



ISIS

UW Medicine

What is ISIS ?

Facts and Opportunities

Brian K. Ross, PhD, MD
Professor, Anesthesiology
Executive Director - Institute for Simulation and Interprofessional Studies
University of Washington
Seattle, Washington

What is ISIS ?
Who was ISIS ?

Besides Being a Tart

ISIS was an Egyptian Goddess
goddess of medicine
goddess of magic
goddess of fertility
Was known as a powerful and
magical healer
Gifted with the ability to cure



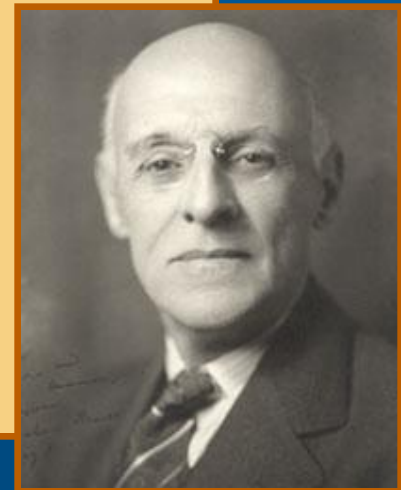
Flexner Report...Birth of Modern Medical Education

“Medical Education in the United States and Canada”

Abraham Flexner

Carnegie Foundation - 1910

- criticized schools for loose and lax apprenticeship system
 - lacked defined standards
 - lacked defined goals
 - in favor of financial gain
- proposed
 - strong biomedical sciences curriculum
 - ‘hands-on’ clinical training



- ‘on the job’
- apprenticeship
- see one, do one, teach one

- see one wrong
- do 100 wrong
- teach 1000 wrong

~~Practice makes Perfect~~

Practice makes Permanent

Perfect Practice makes Perfect

Flexner Model to Medical Education

- ‘on the job’
- apprenticeship
- see one, do one, teach one

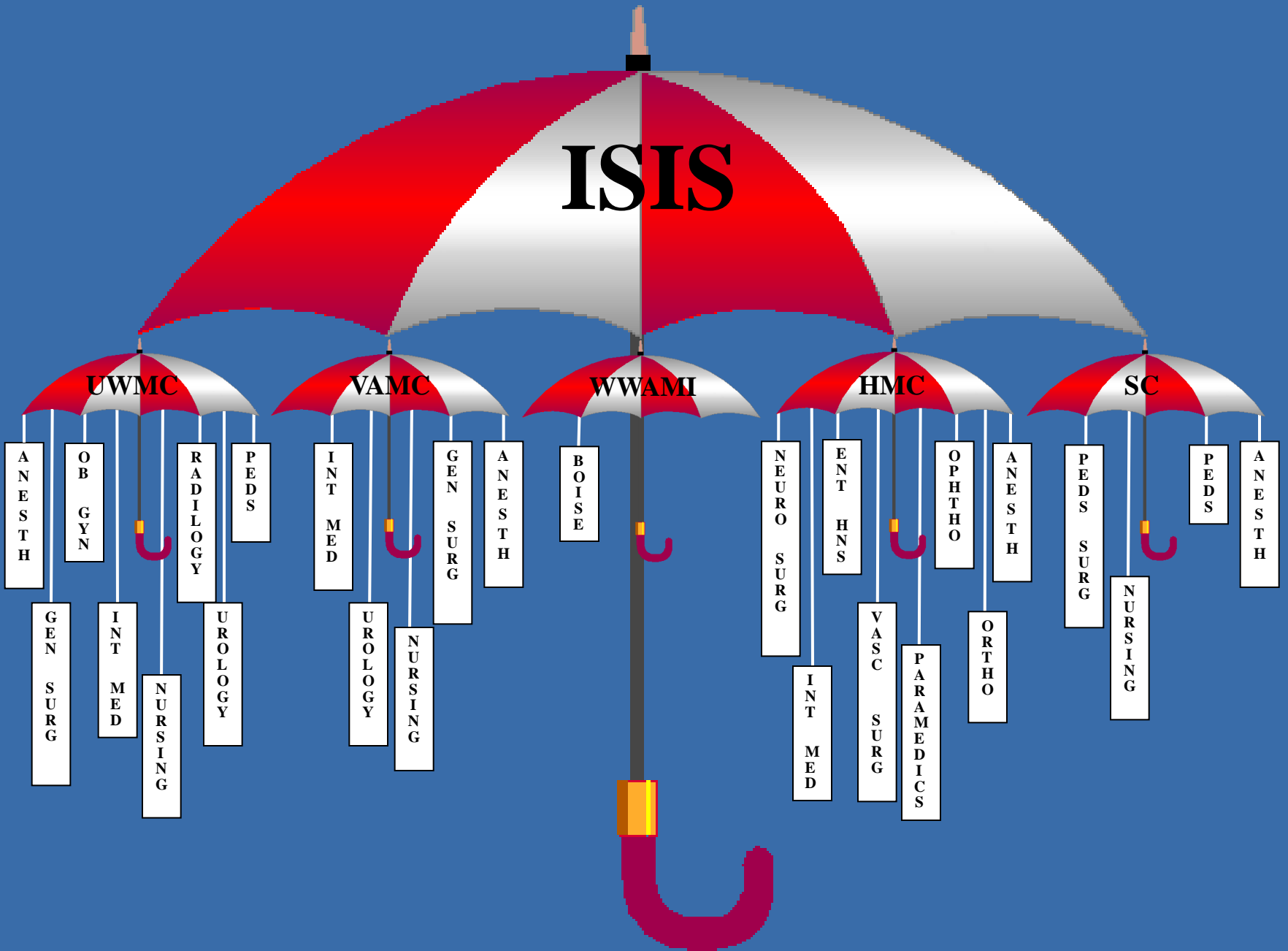
Simulation may allow us to change, in a substantive way, the face and fabric of Medical Education for the first time in over a century.

- Public is beginning to demand - “not on me for the first time”
- Train to criteria with evidence of proficiency, not repetitions
- The people in this room are going to make that decision



Conducting training - simulation - in your own 'silos' is inefficient and costly

ISIS



ISIS Serves A Dual Role

Skills Center

Resource Library



Skills Center



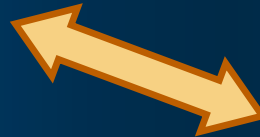
Simulation Resource “Library”

Simulation Center And Point-of-Care (In Situ) (LOFT Training)



