FUTURE

Revolution in Surgical Education
Simulation in the Assessment of Technical Skills of Surgeons

2012 Spring Conference
Center for Personalized Education for Physicians
Denver, Colorado
7 June, 2012

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Presenter Financial Disclosure Slide*

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Financial Support:	None (… but still hoping)
Consulting:	Karl Storz
ISIS Support	Stryker SimuLab
Honorarium	J & J Ethicon Endosurgery Covidien
Research Grant	Intuitive Surgical, Inc
Investment	InTouch Technologies, Inc

* There will be no discussion of products from these companies

Classic Education and Examination

What is the REVOLUTION in Surgical Education?

Training for New Technical Skills

Halstedian Model: See One, Do One, Teach One

SURGICAL EDUCATION

The Revolution

is

. . . Now

Roughly 100 year cycles

(1908 – Flexner Report)

It's all about . . .

Improved Patient Safety


Manikin

through


Virtual Reality

Advanced Medical Education

The 6 Competencies

2003 Consensus by the AGCME & ABMS

- Knowledge
- Patient Care
- Interpersonal and communication skills
- Professionalism
- Practice-based learning and improvement
- Systems-based practice

Two Components of the Revolution Using Modeling and Simulation

- Objective Training of Technical Skills
  - Simulators (technology)
  - Curriculum (training method)
- Assessment of Cognitive and Technical Skills
  - Objective metrics
  - Criterion-based tools

Applying

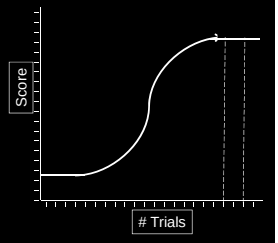
Objective Metrics

and

Competency-based Training

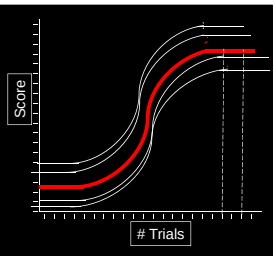
Competency-based Training

Setting Benchmark Criteria for Any Curriculum



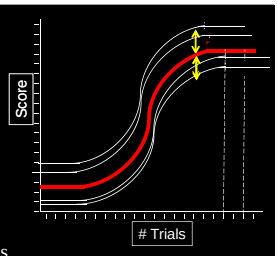
- Train expert/experienced surgeons to their learning curve
- The learning curve is two consecutive trials with no improvement

Setting Benchmark Criteria for Any Curriculum



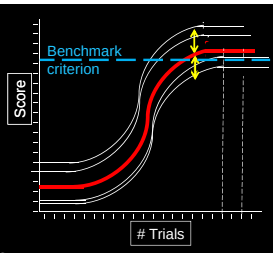
- Train expert/experienced surgeons to their learning curve
- Two consecutive trials with no improvement
- Calculate the mean of their performances

Setting Benchmark Criteria for Any Curriculum



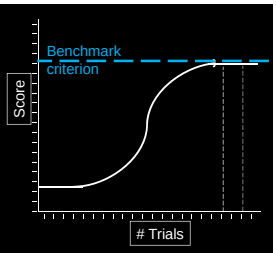
- Train expert/experienced surgeons
- to their learning curve
- Two consecutive trials with no improvement
- Calculate the mean of their performance
- Calculate the standard deviation

Setting Benchmark Criteria for Any Curriculum



- Train expert/experienced surgeons
- to their learning curve
- Two consecutive trials with no improvement
- Calculate the mean of their performance
- Calculate the standard deviation
- Choose benchmark (eg 1 Std dev below the mean)

Setting Benchmark Criteria for Any Curriculum



Training to competency

All learners must meet this benchmark criterion for 2 consecutive trials

The Validation

- Face
- Content
- Construct
- Concurrent
- Predictive

Other Considerations

- Errors (Likert)
- IRR = 0.80
- Practicality
- Usability

Quantitative Measures

"Red Dragon"

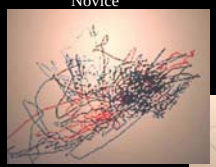
"Blue Dragon"

