



Medical Team Training: Are Simulation and Immersive Environments the Answer? One Clinician's View.

Col. Mark W. Bowyer, MD, FACS
Associate Professor of Surgery
Chief, Division of Trauma and Combat Surgery
Surgical Director
National Capital Area Medical Simulation Center
Uniformed Services University
Bethesda, MD



NATIONAL CAPITAL AREA MEDICAL SIMULATION CENTER USUHS



Learning to Care for Those in Harms Way



Why is Team Training Important?



Background

- 1999 IOM report "To Err is Human: Building a Safer Healthcare System".
- Highlighted inherent dangers of medicine \geq 98,000 deaths per year
- Costly – estimated cost of medical errors \$17-19 Billion/year
- Medical errors undermine pts and healthcare professional's confidence in the health care system itself



Background

- IOM report
 - Recommended establishing inter-disciplinary team-training programs
- AHRQ- focused on assessing whether team-training, properly conceptualized and effected might reduce medical errors and thereby increase patient safety.



Background

- IOM report
 - Systems failure cause far more errors than does the performance of individuals
 - “Thus the crux of pt safety training might reasonably be assumed to lie in improving the coordination, interaction, & communication among individuals who represent disparate medical specialties, but are accountable for the same patients welfare.”



Background

- AHRQ Evidence report 43
 - Concluded that the application of Crew Resource Management (CRM) to medicine has tremendous potential based on its success in aviation, though future research on this Pt safety practice in healthcare is warranted.



Is Aviation Similar to Medicine?

- Environments within medicine (OR, ER, L&D, & ICU) are all high stress, high work-load, dynamic decision making, technology intensive environments where errors result in life or death.
- Similarities to cockpit of an airliner, and military crews responsible for identifying and tracking threats where CRM has been shown to reduce errors.



What is a Medical Team ?





What is a Team?

- Teams consist of minimum of 2 or more individuals
- Team members are assigned specific roles, perform specific tasks, and interact or coordinate to achieve a common goal or outcome
- Teams make decisions
- Teams have specialized knowledge & skills & often work under conditions of high workload
- Teamwork requires team members to adjust to one another, either sequentially or simultaneously, to achieve team goals



<p>An Emergency Room Team</p> <p>ER Doctor</p> <p>Nurse</p> <p>ER Tech</p>	<p>EMT</p> <p>Admitting Clerk</p> <p>X-ray Tech</p> <p>Respiratory Therapist</p> <p>Lab Technician</p> <p>Security</p> <p>Pharmacy</p> <p>Blood Bank</p> <p>Orderly</p> <p>Central Supply clerk</p> <p>Consultants</p>
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But Wait ...
What About...

<p>An Operating Room Team</p> <p>Surgeon</p> <p>Circ Nurse</p> <p>ScrubTech</p> <p>Anesthetist</p>	<p>Transport Techs</p> <p>Sterile supply</p> <p>Anesth tech</p> <p>Lab Technician</p> <p>Pharmacy</p> <p>Blood Bank</p> <p>Surgical assistant</p> <p>Janitor</p> <p>Consultants</p> <p>Pathologist</p>
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But Wait ...
What About...

Characteristics of medical teams

- Teams vary greatly in size depending on purpose, often ad-hoc
- May be member of multiple teams
- Multi-disciplinary, rarely train together
- Work in high stress environments with multiple distractors



Training Medical Teams

- Team training theory is a complex science, but in general effective team training presents information about requisite team behaviors, affords team members the opportunity to practice the skills they are learning, and provides remedial feedback



Components of Team Training

- Must train specific team knowledge, skill and attitude competencies
- Assertiveness training
- Cross training
- Stress management training
- Team self-correction



Team Training

- The fidelity of the training environment to the actual conditions under which the team will perform is an important factor in designing team training.



