



Case Study: Integrating Simulation into a Surgical Orientation

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<http://simcen.usuhs.mil/mmvr2002>

Outline

- Current U.S. military trauma training challenges and solutions
- Basic trauma care education challenges
- Solutions
 - National Capital Area Medical Simulation Center
 - Medical student surgical orientation

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Current U.S. Military Trauma Experience

- Military hospitals don't see enough trauma to train all personnel internally
- DoD should have sufficient expertise & personnel to ensure capable trauma surgical care in earliest stages of war
- All medical care providers

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Special Challenges in Trauma Surgery Training

- Blunt trauma infrequently requires operative care
- U.S. incidence of penetrating trauma is decreasing
- Use of animals becoming less appealing
- Cadavers don't bleed

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Solutions

- Military medical center Level I trauma centers
- Civilian/military trauma training centers
- Individual rotations through trauma centers
- Other trauma experience/courses

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But...

- What about the beginners?
- What about teaching rare scenarios?
- What about testing competency?
- ...

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National Capital Area Medical Simulation Center (NCAMSC)

- unique facility dedicated to the education of military medical students
- modern educational techniques/devices
- 12 clinical exam rooms
- 16 PC computer lab
- Conference rooms
- surgical simulation suite



USUHS Orientation to Surgery 2 Day Program

- Third year medical students
- Two day animal lab
- Laparotomy day 1
- Thoracotomy day 2
- Lectures

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New 3 Day Program

- All parts of the simulation center are being used to introduce third-year medical students to surgery
- First day of 3 day orientation at the Simulation Center (days 2 and 3 = animal lab as previously)

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12 Clinical Exam Rooms

- Teaching through the use of simulated patients – actors taught by a patient trainer to mimic signs and symptoms of specific diseases.



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Standardized Patient Examinations

- 97% of U.S. Medical Schools use Standardized Patients for instruction; 85 % use them for assessment
- Increasing use of Standardized Patients in residency training programs
- SP use in “high stakes” testing: USMLE (2002/2003)

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Clinical Exam Rooms

- Take a medical history and a perform a focused physical exam for a variety of acute abdominal diseases (2 patients each)
- These encounters are videotaped and the tapes are reviewed with the teaching surgeon during the subsequent 45 minutes

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Faculty Monitoring Area



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Computer Lab

- Used to teach a suturing and knot-tying lab using web-based applications (vesalius.com) and hands-on surgeon instruction using suture trainers
- Triage principles

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Two Conference Rooms

- Introductory talk and a lecture preparing the students for the laparotomy lab
- Plastic mechanical models are used to teach such skills as endotracheal intubation, chest tube insertion, and the surgical airway



Surgical Simulation Suite

- state-of-the-art virtual reality lab and an operating room complete with human patient simulator mannequins

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Virtual Reality Lab: Trauma Training Simulators

- BDI Anastomosis Simulator
- MGI Limb Trauma Simulator
- HT CathSim and Bronchoscopy Simulator
- MedSim UltraSim
- USU DPL and Pericardiocentesis

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FAST: Focused Abdominal Sonography for Trauma

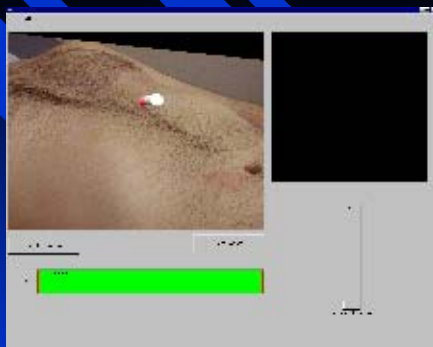
UltraSim:
Ultrasound Simulator



Simulators Developed by the USU Surgical Simulation Lab



Diagnostic Peritoneal Lavage



Pericardiocentesis

ATLS Surgical Skills Practicum



Other VR Trauma Simulators

- ReachIn Technologies:
 - Surgical Airway/Cricothyroidotomy
- Research Triangle Institute:
 - Trauma Patient Simulator
- METI:
 - Combat Trauma Patient Simulator
- University of Michigan
 - Burn Patient / Immersive ED
- CIMIT
 - Chest Tube

Operating Room

- The human patient simulator (METI, Laerdal, MedSim) is used to teach the best approach to simple clinical problems such as hypotension or hypoxemia

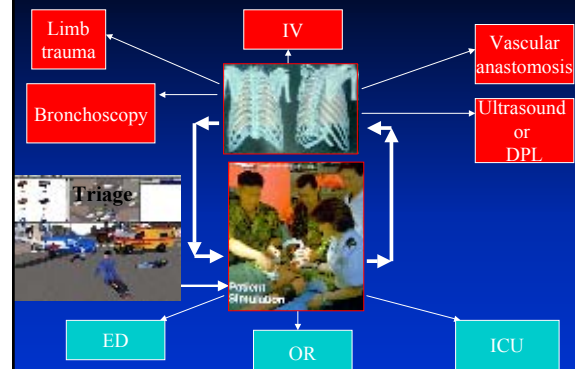


Orientation to Surgery - MSIII

- OSCE (Objective Structured Clinical Exam)
 - Acute abdomen cases
 - Debrief / review videos
- Suture Lab
- Triage
- Resuscitation (human patient simulator)
- Virtual Reality procedures
- Standard mannequin procedures (airway, etc.)
- Lecture X 2

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Integrated Training Scenario



Summary

- Trauma care skills and experience are important in the successful resuscitation and operative care of injured patients
- Lack of training opportunities makes it difficult for military care providers to learn and maintain these trauma care skills
- Virtual reality trauma simulators are the best long term answer to this problem

Collaborators

- Yale, Stanford, Georgetown
- National Board of Medical Examiners
- National Library of Medicine
- NASA, TATRC
- AMSUS
- Agilent, Immersion Medical, E-Semble, ReachIn, Laerdal, METI, SRI, Surgical Science

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