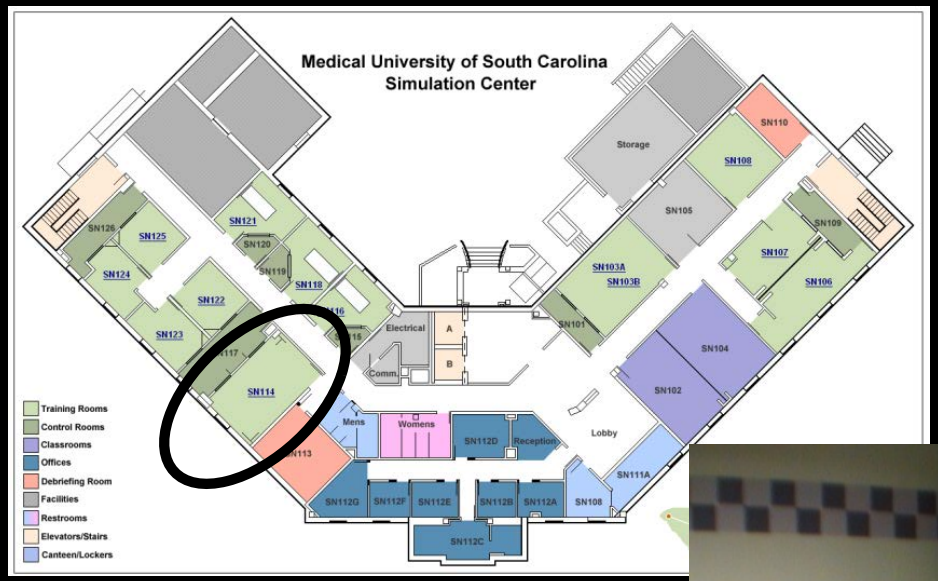

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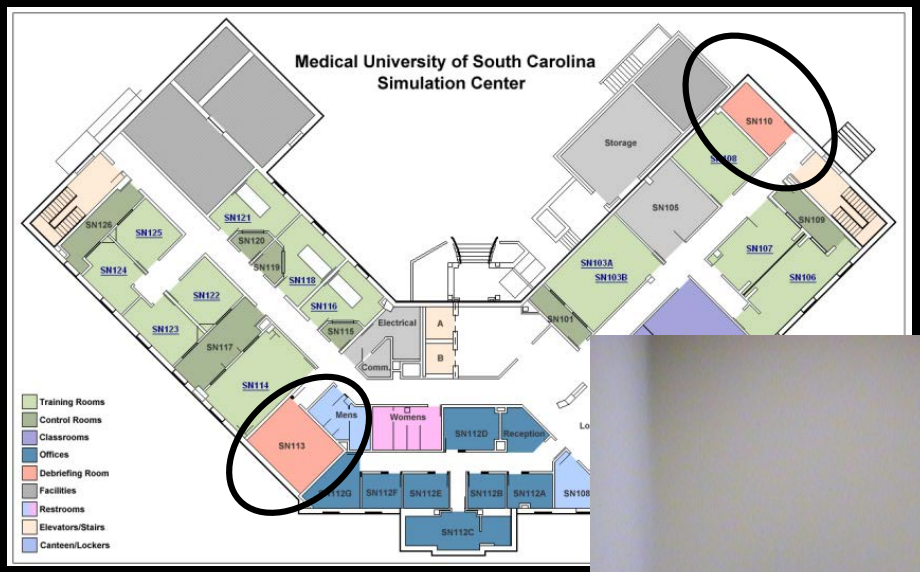

