Simulation for Safety
21st Century Plastic Surgery Training

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MMVR 16

"Virtual Reality is the ultimate Surgical Simulator" Bob Mann

- History of Simulation
- Definition and Devices
- Role in Complex Cases in Plastic and Reconstructive Surgery
- Simulation Centers
- Phases of Introduction for training
- Future Applications in Plastic Surgery

Brief History of Simulation

Early Flight Simulators

Link Simulator

Surgical Simulators

Tendon Transfers

Surgical Simulators Components

Parts of a simulators

- Model of body part and tissues
- Visualization
- Touch and feel (Haptics)

Plastic Surgery: Planning Complex Surgeries

Training for Complex Procedures

American College of Surgery (ACS) New Requirements

Each training program –must have accredited education institutes to focus on competencies and specifically address the teaching, learning and assessment of technical skills using state of the art educational methods and cutting edge technology

How do we get there?

- Core Curriculum developed with training systems for surgical specialties
- The Education Institutes may use a variety of methods to achieve specific educational outcomes, including the use of bench models, animal labs, cadavers, simulations, simulators and virtual reality.
- Each of these systems must have Metrics so that they can objectively measure the residents competency at each level

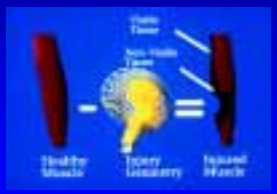
Simulation Centers

- Accredited Education Institutes
- The American College of Surgeons will set a timetable for this to happen (2007-2008) and then Plastic Surgery will follow learning from their successes and failures
- DHMC is now planning their center – 8000 square feet with a multi-specialty approach – Medicine, Anesthesia, Surgery and Nursing and other care providers – completed by 2008
- Three Phases = Three types of simulators
  - Skill (task) training
  - Procedure (scenario) training
  - Team (Crew) safety
  - There is overlap between each of these phases and types

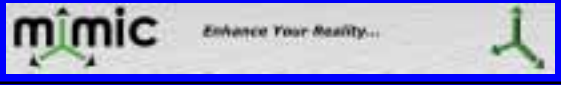
Skill (Task) Training

- American College of Surgery has 20 tasks that have been determined
- Examples include : Central lines and IV access, chest tubes, tracheostomy
- Suture skin and tissue handling
- Flaps and skin grafts
- Bone fixation
- Microsurgery vessel repair
- Minimally invasive surgery
- Multiple other applications areas

Skill Trainers: Debridement of Wounds



Skill Trainers: Surgical Robotics



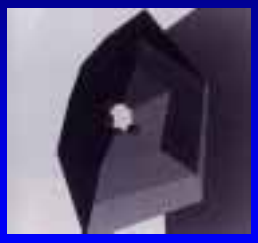
Procedure Training

- Debridement of tissues (Stanford)
- Tendon transfers (Stanford)
- Cheek skin tumor repair (MIT)
- Rhinoplasty (Dartmouth)
- Cleft lip repair (NYU and Stanford)
- Cleft palate repair (NYU)
- Mandible and lower facial reconstruction after tumor resection (Stanford)

Plastic Surgery

- Simulators can allow training for residents for plastic surgery
- CAPS – Computer Aided Plastic Surgery
- Steve Pieper work at MIT and Dartmouth

FEM model of soft tissue



Virtual Flap Procedures

Nasal Operations

Cleft Lip Simulator

Team (Crew) Training

Crew Training from experience with Anesthesia Simulators to OR simulators with Full Team

Future Applications

- Future Applications – Performance Machines (from virtual to augmented reality)
- Simulators embedded into our present tools

Thank You