**Institute for Simulation and
Interprofessional Studies**

**Centralized Simulation
Center**



Medical Ward



Operating Room



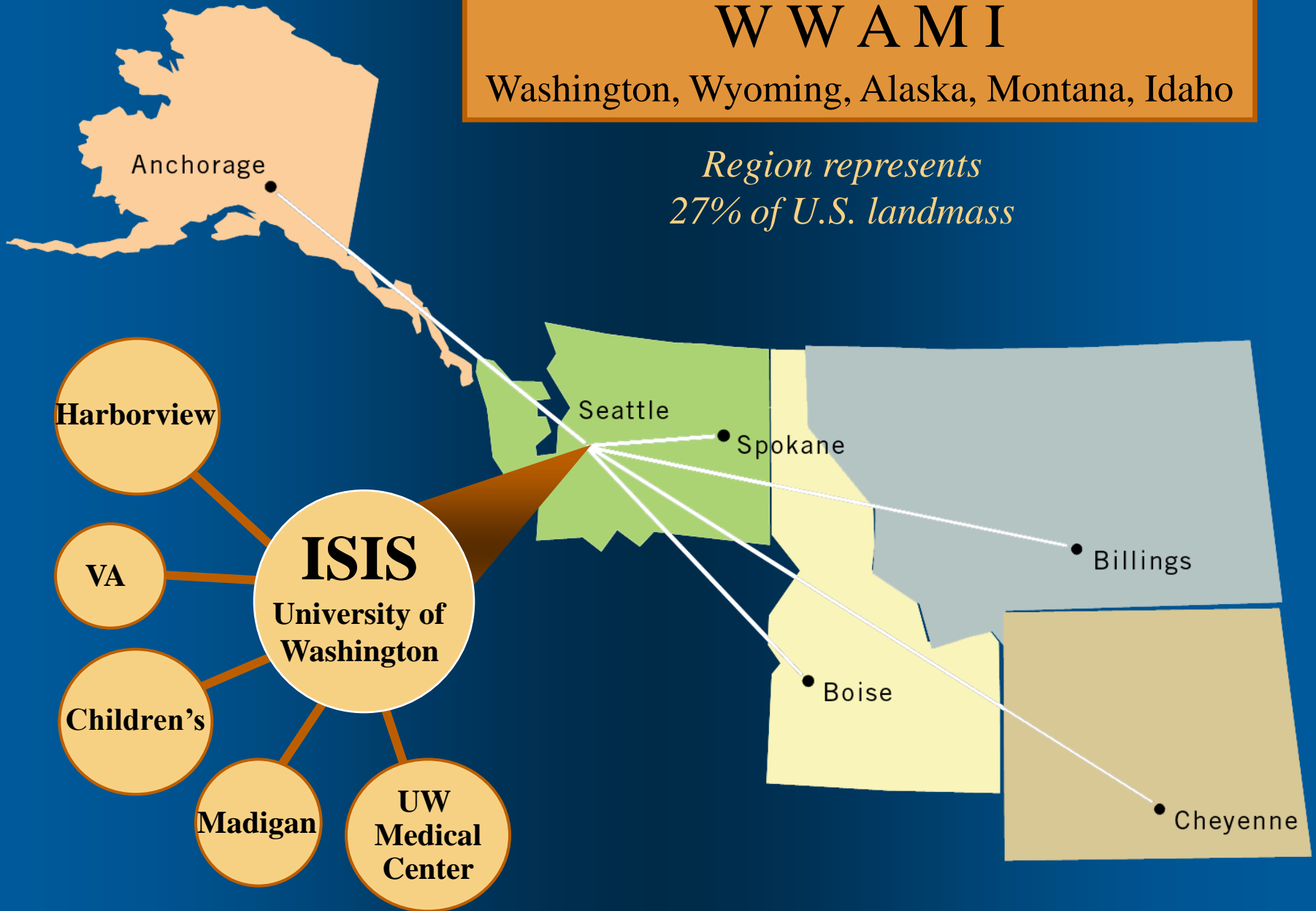
ED Bay

Point-Of-Care : On the Road

W W A M I

Washington, Wyoming, Alaska, Montana, Idaho

*Region represents
27% of U.S. landmass*



Anchorage

Seattle

Spokane

Billings

Boise

Cheyenne

Harborview

VA

ISIS

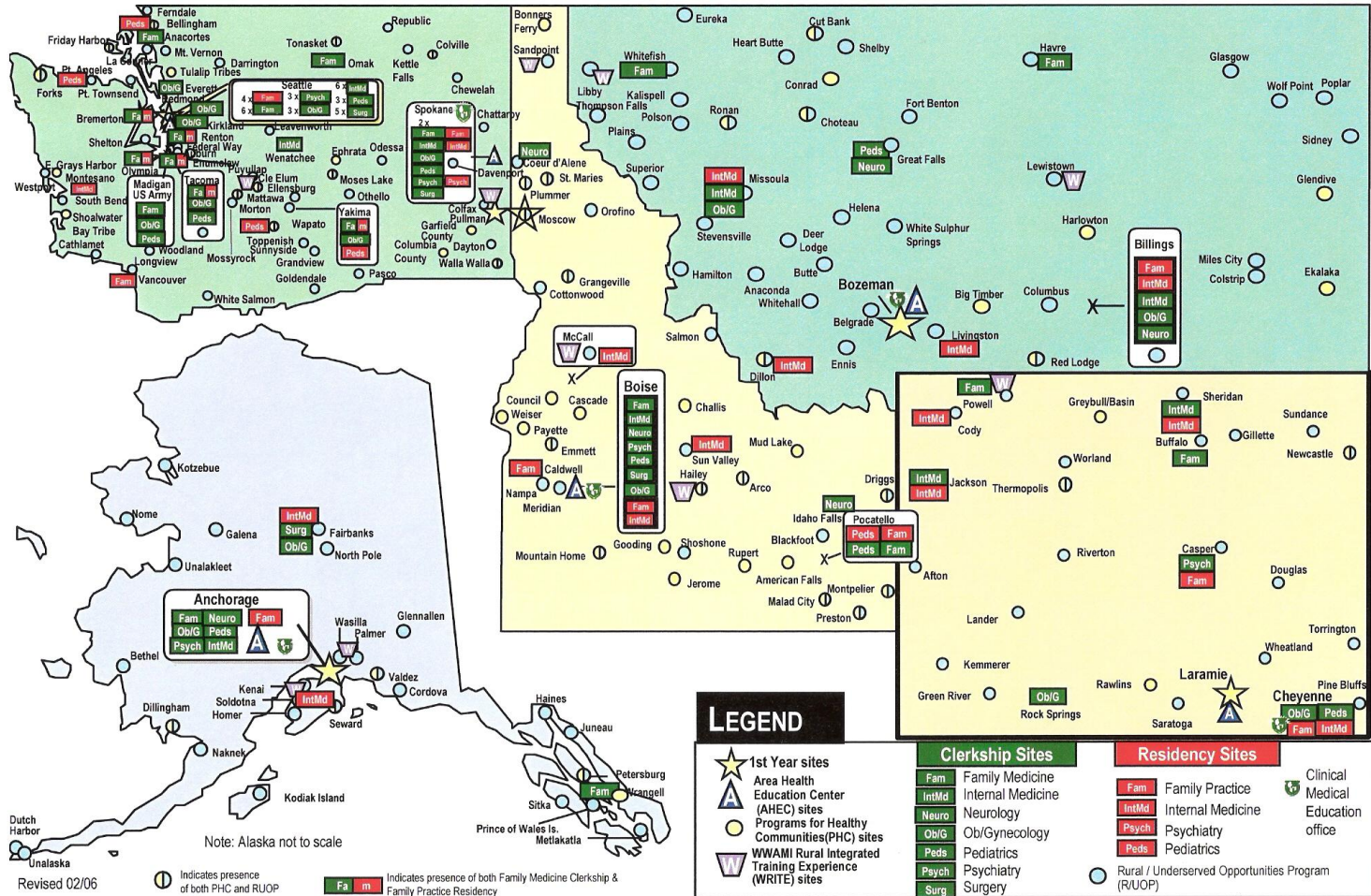
University of
Washington

Children's

Madigan

UW
Medical
Center

WWAMI Program Site Map



Simulation in Industry



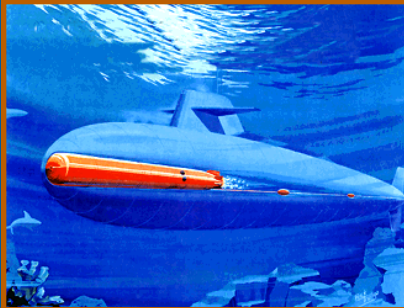
Automobile



Bus



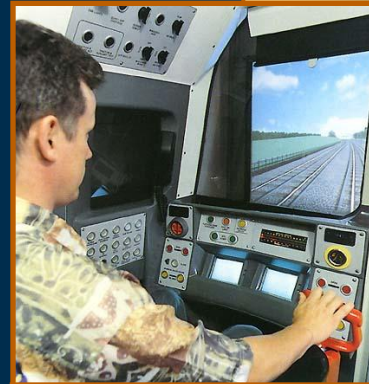
Nuclear Power Industry



Military



Recreation Industry



Locomotive

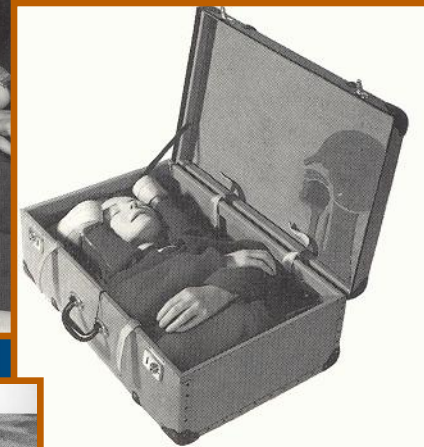
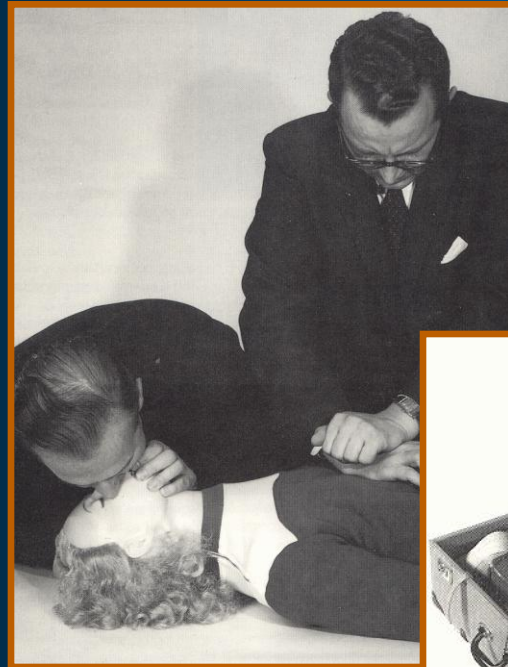
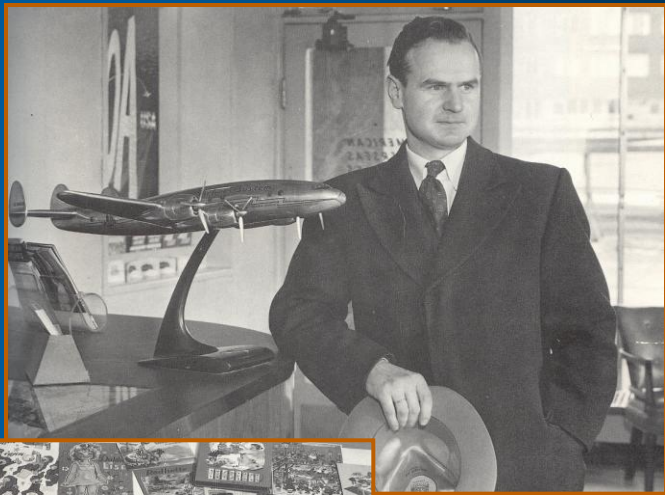


Airline Industry

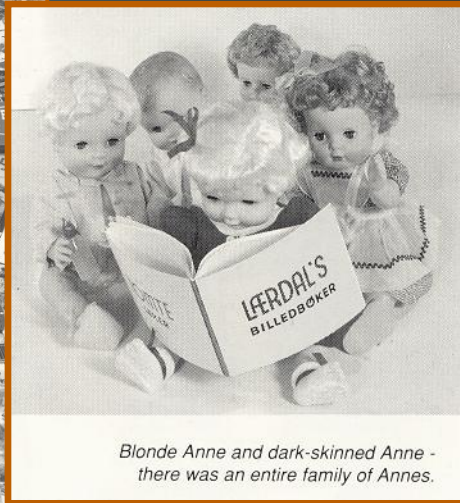
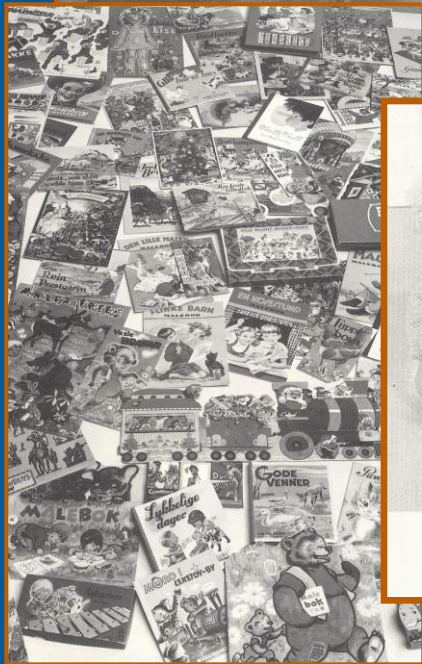
“The Pilot Maker” Vs “The Sweat Box”



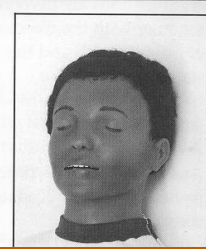
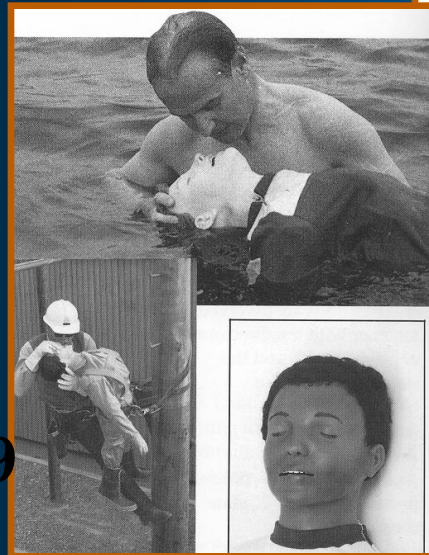
Edwin Link



The girl in the suitcase": this is the way the early Anne used to travel.



