Air Force Medical Modeling & Simulation: Bridging the Gap between US and Battlefield Medicine

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Mission and Vision

Mission

Integrate Modeling and Simulation Technology into all Education, Training and Sustainment Platforms

Vision

Build a Distributed Human Patient Simulation Network, Create Simulation Centers of Excellence, and Exploit Technological Innovation

Battlefield Trauma, Critical Care Air Transport, In Garrison Care, Patient Safety, Humanitarian Missions, CBRN, Disaster, Homeland Defense and Pandemic Response

Integrity - Service - Excellence
Goals

- Combat Casualty Care Training
- Currency and Competency
- Patient Safety and Team Performance
- Medical Error Reduction
- Health Care Cost Reduction
- Disaster and Pandemic Response

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## Surgical WorkLoad (Comparison to US Trauma Center*)

<table>
<thead>
<tr>
<th>US Level One Trauma Center</th>
<th>332 EMDG/AFTH Balad</th>
</tr>
</thead>
<tbody>
<tr>
<td>~2000-7500 admission/year</td>
<td>~8000 admissions/year</td>
</tr>
<tr>
<td>&lt;30% penetrating trauma</td>
<td>&gt;90% penetrating trauma</td>
</tr>
<tr>
<td>High velocity GSW – rare</td>
<td>High velocity GSW – rule</td>
</tr>
<tr>
<td>Blast injury – rare</td>
<td>Blast injury – very common</td>
</tr>
<tr>
<td>&lt;10% trauma pts need surgery</td>
<td>&gt;80% trauma pts need surgery</td>
</tr>
<tr>
<td>Most pts need one procedure/one surgeon</td>
<td>Majority pts require multiple procedures and specialists</td>
</tr>
<tr>
<td>Multiple casualty event – rare</td>
<td>Mass casualty event – common</td>
</tr>
<tr>
<td>Trauma – nominal workload</td>
<td>Trauma – majority of workload</td>
</tr>
</tbody>
</table>

*US trauma care unlike battlefield trauma. Medics must combine hands-on with simulation training to achieve and maintain currency and competency*  

*Integrity - Service - Excellence*  

*May 2007*
“On-The-Job-Training” -- Not An Option!
Prior Status of AFMS Simulation Capability

- Isolated MTF initiative with no strategic plan or CONOPS
  - No procurement strategy (UFRs)
  - Departments worked independently within MTFs
- Lack of total asset visibility
- Lack of support staff to run and maintain equipment
- Simulators are underutilized or used inadequately
- Lack of standardized and validated curriculum
- No plans for interoperability or compatibility

Maximum capability not achieved!
Central Program Office (AETC/SG)

- AF SG tasked program management to AETC/SG--FY08
- Provide CONOPS, strategic plan, oversight, coordination of capabilities
- Validate current and future simulation requirements
  - Ensure total asset visibility
  - Standardize curriculum and scenario development
  - Standardize equipment req’s to training/readiness platform
  - Standardize equipment procurement and maintenance
  - Standardize contracts and funding for personnel
  - Consultant for equipment purchases/bulk negotiating agent
- Monitor and track progress of simulation projects and contracts
- Staff assistance and technical support
- Program for sustainment through corporate process
AFMS Equipment Inventory*: Mannequins & Surgical Simulators

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>METI HPS</td>
<td>25</td>
</tr>
<tr>
<td>METI ECS</td>
<td>124</td>
</tr>
<tr>
<td>METI IStan</td>
<td>21</td>
</tr>
<tr>
<td>METI PediaSim</td>
<td>7</td>
</tr>
<tr>
<td>METI BabySim</td>
<td>14</td>
</tr>
<tr>
<td>METI Surgical Simulator</td>
<td>12</td>
</tr>
<tr>
<td>Laerdal SIMMAN</td>
<td>86</td>
</tr>
<tr>
<td>Laerdal SimBaby</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>312</strong></td>
</tr>
</tbody>
</table>

Standardized Curriculum Will Create World Class Simulation Training

Total: $24M

*Includes AFR/ANG and STARS-P
11 Nov 2008
Identified 9 existing simulation “Centers of Excellence”
- Tier 1 Sites
- Simulation SMEs
- Full-time Staff
- Workload >30 hrs/month

Enhanced site capability
- Additional Contract FTEs- Simulation Coordinator/Operator
- Standardized curriculum and scenarios
- Support for equipment operation and maintenance
- Validation review by AF SG Consultants and Career Field Managers

“Hub and Spoke” support network for AF MTF mentorship
- Similar training platform
- Geographic location
Tier I Site Selections