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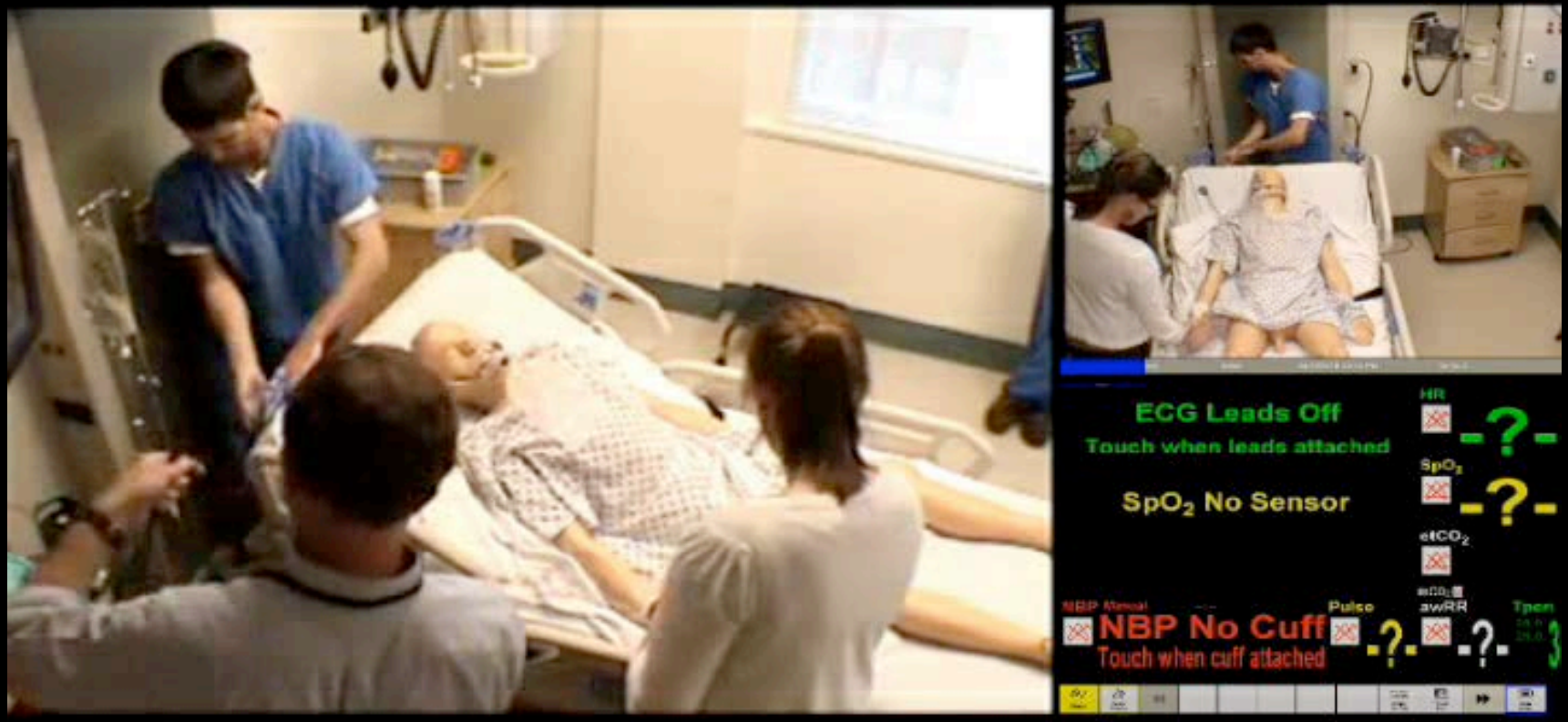

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That's cool and all, but doesn't it cost A LOT!?

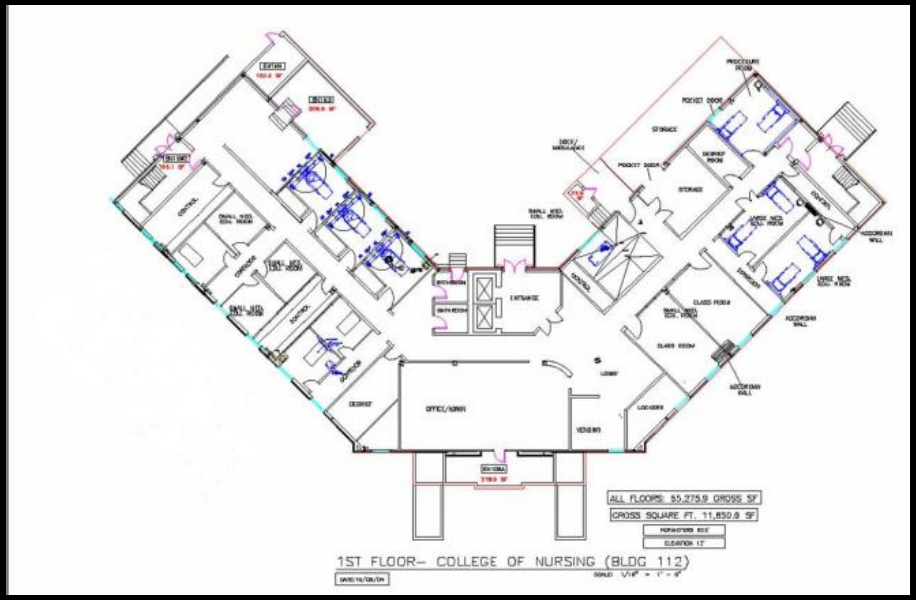
11,000 square feet

Renovation $1,560,000

Equipment $810,000

AV Equipment $300,000

Computers $200,000



2.9 million

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PASS
Pediatric Anesthesia in-Situ Simulator

Laerdal SimBaby	$35,000
Modular Cart	$1000
AV Equipment	$3300
Anesthesia Equipment	$Free???