Blonde Anne and dark-skinned Anne - there was an entire family of Annes.



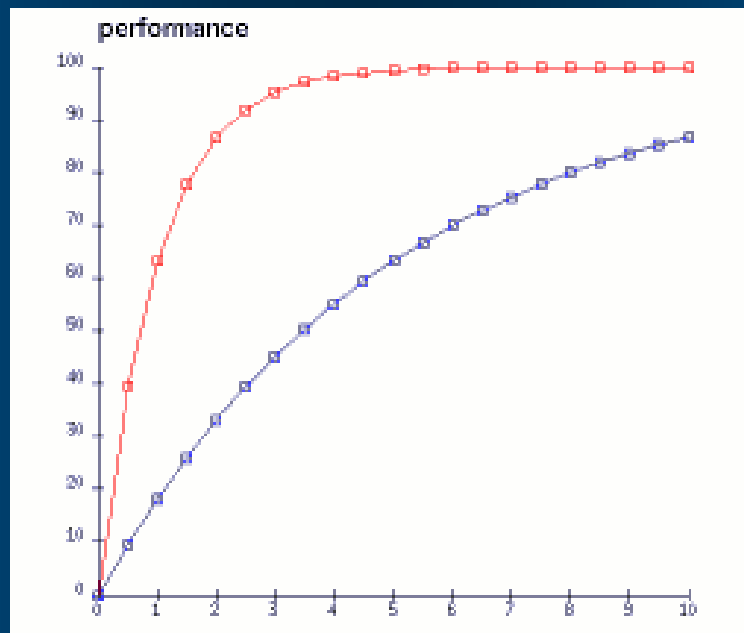
Asmund S. Laerdal - 1949 Stavanger, Norway

Advantages of Healthcare Simulation

- no risk to patients - can simulation substitute for a real patient ??
- patients every practitioner needs to know how to manage- in locations with limited patients can simulation be a substitute for case load ??
- uncommon but critical events - patients they may see only rarely in their practice but need to be facile at managing
- participants can see the results of their decisions and actions
- participants can be allowed to make errors - ‘error recognition’
- identical scenarios can be presented to different clinicians or teams – assessment and credentialing
- team training - ACRM/LOFT

Advantages of Healthcare Simulation

Speeds Learning



Sim-One

- introduced in 1967, University of Southern California
- life-sized mannequin connected to a computer, an instructor console, an interfacing unit, and an anesthesia machine
- anatomically correct airway, palpable carotids, temporal pulses, breathes normally
- responded to four intravenously administered drugs (STP, ephedrine, succinylcholine, and methoxamine) and two gases (O₂ and N₂O)
- variety of anesthesia complications (patient 'bucking'), several cardiac arrhythmias (cardiac arrest), airway compromise (occlusion of mainstem bronchus), changes in HR/BP/RR



A computer-controlled patient simulator
Denson, Abrahamson J Amer Med Assoc
1969;208:504-508

Effectiveness of a simulator in training anesthesiology residents

Abrahamson, Denson

J Med Education 1969;44:515-510

Conclusion:

Anesthesiology trainees, who learned intubation on Sim-One achieved performance criteria in real patients in less time and with half the number of intubating attempts of those who did not use the simulator.

Comment:

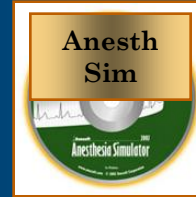
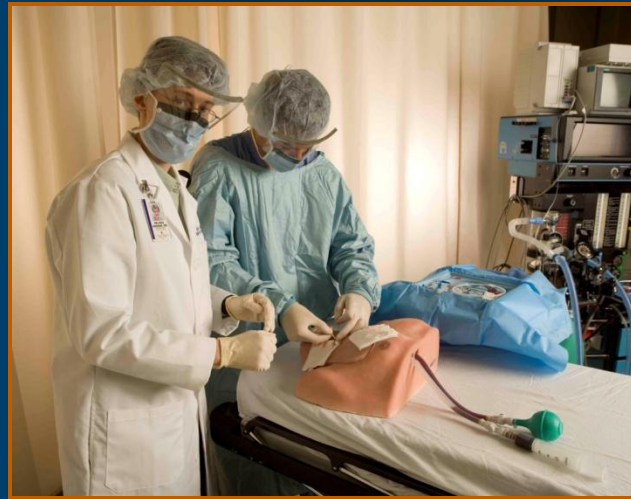
However, the enormous cost of the simulator and complexity of computers made this approach impractical until recently.

Major areas of progress allowing for the development of High Fidelity Simulators:

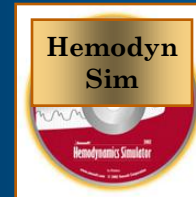
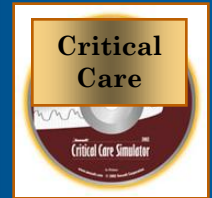
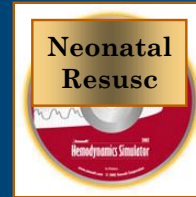
- **industry embraced and incorporated simulation into their training**
aviation industry became the model for medical simulation
- **increased knowledge of structure and function of the human body – disease, drugs, environment, aging**
- **evolution of medical technology and acute care specialties:**
anesthesiology, emergency medicine, resuscitation, trauma, critical care - (BLS, ACLS, PALS, ATLS, FCCS)

Major areas of progress allowing for the development of High Fidelity Simulators:

- evolution in health science education and evaluation to student centered, competency-based method
- revolutionary synthetic materials allowing construction of modern computers and medical mannequins
- phenomenal growth of computer hardware/software for mathematical description of human physiology/pharmacology, and human tissues
- worldwide communication (internet), and design of virtual worlds



Anesoft®



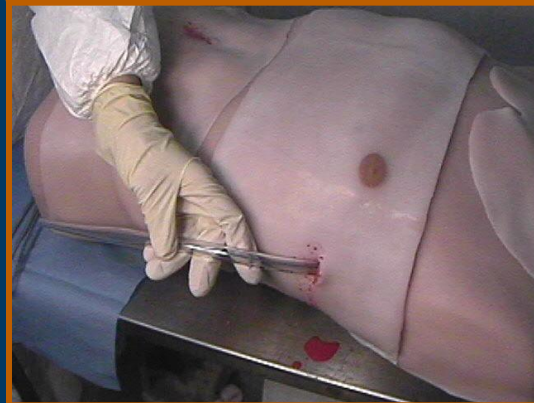


**Central Line
Simulator**
Simulab®



Limbs N'Things

TraumaMan
(“TorsoMan” - Simulab Corp®)



Chest Tube



Gaumard Scientific Company



EYES I®

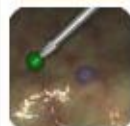
LapSim Simulator



Camera Navigation



Instrument Navigation



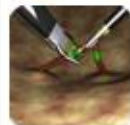
Coordination



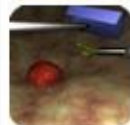
Grasping



Cutting



Clip Applying

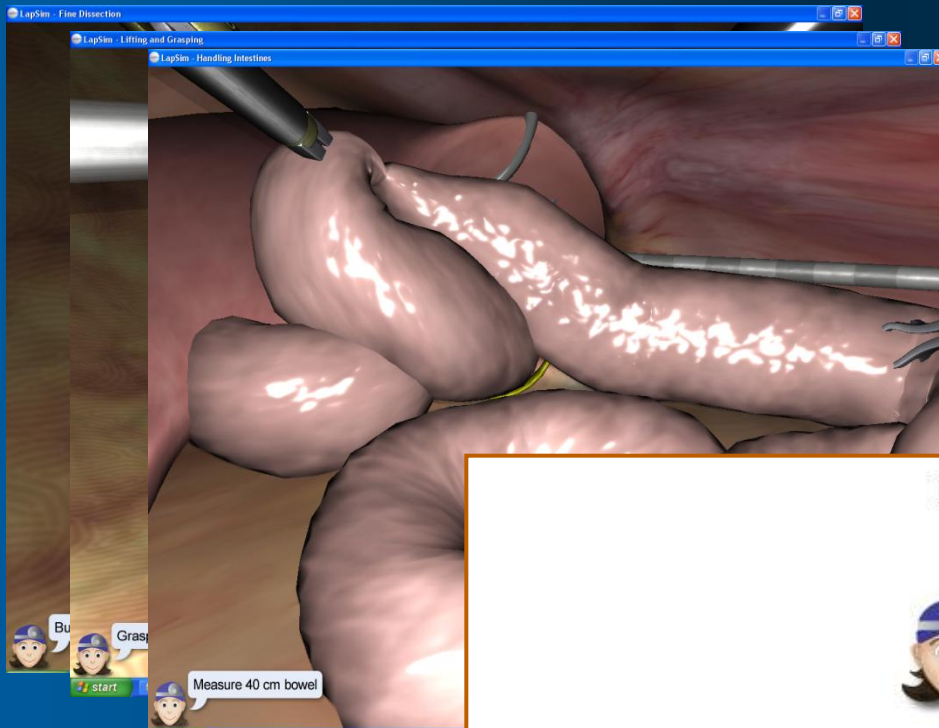


Lifting and Grasping



Suturing





LapSim Simulator Tasks and Evaluations

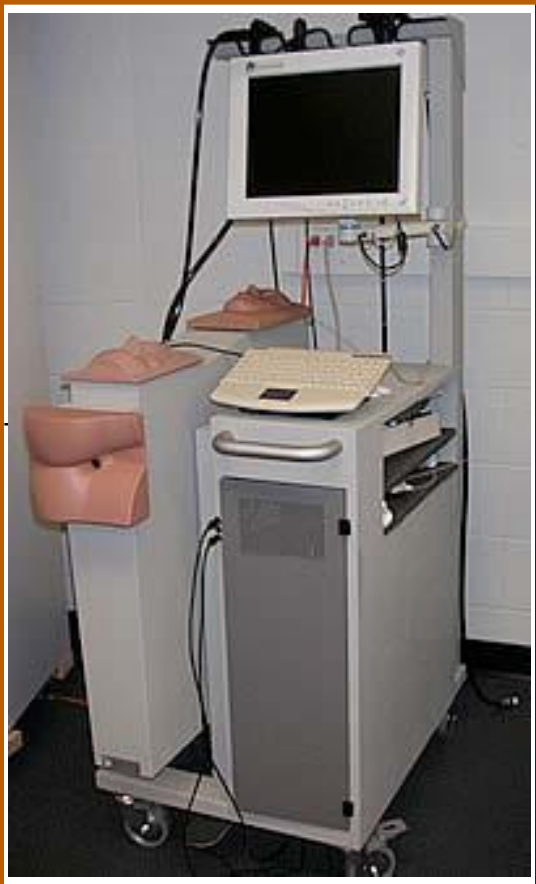
Results for: Cutting



You failed !