- Travis *
- Keesler *
- Wilford Hall *
- C-STARS Saint Louis
- C-STARS Baltimore
- C-STARS Cincinnati
- USAFSAM - EMEDS *
- National Capitol Simulation Center/USUHS
- Defense Medical Readiness Training Institute (DMRTI)

- Simulation Operator Course
  Center for Sustainment of Trauma and Readiness Skills (CSTARS)
Curriculum Development

Readiness Skills met with Simulation

- Physician: 75%
- Nurse: 97%
- Technician: 87%

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Curriculum Development

- Tier 1 Site Projects Workshop 12-14 May 08
  - Tier structure, roles and responsibilities
  - Curriculum standardization and development
    - Standard templates and validation tools
  - Tier 1 site collaboration – current best practice sharing
  - Assigned curriculum to Tier 1 sites c/w expertise

- Populate Knowledge Exchange, ADLS
  - Download/share curriculum, scenarios and validation tools

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Kitchens and Hygiene Equipment

MED+Learn

COURSE LIST

Welcome to the AFMS online course catalog. To search the course catalog, enter the search criteria and then click Search. To view information on a course, click on the information icon. To enroll in an online course, click on the course title. To enroll in an online section or a classroom course, click the information icon to display the section list and then click the enroll link next to the section which you wish to enroll.

Note: If the section you wish to enroll in is full, you may click the Waitlist link to be added to the waiting list for the course. When a spot becomes available, you will be notified.

USAFA School of Aerospace Medicine

Internet Education Training Center (IETC)

Emergency Management Training Center (EMTC)

Environmental Engineering Training Center (EETC)

Environmental Protection Training Center (EPTC)

Expeditionary Training System (ETS)

Functional Diagnostic Laboratory (FDL)

Hazardous Material Response Center (HMRC)

Intelligence, Surveillance, and Reconnaissance (ISR)

Logistics Management Training Center (LMTC)

Medical Training Support Center (MTSC)

Military Medical Operations (MMO)

National Training Center (NTC)

Public Safety Support Center (PSSC)

Remote Site Training Support Center (RSTSC)

Research, Development, and Engineering (RDE)

Strategic Environmental Research and Development Program (SERDP)

Technical Support Center (TSC)

U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)

U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)
Aeromedical Evacuation C-17 Virtual Walkthrough

Image courtesy of Dorothy E Buckholdt, Director, Advanced Distributed Learning, USAF School of Aerospace Medicine
210-536-4671 Dorothy.Buckholdt@brooks.af.mil
Center for Sustainment of Trauma and Readiness Skills St Louis

- Operational Rehearsal for Mass Casualty and Trauma Triage
- Emergency Medical Command and Communication Systems
- SME Tier 1 site for Sustainment for Trauma and Resuscitation Skills Program (STARS-P)
- Lead for Simulation Center Accreditation Process
- Society for Simulation in Healthcare
- American College of Surgeons

Trauma lab at SLU simulates war zone

Medical personnel headed overseas, plus students here, learn to face emergencies, make decisions and take action.

By Rhyla Bernhard

When brain matter spilt from the mannequin’s head, doctors knew he was gone and moved to the next patient.

Doctors, nurses and medics demonstrated their skills Tuesday at a simulated military hospital now housed at the St. Louis University School of Medicine. The school teamed up with the Air Force’s Center for Sustainment of Trauma and Readiness Skills to build the new trauma lab, which opened last week to simulate a smaller facility established six years ago.

Before they are deployed to war zones overseas, Air Force health care staff take a two-week training course at the center, including a rotation in the emergency department at St. Louis University Hospital.

In the simulation lab, realistic mannequins play the role of injured of- ficers and civilians to help prepare military doctors for the battlefield.

On Tuesday, the mannequins included two adults and one child. All the mannequins were designed to simulate injuries.

“Trauma has to decide which patients should be airlifted to the hospital, and which they couldn’t save.”

“If our medical students and war Air Force personnel can handle this, they can handle 90 percent of what they see in the real world,” said Dr. Philip Alderson, the school’s dean.

The Simulation and Clinical Skills Center operated at Keesler Air Force Base in Mississippi 17 years ago with one mannequin. Now housed on campus, the center expansion also includes an emergency room, an operating room and a central room where instructors can watch through one-way glass.

“The Air Force idea helps operate two smaller clinics in Baltimore and Glencoe, Air Force officials estimated, they would today at more than $3 million, including $250,000 each for such mannequins.”

“The mannequins breathe, bleed and take under the control of instruc-
tors.

Simulating injuries seen in war zones helps demobilize soldiers and nurses as they can stay calm, said Lt. Col. Dan Brodsky.