$50,000

Edler. Simulation in Healthcare. 2010,5(2)112-115

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PASS
Pediatric Anesthesia in-Situ Simulator

100%: course was useful, met expectations, enjoyable and realistic

Excellent introduction to ARCM

Scenarios were good, very real

Among many meeting highlights

Edler. Simulation in Healthcare. 2010,5(2)112-115

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Scenario Design

- Intended purpose of scenario (test)
- Scenario amenable to simulation
- What are the knowledge and skills to be evaluated?
- Ensure those skills are imbedded in the scenario
- Must target activities at skill level of provider

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Simulation in Healthcare

Management of Profound Hypotension Secondary to Spinal Anesthesia: Simulation Case Scenario

William Raymond McIvor, MD;
Yetunde Olutunmbi, MD;
Jessica Borrell

February 2010

Recognizing and Treating Malignant Hyperthermia

Marcia A. Corvetto, MD;
Jeffrey M. Taekman, MD

June 2010

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MH
Learning Objectives

Medical Knowledge
- List the triggering agents
- Describe pathophysiolgy
- List the S&S
- Generate differential diagnosis

Patient Care
- Demonstrate Dx, Rx
- Demonstrate knowledge of Dantrolene
- Demonstrate knowledge of management of susceptible patients

Practice-Based Learning
- Discuss MHAUS and how it works

Professionalism
- Demonstrate appropriate teamwork and communication

Systems-Based Practice
- Demonstrate ICU care
- Discuss how to counsel family
- Describe diagnostic testing for MH

Carvetto. Sim Hlth Care. 2010

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MH
Guided Study Questions

What drugs are known to trigger MH?

How do triggering agents cause MH crisis?

What are the S&S associated with MH?

Is Masseter Muscle Rigidity related to MH?

What should I do to manage MH?

What is the dose of Dantrolene?

How should I counsel this patient?

How can a diagnosis be confirmed?

How should an anesthesia machine be prepped for a MH case?

Carvetto. Sim Hlth Care. 2010

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MH

Stem

JP is a 19 yo man with no significant medical history who suffered a severe fall while mountain biking which resulted in an open ankle fracture. He presents to the OR for ORIF.

Carvetto. Sim Hlth Care. 2010

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State	Patient Status	Student Learning Outcomes or Actions Desired and Trigger to Move to Next State	
1. Baseline	Awake, oriented Tachycardic T 37.9°C BP 145/80 HR 90 O_2 Sat 98% RR 24	Learner Actions: Place monitors Preoxygenate Premedicate and proceed with induction	Operator: Announce patient arrival in OR Maintain oxygen saturation above 98% Teaching Points: Use the appropriate monitoring Premedication drugs and preoxygenation Trigger: Proceed to INDUCTION once patient is preoxygenated, premedicated and all monitors are applied
2. Induction	Patient becomes unresponsive T 37.5°C BP 110/60 HR 80 O2 Sat 100%	Learner Actions: Induction with agent of choice Neuromuscular blocker given	Operator: Patient remains stable during induction Teaching Points: Choice of induction agents Trigger: If succinylcoline is used proceed immediately to MMR
3. MMR	Patient presents incomplete relaxation of the muscles of the jaw T 37°C BP 95/58 HR 90 O_2 Sat 100%	Learner Actions: Manual separation to open the mouth Intubation Check ETT placement Mechanical ventilation initiated	Operator: Trismus after succinylcholine for 90 s (perform it in the simulator or provide the information to the students) After 90 s, laryngoscopy and intubation are possible Progressive decrease of oxygen saturation if intubation takes more than 3 min (until 90%) Once intubated, bilateral breath sounds present Teaching Points: Association of MMR and MH Trigger: Proceed to SURGERY after mechanical ventilation
4. Surgery	Patient stable. Surgery starts T 37°C BP 110/70 HR 80 O_2 Sat 99% $ETCO_2$ 38	Learner Actions: Demonstrate proper intraoperative monitoring Continue anesthesia with nontriggering drugs	Operator: Patient remain stable Teaching Points: Decide to discontinue or continue the surgery Continue with nontriggering agents Trigger: Proceed to HYPERCARBIA in 2 min
5. Hypercarbia	Patient becomes hypercarbic and mildly tachycardic T 37°C BP 100/70 HR 110 O_2 Sat 97% $ETCO_2$ 55	Learner Actions: Recognize hypercarbia and tachycardia Increase FIO_2 to 100% Try to find the cause of hypercarbia Check ventilator parameters, ETT, and breath sounds Arterial line placement	Operator: If learners check absorbent canister, tell them that it is purple and hot Ventilator, ETT, and breath sounds are OK ABG: PH 7.2, $PaCO_2$ 67, PaO_2 379, Bic 24, BE −1.2 Teaching Points: Differential diagnosis of hypercarbia Order of signs in MH Invasive monitoring Trigger: Proceed to FEVER in 2 min