Overall Score: 75 %

Parameter	Value	Graph	Min	Max	Passed	Score
Total Time (s)	89.52		0	360	Passed	100%
Rip Failure (%)	0		0	50	Passed	100%
Drop Failure (%)	0		0	50	Passed	100%
Timeout Failure (%)	75		0	50	Failed	0%
Cutter Path Length (m)	0.92		0	3	Passed	100%
Cutter Angular Path (degrees)	255.82		0	720	Passed	100%
Grasper Path Length (m)	1.08		0	3	Passed	100%
Grasper Angular Path (degrees)	179.77		0	720	Passed	100%
Maximum Stretch Damage (%)	84.29		0	80	Failed	0%
Tissue Damage (#)	9		0	10	Passed	20%
Max Damage (mm)	6.97		0	30	Passed	100%



**Endoscopy Simulator
Immersion®**



**Turp-Simulator
METI®**



High Fidelity Simulator



Head

- Insertion of artificial airways
- Direct laryngoscopy
- Tracheal intubation (oral & nasal)
- Laryngospasm
- Airway visualization occluder
- Patient voice

Arms

- Radial artery pulsation
- Pulse oximetry (SpO₂)
- Twitch response
- Non-invasive blood pressure measurements
- Arterial blood gases
- IV drugs and fluids

Heart

- Cardiac output
- Electrocardiogram
- Cardiac dysrhythmias
- Arterial blood temperature
- Central venous pressure
- Heart sounds
- Hemodynamic monitoring
- Pulmonary artery catheter
- CPR
- Defibrillation
- ACLS protocol
- Chest compression

Neck

- Difficult airway
- Carotid artery pulsation
- Puncturable cricothyroid membrane
- Endobronchial intubation
- Esophageal intubation

Stomach

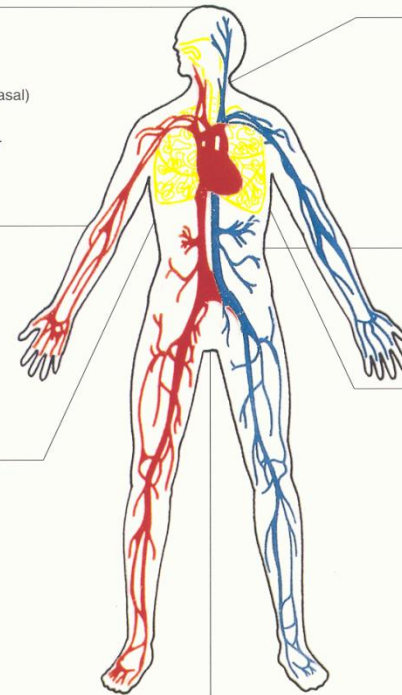
- Gastric distention

Lungs

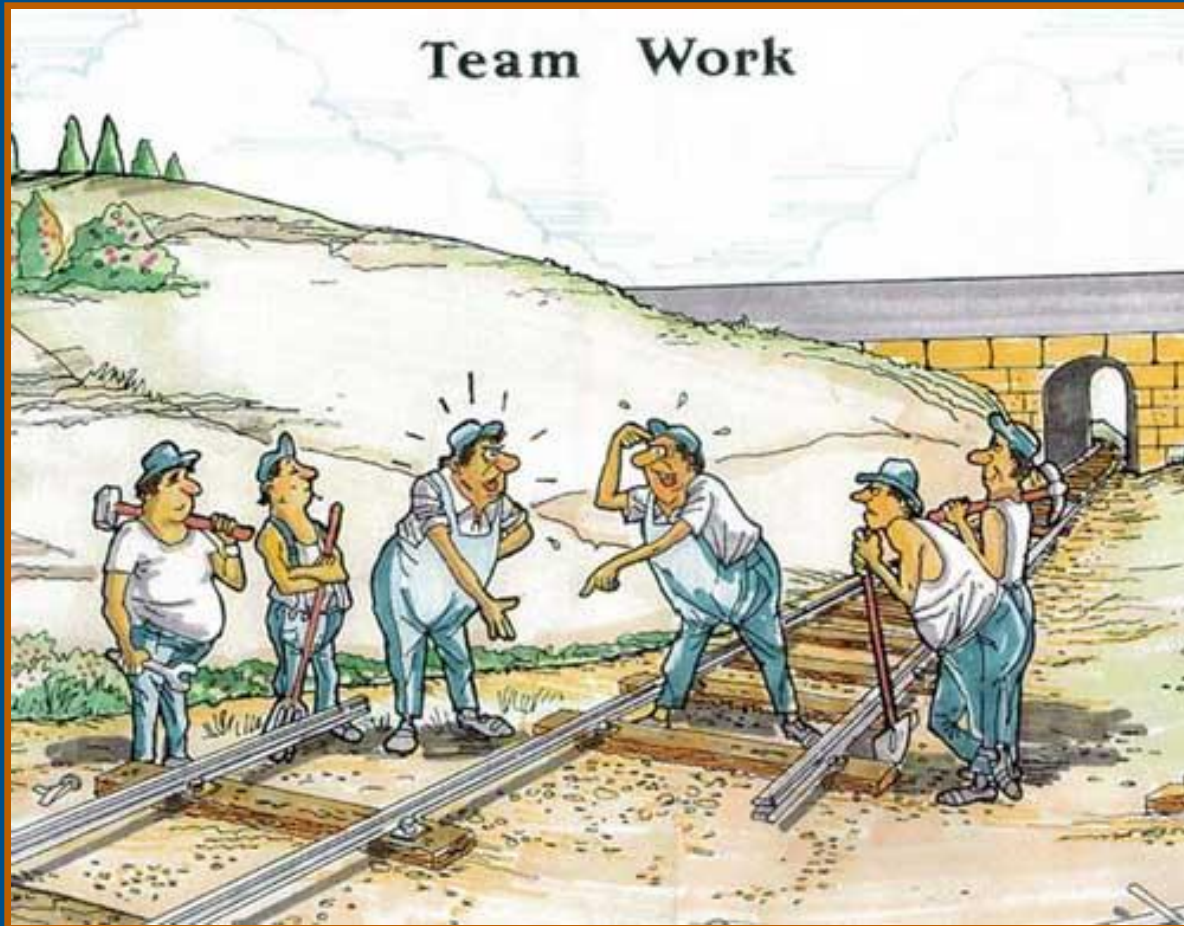
- Spontaneous respiration
- Mechanical ventilation
- Combined ventilation
- Chest excursions
- Oxygen consumption
- Uptake & elimination of anesthetic gases
- Lung/thorax compliance
- Airway resistance
- Breath sounds
- Pleural volume
- Functional residual capacity

Genital Urinary

- Foley catheter insertion
- Urine output



Good Clinical Care Requires Team Work

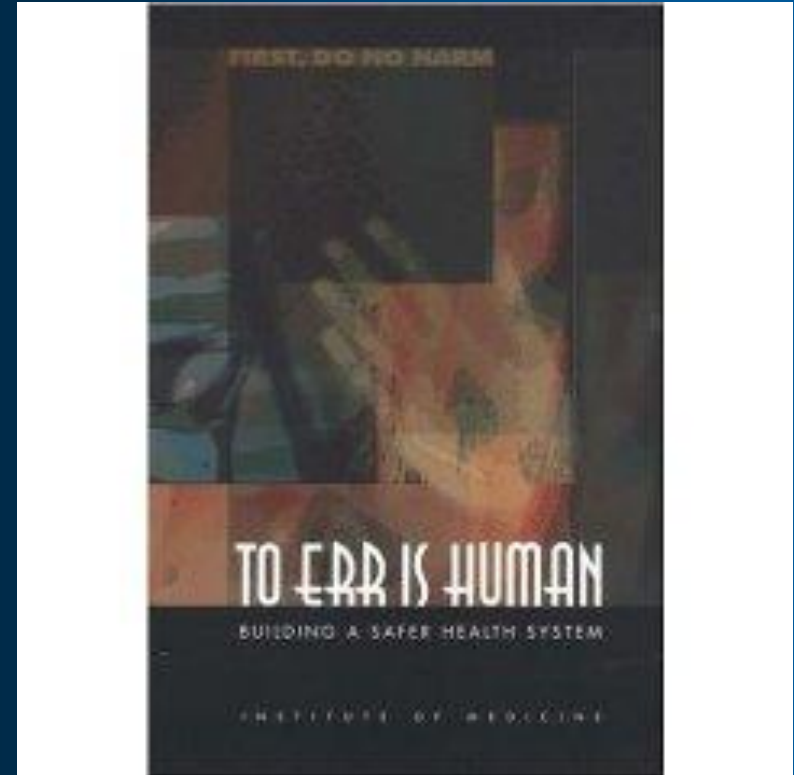


Otherwise Patient Care and Patient Safety Will Be De-Railed

Institute of Medicine

November, 1999

“approximately 100,000 patients die in the hospital each year from medical errors and **72 % resulted from communication errors**”