Team training fidelity

- **Stimulus fidelity**- trainees experience the same “behavioral triggers” that they will experience on the job
- **Response fidelity** – perform the same behaviors
- **Equipment fidelity**- use the same equipment



- A high level of training-environment fidelity is particularly useful in training teams that will perform under stressful conditions (ER, OR etc)
- Simulation training is especially appropriate in such settings
- Research suggests that training be conducted under the same stressful conditions that the team will encounter operationally



Simulation for Team-Training Three Broad Categories

- Case Studies and Role Plays
- Part Task Trainers
- Full Mission Simulations



Case Study & Role Play

- Example of team performance to reinforce trained material (usually paper and pencil)
- No attempt to re-enact the event
- Low in equipment fidelity, low in environmental fidelity and low to med in psychological fidelity
- Minimal resource investment & well received



Part Task Trainers

- Include SPs, task specific simulators, serious games, etc.
- Allow trainees to practice technical and teamwork skills to pre-defined level without being distracted
- Portable and cost effective



Full Mission Simulators

- Designed to simulate a complex task with all the environmental complexities that go along with it
- Allow trainees opportunity to practice skills under realistic conditions and to observe the consequences of their actions/inactions
- Present rare but highly critical situations impossible to train otherwise
- Unless properly pre-trained trainees may be overwhelmed by distractions, stress and time pressure



How do you train teams to function in austere environments such as military deployments, combat, mass casualties while subjected to multiple stressors such as noise, extremes of temperature and fear of personal harm?



VR/Part Task Trainers

- Target specific procedures (infrequent) allowing repetitive practice until mastered
- Variability ranges from limited to highly variable
- Wide variability in costs





Training with part task trainers

- Teaching individual skills with part task trainers is important
- Usually taught in sterile environment
- ? Ability to teach team skills
- Does this translate to ability to perform when in stressful environment?

An Examination of Surgical Procedures under Simulated Combat Conditions

(Scerbo, Weireter, Bliss, Schmidt, & Hanner-Bailey, 2005)



Image Courtesy of Mark Scerbo PhD
Old Dominion University

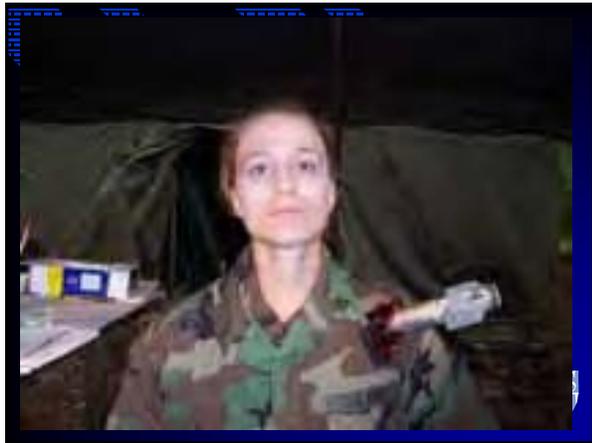
What simulation tools are available to teach team training?

- Standardized Patients
- Part Task Trainers
- Serious Games
- High Fidelity Human Patient Simulators
- Immersive environments
- Integrated combinations of all of the above

Standardized Patients

- Can be moulaged to meet needs
- Excellent suspension of disbelief
- Highly portable
- Human interaction
- Immediate feedback
- Costs and variability a con





High Fidelity Human Patient Simulators

- Can be mouldaged
- Can replicate Physiology
- Can do limited procedures
- Expensive
- Reduced portability
- Limited variability
- Decreased Human Interaction





Immersive environments

- Computer based – desktop/Internet
- Large scale recreation
- Virtual Environments
 - CAVE
 - WAVE

Immersive Virtual Reality Patient Simulator

A patient simulation A.I. engine has been developed by the TOUCH team

Immersion



Sim-Patient Triage Casualties

Sim-Patient Haptic Concepts

Desktop skill-station with part-task medical skill trainers.

Semi-immersive experience using life-size projection display.





WAVE Proof of Concept



Maximizing the usefulness of simulation in healthcare team training

- Carefully tailor training needs, goals, content & evaluation measures to reinforce one another
 - Use case studies & role plays to train teamwork related knowledge & attitudes
 - Use part-task trainers to train teamwork related skills to the point of over-learning
 - Use full mission simulators to hone teamwork related skills under conditions of ambiguity, time pressure, & stress
 - Train for unusual events
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