Passive recording devices

Courtesy Blake Hannaford, PhD, University of Washington, Seattle

Quantitative Measures

Novice



Intermediate

Expert

MEMS based tracking, RFID, etc

Hand motion tracking patterns

Ara Darzi, MD. Imperial College, London, 2000

Skills Training

The New Mandates

Effective	
1 July 2008 RRC*	All residency programs must have a skills training (simulation) center
1 July 2009 ABS	All surgical residents must pass FLS** in order to apply for board certificate

* Residency Review Committee (RRC)

** Fundamentals of Laparoscopic Surgery

Accreditation Council of Graduate Medical Education
Approved by American Board of Medical Specialties

It's not the Simulator

It's the Curriculum

Uses for the Curriculum*

Training	Assessment of Innate Abilities Initial fundamental training (residency, etc) New procedure(s) Pre deployment (military)
Re-training*	Maintenance of certification Admin leave (pregnancy, sabbatical, illness, admin training) Redeployment (military)

* Retraining curriculum needs to be substantively different from initial training - essentially a refresher of known skills

The 4 "Customers"

WHO USES A CURRICULUM ?

Customer	Role	Purpose
Department Chair	Planner	Develop a program
Faculty	Consumer	Teach the learner
Student	End user	Learn to be competent
Licensing Authority	Certifier	Certify* competence

* Hospitals DO NOT use curricula, they use CERTIFICATES that prove their doctors/nurses are competent

Standardized Curriculum

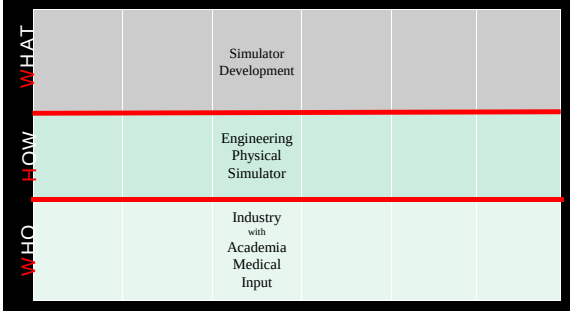
Suggested very high level template

- Goals of the Simulation
- Anatomy
- Steps of the Procedures
- Errors
  - TEST
- Skills Training
- Outcomes

What Has Been Learned

Curriculum Development

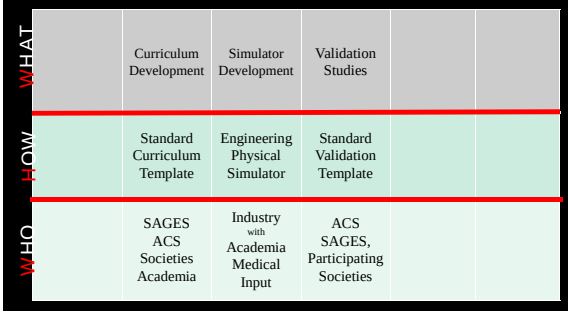
1987 – 2003 Simulator Phase



What Has Been Learned

Curriculum Development

2003 - 2008 Curriculum Phase



What Has Been Learned

Curriculum Development

2008 - 2010 High-stakes Testing Phase

WHAT		Curriculum Development	Simulator Development	Validation Studies	High stakes Testing Survey Training Certification	
HOW		Standard Curriculum Template	Engineering Physical Simulator	Standard Validation Template	Current Procedures	
WHO		SAGES ACS Societies Academia	Industry with Academia Medical Input	ACS SAGES, Participating Societies	FLS SAGES/ACS	