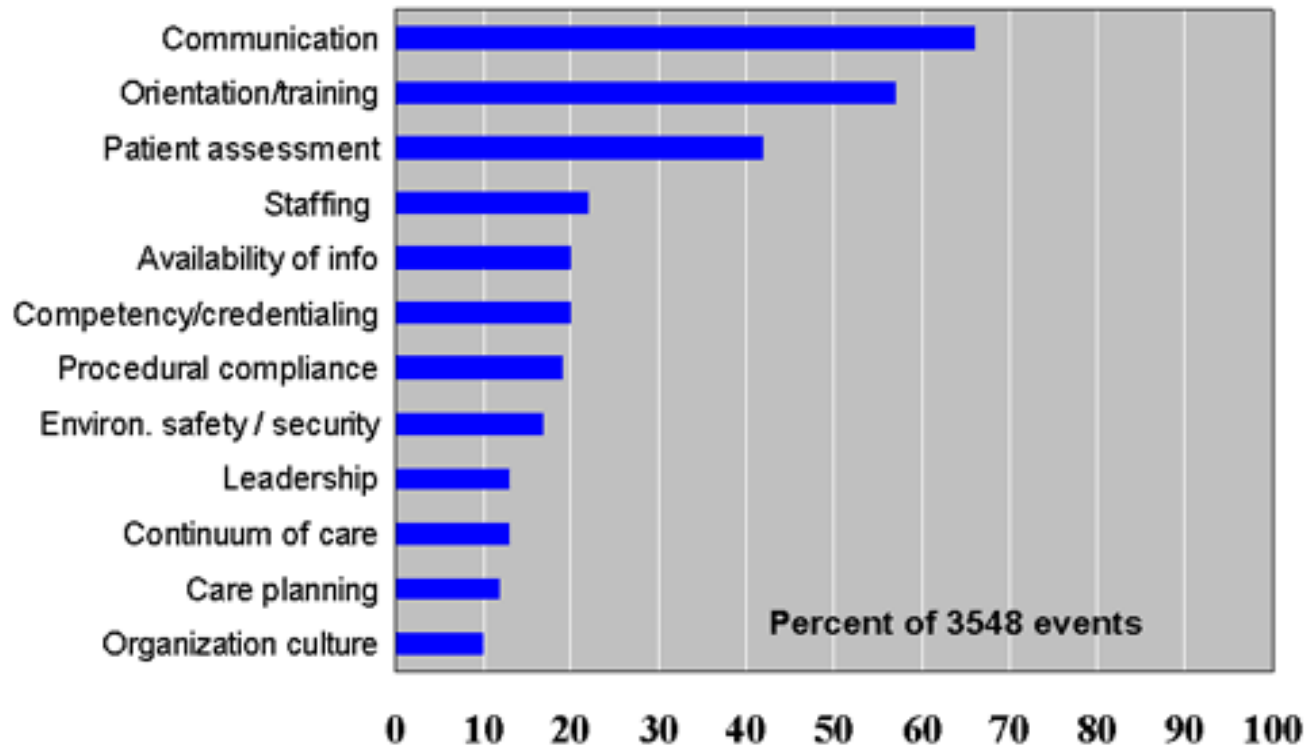


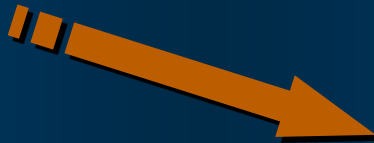
This report lays out a comprehensive strategy by which government, health care providers, industry, and consumers can reduce preventable medical errors. Concluding that the know-how already exists to prevent many of these mistakes, the report sets as a minimum goal a 50 percent reduction in errors over the next five years.

JCAHO Sentinel Events

Root Causes of Sentinel Events

(All categories; 1995-2005)





‘Expert Team’

‘Team of Experts’



**Leadership
Skills**

VS



**‘Teamanship’
Skills**

Expected Team Behaviors

Leadership Behaviors:

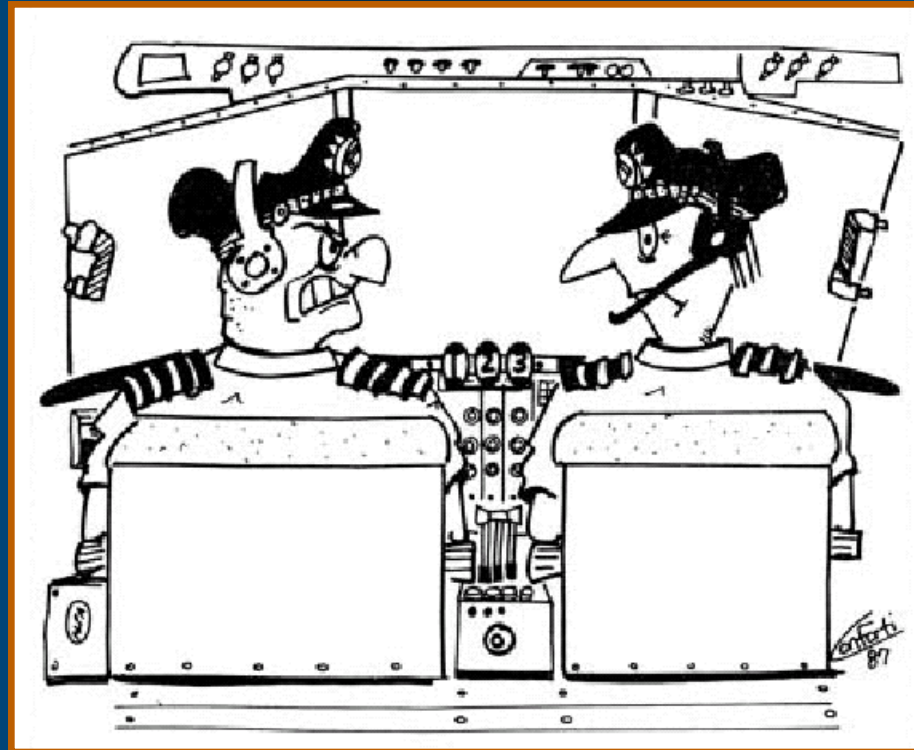
- SBAR
- Requests
- Call-Outs
- **Cross-Checks (cards)**
- “Shake the Yoke”
- Task Prioritization
- Situational Awareness
- Mutual Support
- Briefs/Huddle/Debriefs
- Hand-Offs
- Expect Teammanship

Behaviors

Teammanship Behaviors:

- SBAR
- Call-Outs
- Check-Backs
- Cross-Monitoring
- Cus’ing
- Two Challenge Rule
- Mutual Support
- Requests Help
- I’m Safe

Crew Resource Management



**"Oh I believe in resource management all right.....
You are the resource and I'm the management!"**

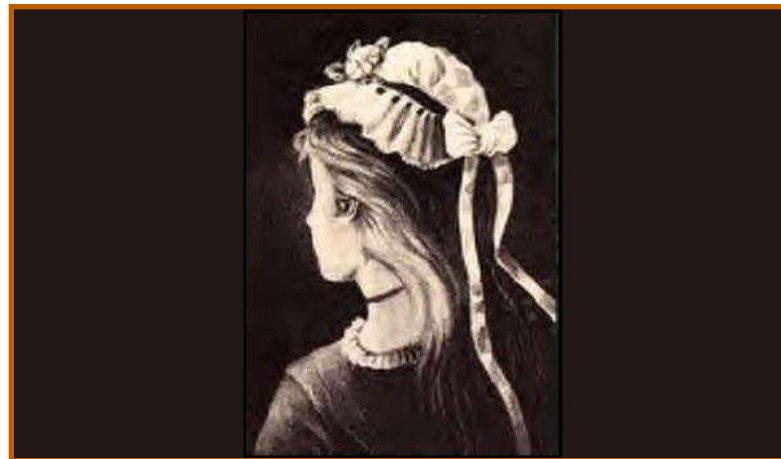
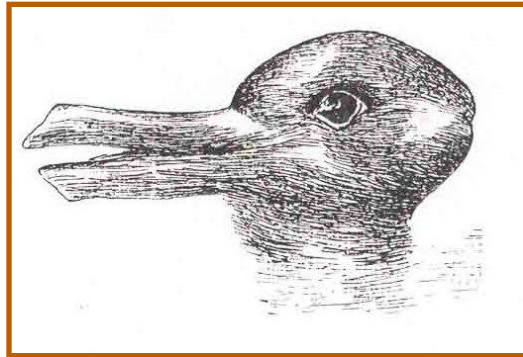
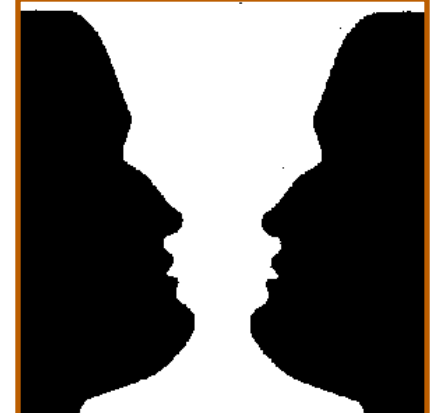
High-Performing Teams

Teams that perform well:

- **Hold a shared mental model**
- Have clear roles and responsibilities
- Have clear, valued, and shared vision
- Optimize resources
- Have strong team leadership
- Engage in a regular discipline of feedback
- **Develop a strong sense of collective trust and confidence**
- **Create mechanisms to cooperate and coordinate**
- Manage and optimize performance outcomes



What is A Shared Mental Model ?