“If you screw up here, you learn. You’re not going to make that mistake here,” said Dr. James, a doctor who directs pediatric medicine at the lab. Medical students will share the SLUFACILITY Military equipment can be swapped out for hospital equipment, for familiarization while with the mannequins, they will use in the field. After the practice sessions, instructors watch de- mensions to video and critique their performance with instructors.

In the simulation, Dr. Emilio Ortego held still a 6-year-old mannequin, his leg with internal bleeding.

“They’re things I haven’t seen before or treated before,” said Ortego, a resident in family medicine at St. Me- rickville Hospital in Belleville who is on active duty in the Air Force.

The simulations are crucial because civilian hospitals can’t fully prepare you for military situations, said Stephanie Butler, an Air Force nurse who spent six months in a trauma coordinator in Afghanistan.

“They’re going to have limited resources, limited personnel,” she said. “You don’t get a second shot when you’re in the theater.”

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USUHS/NCR and AFMM&S Collaborative Research

- Curriculum/Scenario Development
  - Graduate Medical Education
  - Standardized Patient Training
- R+D Center Surgical Task Trainer
- Wide Area Virtual Environment (WAVE)
- AF curriculum validation/assessment site
- Execute AF Med Sim training for NCR
- Accredited by the American College of Surgeon’s

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Program Update: VR Cricothyroidotomy Simulator

- 1 R+D Contract Support
- VR Cric simulator with haptics to improve field performance
- Trained AF personnel in Balad, Iraq Sep 06 - Jan 07
- Deploying throughout the AFMS

Acosta E, Bhasin Y, Bowyer M, Liu A; Uniformed Services University of the Health Sciences, Bethesda, MD
VR Head Trauma Trainer

Damage Control Neurosurgery

Intracranial Hemorrhage Perforator Demo

Intracranial Hemorrhage Drill Bit Demo

Acosta E, Bhasin Y, Bowyer M, Liu A; Uniformed Services University of the Health Sciences, Bethesda, MD
New Technology: Video Laryngoscopy Trainer

- Video Laryngoscopy Trainer
  - Airway management causes major pre-hospital M&M
  - Airway obstruction contributes in up to 85% of trauma deaths
  - Major cause of death in conscious sedation – Recent Sentinel Event

- Video laryngoscopy technology
  - Intubation training and airway management
  - Battlefield intubation
  - Deployment
    - Wilford Hall
    - 55 MDG, Offutt AFB
    - Nebraska ANG Training Center
    - Landstuhl, Germany
    - BAA for Tier 1/STARS-P sites
  - Over 200 trained

* Boedecker B. et al, University of Nebraska Medical Center, Omaha, NE
Future Initiatives

- C2 Natural Disaster Training- Avatar based “serious gaming”
- Simulation Center Partnership/Expansion
  - Center for Sustainment of Trauma and Readiness Skills (CSTARS)
    Baltimore/University of Maryland Shock Trauma Center
  - Sustainment of Trauma and Resuscitation Skills Program - Scottsdale/Luke,
    UC Davis/Travis, Miami Valley/WP
- Human Patient Simulators
  - Light, portable simulator international training
  - Defense Institute Medical Ops
  - Safe to fly simulator for CCATT, AFSOC
- Hemorrhage management and use of Hemostatic agents
- Member, DoD Joint Technology Coordinating Group -1
  - Use of Simulation to Replace Use of Live Animals in Medical Education and Training
Future Initiatives & Requirements

- Blended Learning: Live, Virtual, Constructive
- Open courseware – Public, NIPR, SIPR
- Virtual AFTH’s at Balad, Iraq and Bagram, Afghanistan
- “Serious Gaming”
  - Operational Rehearsals
  - Hospital and medical equipment familiarization
  - Mass casualty triage, staging and patient throughput
  - Patient management scenarios
  - Trauma/burn management skills, use CPG’s from Joint Theater Trauma System (JTTS)
- OLIVE - Pre deployment training alone or with team in virtual world
- C2 in Natural Disaster, Homeland Security response
- PTSD pre-inoculation

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Future Initiatives & Requirements

- Distributed Human Patient Simulation Network
  - Execute remote scenario-based training across distances
    - Conduct simulation training between geographically separated sites
    - Execute Tier 3 simulation training from Tier 1 site
  - “Medical War Games”
    - Simulate AOR trauma management from POI to AFTH to CCATT to LRMC
    - Orchestrated by central group of SMEs: C2/Trauma/CCATT/CritCare
    - Include CBRNE, Natural Disaster, Homeland Defense
    - Capture performance on CD, debrief, rapid feedback

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We do it right…….so you don’t have to

“WE DO IT RIGHT……..SO YOU DON’T HAVE TO”