Carvetto. Sim Hlth Care. 2010

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MH
Debriefing

Talk about MMR and MH

Talk about intubation, importance of RSI

Discuss signs of MH and their appearance order. Unexplained tachycardia is the earliest and most sensitive sign of MH

Discuss MHAUS protocol for MH

Discuss how to contact MHAUS for information

Discuss use of Dantrolene

Talk about MH kit or cart in your hospital

Discuss importance of ICU stay and treatment options

Discuss how to counsel the family

Carvetto. Sim Hlth Care. 2010

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The Debrief

Provide a safe place for decompression

- Serious but able to have fun

Stimulate reflection on performance

Provide prompt, objective and appropriate feedback

- Let participant discover what went wrong
- Focus on perforMANCE not perforMER.

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Diagnostic Educational Objectives based Reflection (D.E.O.R)©

00:00:00	SCENARIO: NLN Preoperative Bowel Obstruction--Fluid and Electrolyte Imbalance Revised PATIENT: Stan Checketts Brief summary: This case presents a preoperative patient who presents to the Emergency Department with severe dehydration. The symptoms of dehydration are related to poor intake of fluids by mouth and reflux vomiting (small bowel obstruction). The student will be expected to demonstrate basic assessment to detect signs and symptoms of severe dehydration and impending hypovolemic shock, notify the physician immediately and provide the appropriate treatment. CRITICAL STEPS: Fluid Bolus for Dehydration COURSE AUTHORS: NLN, modified by Frances W. Lee, DBA: CEPSC
00:00:19	√ Caregiver washed hands.To reduce the risk of health care associated infections nurses should comply with current Centers for Disease Control and Prevention hand hygiene guidelines. Wash hands when entering a room, use gloves, and wash hands following a procedure.
00:00:20	√ Introduced self to patient. Introducing self to patient and family members initiates the nurse patient relationship. A proper introduction not only includes name but also title so that the patient knows who is providing care. A name badge should also be worn visible to the patient.
00:00:21	√ Identified patient by the patient's armband. Accuracy in patient identification should be provided with high attention and should be performed by at least two independent identifiers.
00:00:31	√ Applied Oxygen. Application of oxygen is appropriate for this patient.
00:02:16	√ Obtained Vital Signs in first 5 minutes.
00:02:18	√ Attached SpO2 in first 5 minutes.
00:02:21	√ Evaluated labs.
00:02:56	√ Evaluated labs.
00:05:03	x Did NOT assess Pain within first 5 minutes. Assessment and documentation of pain is as prominent as the documentation of the traditional vital signs and should be considered as an important part of care. The American Pain Society coined the phrase "Pain as the 5th vital sign". Pain assessment and management are mandated by the Joint Commission on the Accreditation of Healthcare Organizations.
00:09:22	√ Communicated directly with physician.
00:09:24	-----Emergency Room Orders. Start IV and give Normal Saline fluid bolus 500 mL over 30 minutes O2 via nasal cannula to maintain SpO2 greater than 92% Diet: NPO Insert Nasogastric tube to low constant suction Labs: Complete Blood Count Chemistry Profile Abdominal Series x-ray Meds: Buprenex 0.3 mg slow IVP every 6 hours prn pain -----
00:09:59	-----Emergency Room Orders. Start IV and give Normal Saline fluid bolus 500 mL over 30 minutes O2 via nasal cannula to maintain SpO2 greater than 92% Diet: NPO Insert Nasogastric tube to low constant suction Labs: Complete Blood Count Chemistry Profile

From a Nursing Scenario

Note what's in the log—

1) Summary of the scenario (facilitator can review this to start a debriefing)
2) In this particular scenario, performance points are flagged as √ for Correct and X for Incorrect (could have point values or other)
3) Each performance value (√, X) is followed by a "Comment" that notes why a given performance point is Correct or Incorrect as a function of a specific training objective.
4) Clicking on a specific time line cues the video to that point associated with the comment.

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D.E.O.R.©

Facilitator Knowledge Probes:

Do you know that it is important to ….?

What are the steps to…..?

Facilitator Skill Probes:

Do you know how to …..?

Show me how to….

Facilitator Judgement Probes:

When it is important to…..?

When should you…..?

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There must be a downside!

- Some patient conditions cannot be modeled well. diaphoresis
- Physiology is sometimes difficult to mimic. Multiple pharmacologic interventions for an unstable patient
- Unnecessarily complex scenarios can be difficulty. Separation from CPB
- Assessment is not yet well defined.

Rationale for simulation

Where simulation is today in education and assessment

Types of Simulators

Creation of a scenario

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John Schaefer, MD
Associate Dean for
Patient Safety

Matt McEvoy, MD
Assistant Dean for
Patient Safety

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Thanks!

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