Situational Monitoring/Awareness

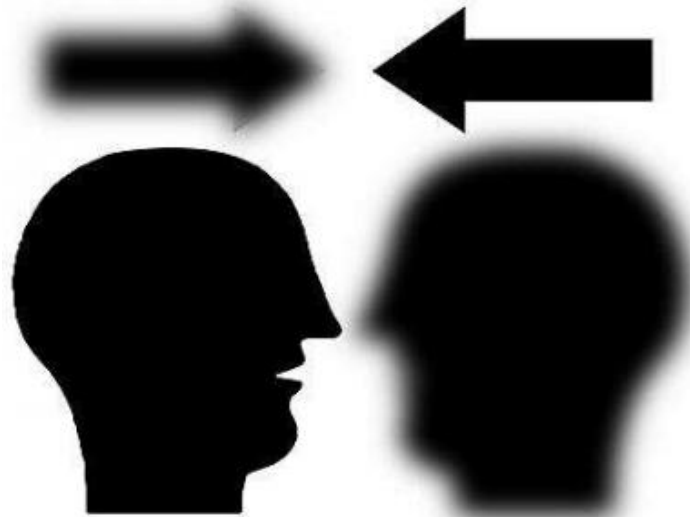
How Situational Monitoring Helps Teams

Process of actively scanning behaviors and actions of other team members to assess elements of the situation or environment

- Fosters mutual respect and team accountability**
- Provides safety net for team and patient**
- Includes cross monitoring**

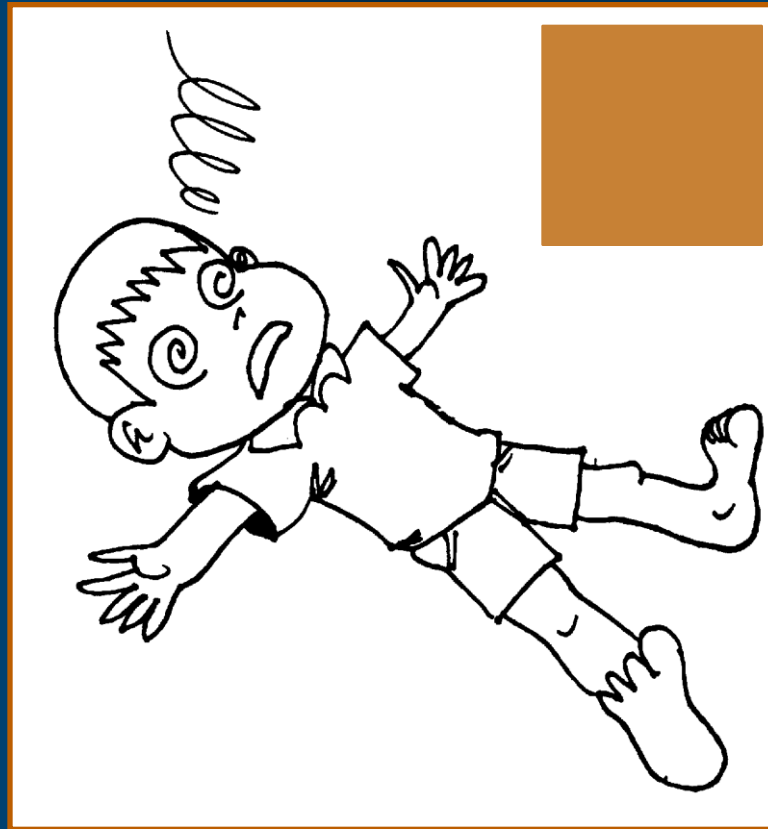


Communication



Effective Communication must be:

- **complete:** relevant information avoiding unnecessary detail
- **clear:** standard terminology, minimize an acronyms
- **brief:** be concise
- **timely:** avoid delays, verify, validate or acknowledge



Validity

Def: the property of being true, correct, and in conformity with reality

Types

Training and testing

Face validity - 'looks like the task'

Content validity - 'detailed exam by experts of content'

Construct validity - 'can identify novice vs experts'

Concurrent validity - 'scores on curriculum match other gold standard scores'

Discriminate validity - 'factors that should correlate actually do - all R_1 's look like R_1 's'

Clinical Outcome

Predictive validity - 'can curriculum predictive performance in the real world'

All these strategies have merit; however, predictive validity is the one most likely to provide clinically meaningful assessment.

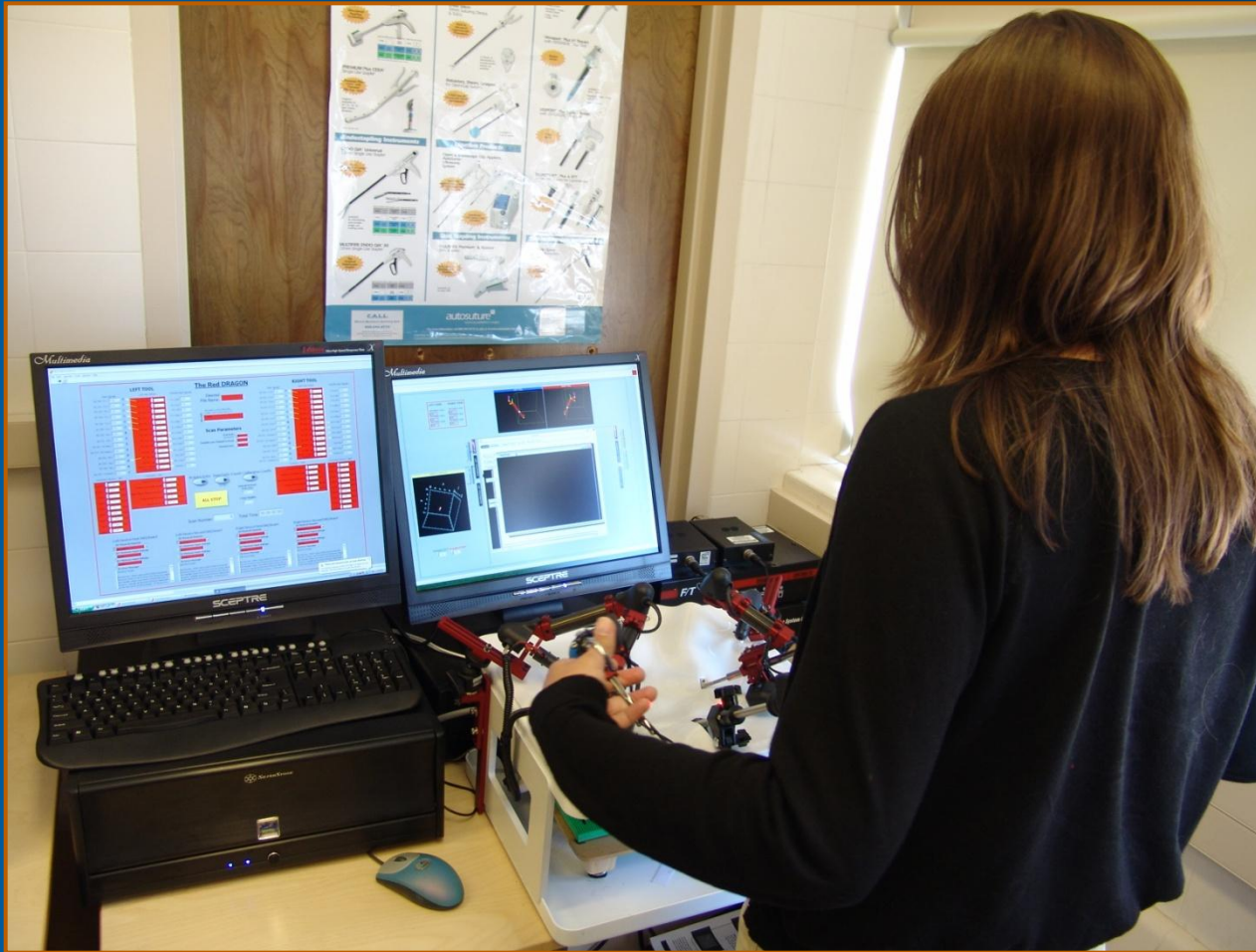
Some things probably don't need validation !!



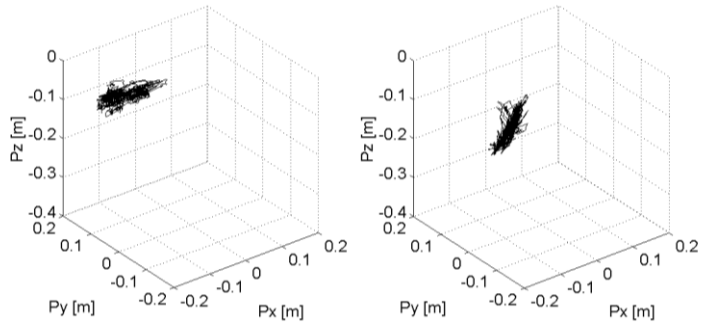
Opportunities in ISIS

Research and Development

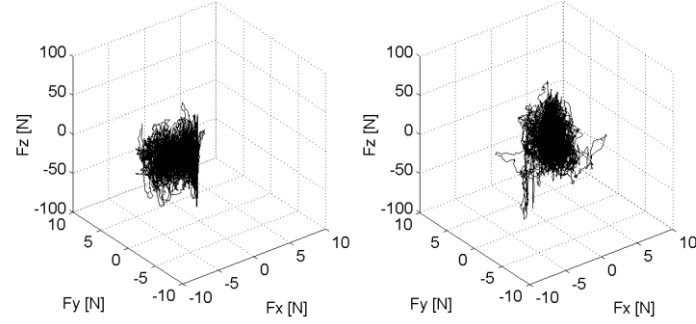
The Red Dragon



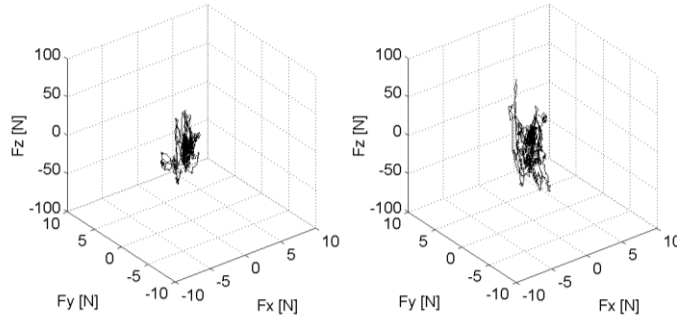
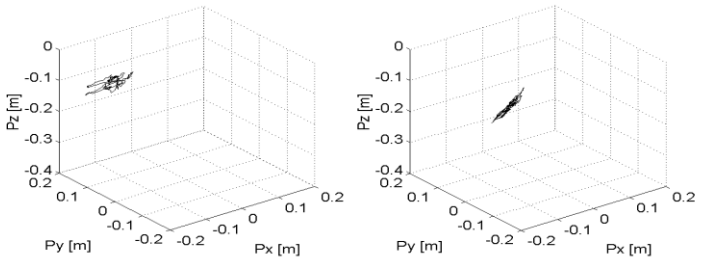
Position (Path) - Raw Data