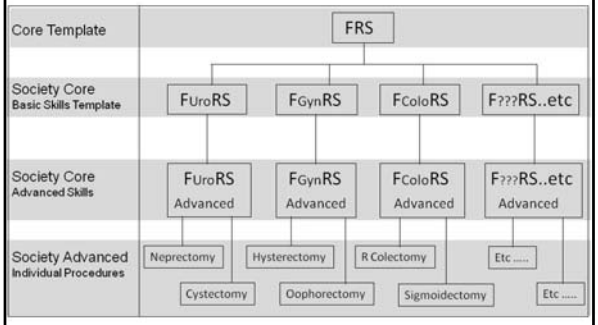
The Metrics Drives the Process

Curriculum Development

2010 - ? Certification Phase

WHAT	Outcomes & Metrics	Curriculum Development	Simulator Development	Validation Studies	Implement: Survey Training Certification	Issue Certification
HOW	Consensus Conference	Standard Curriculum Template	Engineering Physical Simulator	Standard Validation Template	Current Procedures	Issue Mandates And Certificates
WHO	ABS SAGES ACS Specialty Societies	SAGES ACS Societies Academia	Industry with Academia Medical Input	ACS SAGES, Participating Societies	FLS SAGES/ACS	ABS certifier

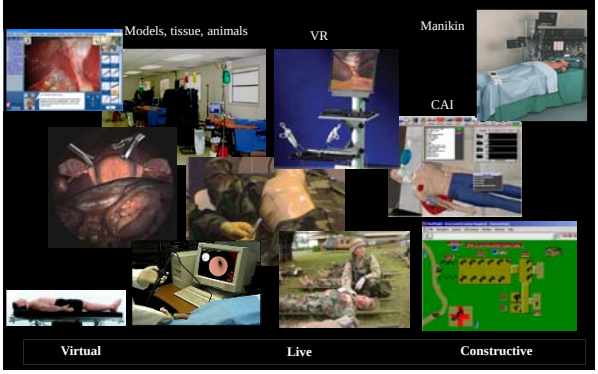
Development of Curriculum from common template



Adapted from Rob Sweet, MD, Professor of Urology, University Minnesota, 2010

Scope of Simulation

Technology
Current areas of simulation



Military Simulation Elements

Courtesy Roger Smith, Nicholson Center for Advancement of Surgery, Orlando FL 2011

OSATS Methodology

Objective Structured Assessment of Technical Skills

Richard Reznick, Univ of Toronto - 1998

Task and Procedure Simulators

Surgical Simulators

LapSim simulator tasks - abstract & texture mapped
Courtesy Andres Hytland, Sugical Science, Gothenburg, Sweden, 2000

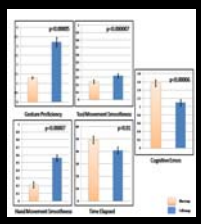
Laparoscopic hysterectomy
Courtesy Michael vanLent, ICT, Los Angeles, CA

Laparoscopic Simulator with tactile feedback
Courtesy Murielle Launay, **Xitact**, Lausanne Switzerland

Clinical Application

Pre-operative Warm-up

Pre-operative Warm-up



25% ↓ errors 45% ↑ efficiency
25% ↓ time

Portable Simulator rolled into the OR

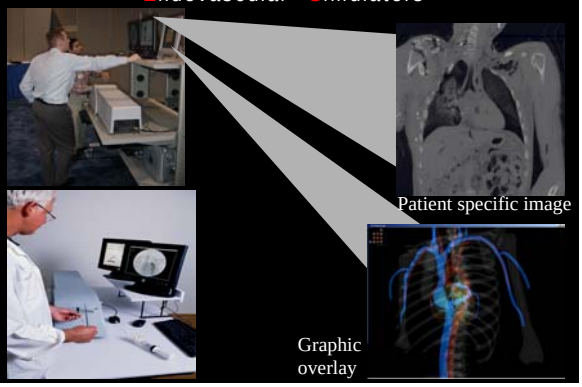
Courtesy Marshall Smith, MD
Kanav Kahol, PhD

Banner Health
ASU Arizona State University

Surgical Rehearsal

Surgical Rehearsal

Endovascular Simulators



Simulation in Social Networking

- My Space
- You Tube
- Multi-user video games
- Second Life

Second Life

Another ~~Concern~~ opportunity

Re-training

Maintenance of Certification …

… of Skills training …

…is going to be mandated soon

Skills Training via Internet

Comprehensive Curriculum

Basic Skills

Simple Procedures

Advanced Procedures

Team Training

Continuity of Care

Task Deconstruction

Do Robots Dream ?

http://depts.washington.edu/biointel