Forces - Raw Data



Novice



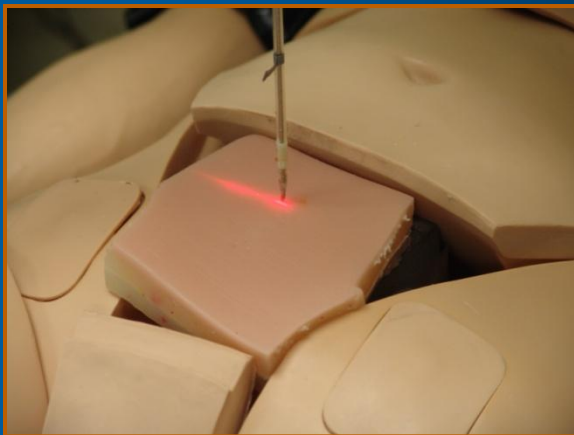
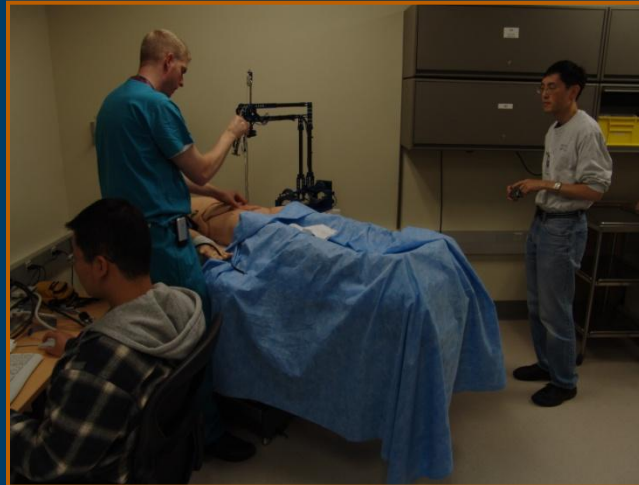
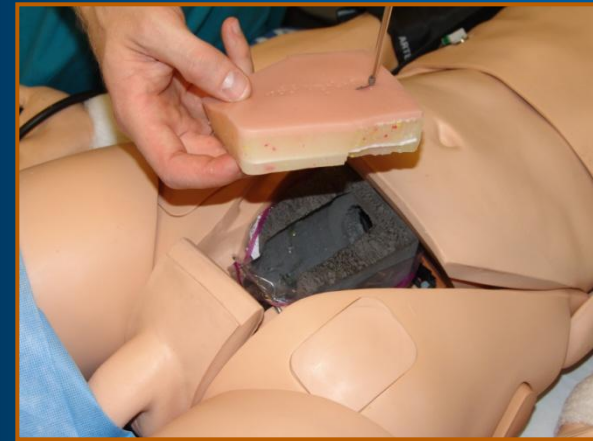
Expert



Supra-pubic Catheterization

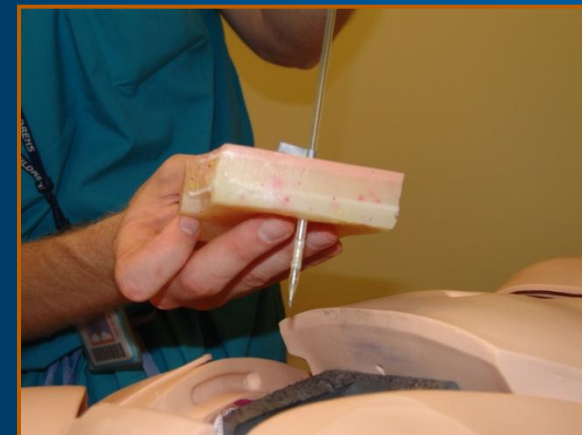
Tom Lendvay

The Blue Dragon



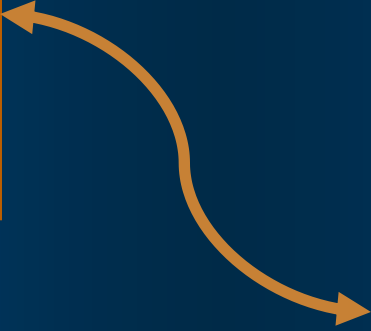
**If there is no simulator
commercially available.**

**We set out to develop a
new simulator.**





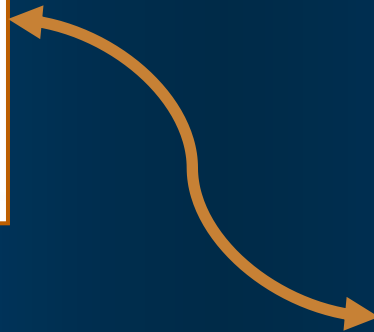
Home Health Care



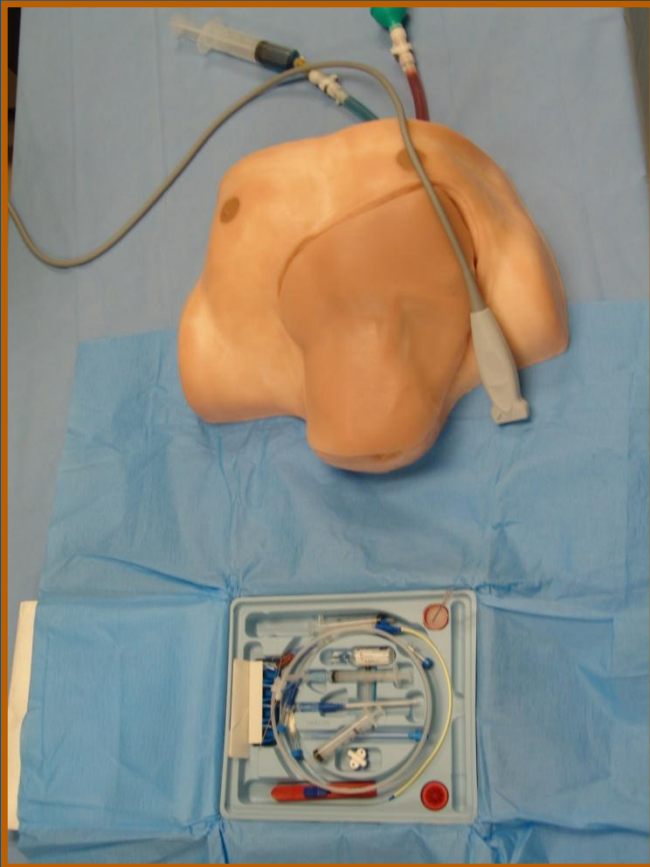
Distance Medical Education



UW Surgical Pavilion

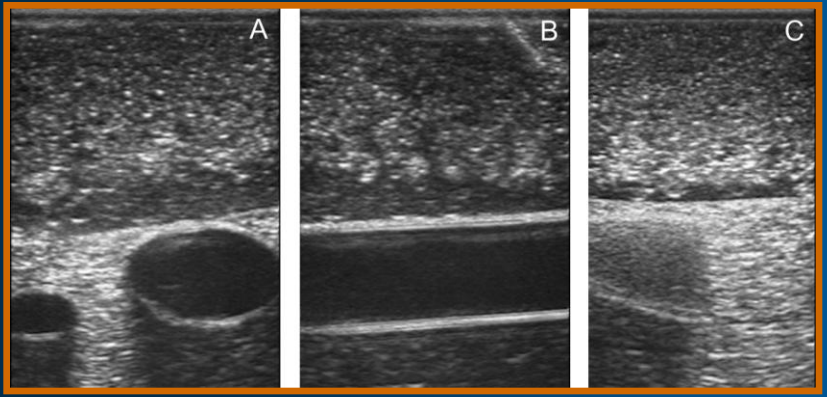
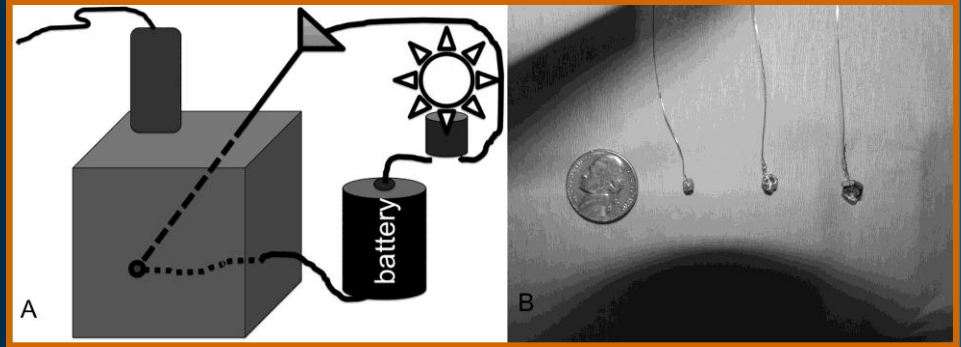


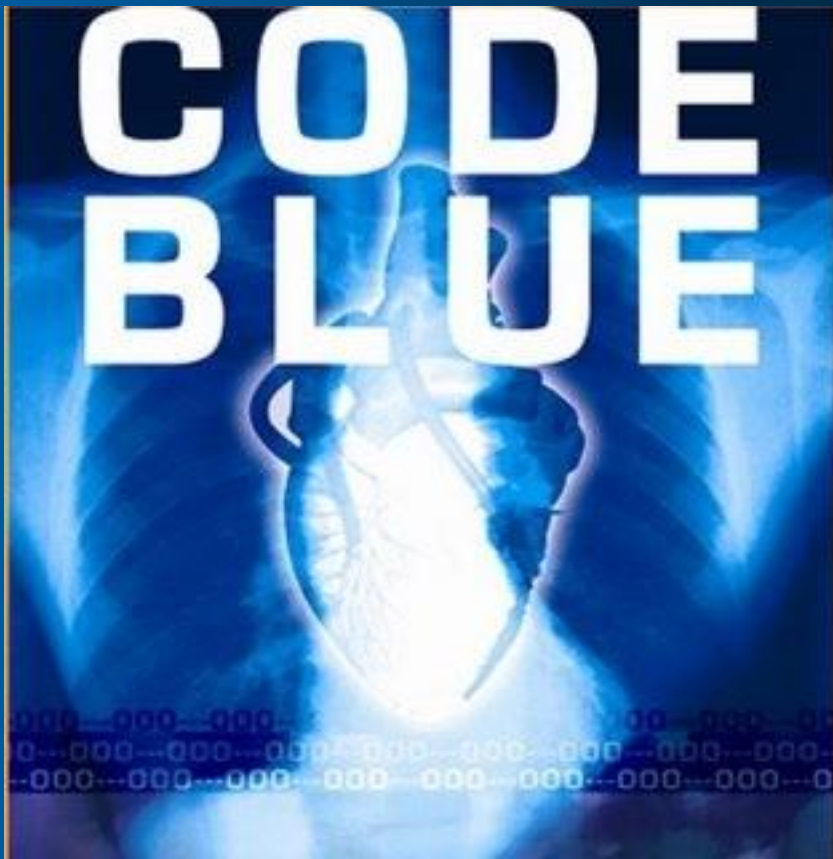
Central Venous Line Placement



Ultrasound Phantoms

metrics
translational metrics





Development Team:

Clinicians
Simulation Technicians
Med Ed BioInformatics
Design Engineers
Bio-Engineering
Computer Science



MEBBIS Project
Funding: FY2009



Team Communication and Patient Management Curriculum For 4th Year Medical, Nursing and Pharmacy Students



Hearst Foundation – Objective Performance Instrument

Macy Foundation – Curriculum Development & Assessment

How do we objectively measure:

Teamwork

Team Communication

Shared Mental Model

Situational Awareness

Mutual Support

Self-Assessment Questionnaire

Likert Scale

Translational Measures

Team Evaluation Form

Date: _____ Team Members _____
 Time: _____
 Evaluator: _____

Rating Scale:

Very Poor	Poor	Marginal	Acceptable	Good	Very Good	Superior
1	2	3	4	5	6	7

Team Structure and Climate

Establish the leader, assemble the team, assign roles and responsibilities _____

Communicate essential team information, acknowledge contributions of team members to team goals, demonstrate mutual respect in all communication _____

Hold each other accountable for team outcomes _____

Address professional concerns directly, resolve conflicts constructively _____

Section evaluation _____

Apply Problem Solving Strategies

Engage members in planning process _____

Identify, develop, and establish plan to be used _____

Engage members in decision making process _____

Alert team to potential biases and errors _____

Report slips, lapses, and mistakes to team _____

Advocate for a position _____

Section evaluation _____

Communicate with the Team

Request situation awareness updates, seeks information _____

Provides situation awareness updates _____

Communicates decisions and actions to team members _____

Uses common ACRM terminology in all communications _____

Call out critical information during emergent events _____

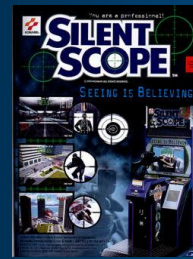
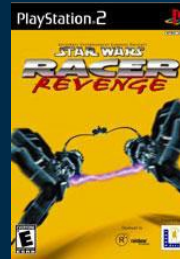
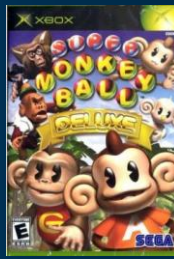
Parrots requests and information received _____

Systematic handoff during team transitions _____

Section evaluation _____

Thursday, February 28, 2004

By Bonnie Rothman Morris



Pre-Op Warm-Up: A Few Video Games

When 33 surgeons turned up at Beth Israel Medical Center in Manhattan last summer for a training program in suturing techniques for laparoscopic surgery, they started their day not by hearing about an intriguing case study, but by playing three off-the-shelf video games....

Super Monkey Ball, Star Wars Revenge Racer and Silent Scope

...surgeons who currently play video games scored 40 percent better in the suturing course than those who never play - **37 % less mistakes and 27% faster.**

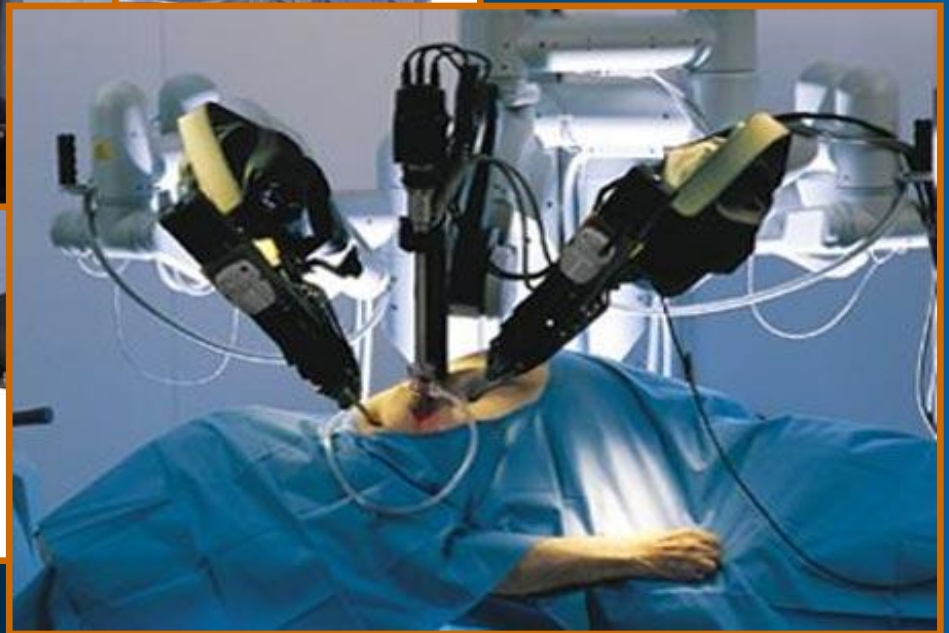
NewScientistTech

19 January 2008

A Wii warm-up hones surgical skills

Kanav Kahol and Marshall Smith of the Banner Good Samaritan Medical Center in Phoenix, Arizona, have found that surgical residents performed better during simulated surgery after playing on the Wii console. ...

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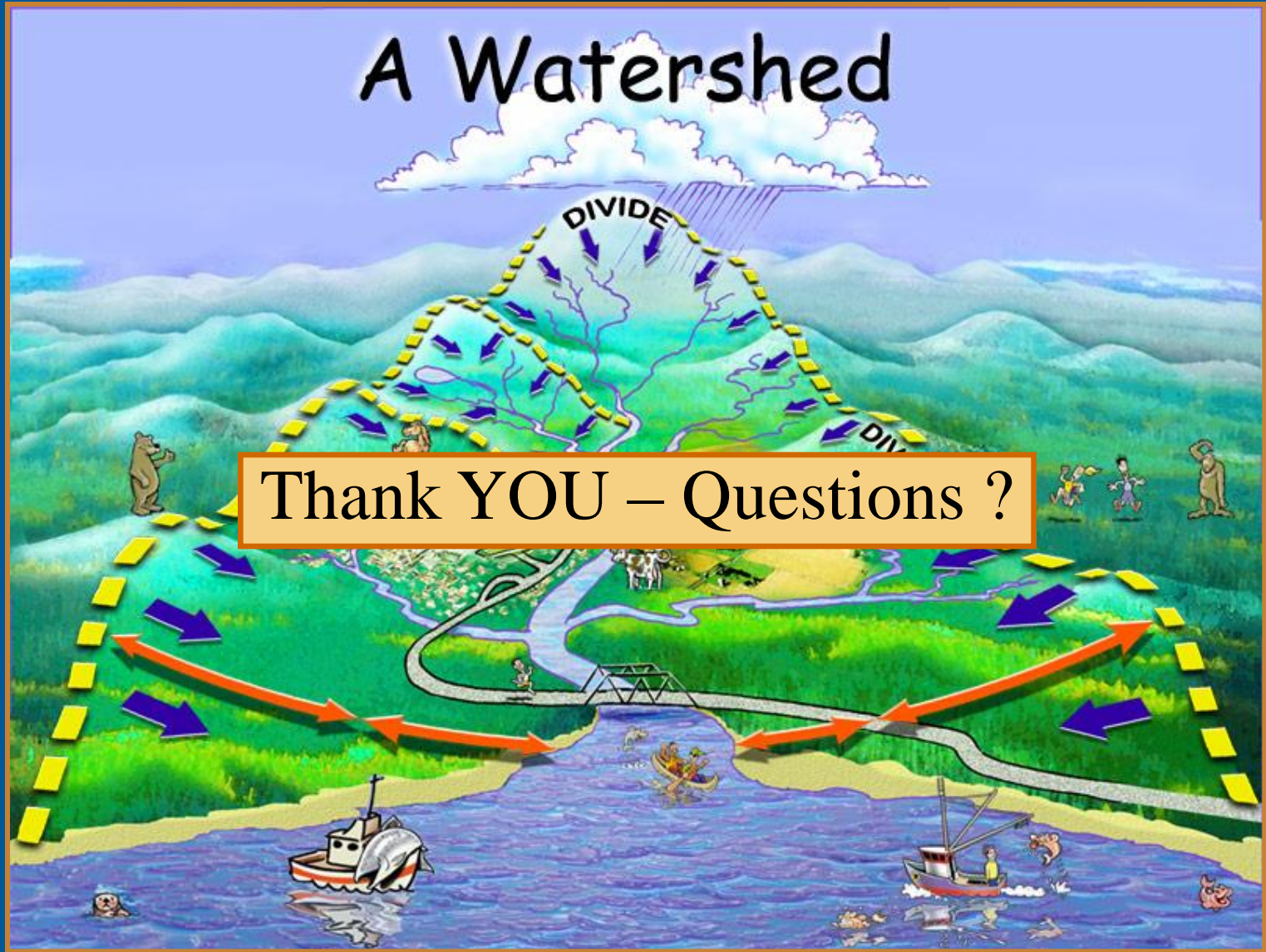
Laparoscopic surgery: comparison of 3 chip and HD Laparoscopic Optics Tasks Performance



Orthopedic surgery: use of EM-based computer guidance system for teaching of total knee arthroplasty



A Watershed



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