presents
The Inter-professional Simulation Center: Opportunities, Challenges, Solutions

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Agenda

• Current State of Simulation

• Planning Considerations

• Case Studies
  – Emory University
  – Western Michigan University
  – Duke University

• Inter Professional Education
  – Strategic Integration of Simulation into the Duke Curriculum
Learning Objectives

• Program and Planning Benchmarks

• Planning a Simulation Center for Maximum Efficiency

• Cost Benefit Consideration

• Future Impacts
Current State of Simulation
Impacts on Medical Education

- Halstedian approach
- Increased emphasis on patient safety
- Changes in health care delivery

• Simulation
  - Opportunities
  - Outcomes
Accreditations

• **Undergraduate Medical Education**
  – Liaison Committee for Medical Education
  – United States Medical Licensing Exam Step 2CS

• **Graduate Medical Education**
  – American Council for Graduate Medical Education
  – Educational Commission for Foreign Medical Graduates

• **Continuing Medical Education**
  – American Council for Continuing Medical Education
Expanding Role in Health Prof. Training & Certification

• **Regulatory Drivers**
  – Joint Commission documentation of improvement

• **Patient Safety Drivers**
  – Continuum of care logistics and handoff

• **Training Drivers**
  – Procedure rehearsal
  – Team training
  – Specialty team training
  – Identification of knowledge into actions
  – Competency-Based Education & Assessment
Medical Simulation Time Line

1960’s-1970’s
- Resusi-Anne developed for mouth to mouth resuscitation training
- University of Miami developed Harvey: Cardiology Patient Simulator
- Rise & fall of Sim One (USC)

1990’s
- Sim Man developed with support of the University of Pittsburg
- METI brings Human Patient Simulator to market (technology developed at the University of Florida)

2000+
- Pediasim & EC5 available
- Dramatic increases in technological sophistication as market is establish

True interdisciplinary collaboration of physicians, scientists, engineers and educators
Strategic Mission & Business Plan

• Know the utilization by experience
  – Plan for learner thru-put in order to plan for FTE support
  – Number of Hours Per Learner Per Year

• Critical to know FTE operational support before design

• Too many have large sites unused due to lack of $$$ planning before design
Emerging Trends

- Synthetic cadavers instead of manikins
- Virtual Simulation
- Expanding standardized patient use for Nursing
- All striving to be a “Center of Excellence” in order to differentiate and be able to charge for sharing space / equipment / personnel
- Intra and Inter Professional Training
Planning Considerations
Organic Evolution in Simulation Space Programs

- Simulation Program vs. Center
- Renovation & Opportunity
- Strategic Mission & Business Plan
- Rightsizing: Aligning Program, Mission, Budget & Facilities
- Emerging Trends
Educational Program vs. Simulation Center

- Facilities grow as learner experience and desired outcomes expand

### Undergraduate Medical Education
- Hospitals
- Clinics
- Industry
- Emergency Medical Service

### Inter-professional Education
- Nursing
- Physicians Assistant
- Pharmacy
- Research Staff
- PhD
- Residents
- Medical Students M 1, 2, 3, 4

### Regional
- Basic Skills Development
  - Decision Making
  - Group Dynamics
  - Patient Interaction
  - General Procedures
- Procedural
  - Surgical Procedures
  - Research
  - Clinical Trials
- Immersive
  - Virtual Reality
  - Continuum of Care
  - Disaster Response

### Square Footage Requirements
- Cost – Complexity – Flexibility
- $
Simulation Center Benchmarking  NSF/MS1 & STAFF SPACE

- NSF / MS1
- NSF / staff

- 2,612
- 2,624
- 2,600 NSF/staff group
- 1,695
- 1,628
- 1,417
- 925
- 993
- 793
- 750-1,000 NSF/staff group
- 1,695
- 925
- 793
- 750-1,000 NSF/staff group

- NSF/MS1 & STAFF SPACE

- average benchmark range:
  - 70-100 NSF/MS1
  - 750-1,000 NSF/staff group
  - 1,400-1,600 NSF/staff group
  - 2,600 NSF/staff group

- Simulation Center Benchmarking

- NSF/MS1 & STAFF SPACE

- class size
- pers cap

- WMU 186
- Duke 102
- CMC 87
- VCU 56
- Stanford 117
- Emory 70
- JHU 47
- Wash U 63
- Mayo 135

- Simulation Center Benchmarking

- NSF/MS1 & STAFF SPACE

- class size
- pers cap

- WMU 100 11
- Duke 100 11
- CMC 120 4
- VCU 200 14
- Stanford 125 9
- Emory 150 4
- JHU 150 5
- Wash U 150 12
- Mayo 50 7

- Simulation Center Benchmarking

- NSF/MS1 & STAFF SPACE

- class size
- pers cap

- WMU 100 11
- Duke 100 11
- CMC 120 4
- VCU 200 14
- Stanford 125 9
- Emory 150 4
- JHU 150 5
- Wash U 150 12
- Mayo 50 7
Experiential Learning Environments: Spectrum

- Task Trainers
- Fundamental Skills
- Case Simulation
- Clinical Skills
<table>
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<tr>
<th>Class</th>
<th>Exercise</th>
<th>Abr</th>
<th>Group size</th>
<th>Groups</th>
<th>Week</th>
<th>Duration (hours)</th>
<th>Room</th>
<th>Hours/Week</th>
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**MS1: 3 hours / wk**

**MS2: 4 hours / wk**

**MS3: 1.5 hours every 6-8 wks**

<table>
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<th>Group</th>
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<td>Surgical Skills#</td>
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<tr>
<td>AH</td>
<td>Teamwork &amp; large room exercises</td>
<td>?</td>
<td>large</td>
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Modeling Utilization

- Sim & Exam Rooms available 50% of the time
- Skills Lab available 84% of the time
  - Design exam rooms to flex as sim rooms
  - Design skills lab to flex as sim support (pre event briefing, debrief, etc.)
  - Design sim studio that can also function as a skills lab
Critical Adjacencies

PROCEDURAL SIMULATION SUITE
4,250 NSF

OFFICES
PROCEDURE ROOM
CONTROL ROOM
PROCEDURE ROOM
OPERATING ROOM SIMULATION
DEBRIEFING ROOM
SUR. SIM. BOXES
STORAGE
CLASSROOM

CONF ROOM

SHARED
810 NSF

PROCEDURE ROOM
PROCEDURE ROOM

CLINICAL SKILLS SUITE
2,975 NSF

SUPPORT WRITE-UP CORE
SP TRAINING & FACULTY VIEWING

EX
EX
EX
EX
EX
EX
EX
EX
PR
PR
CR

Critical Adjacencies
Flow of Anatomy to Wet/Dry
Procedure to US/Robotics/Haptics to Clinic to In Patient with central shared technology control & supply work area
Case Studies
Emory University (UME)

- User Profile
- Utilization
- Design & Layout
- First Cost
- FTE’s
- Operational Cost
Emory University Beneficial Adjacencies
Emory University Simulation Center
Emory University Standardized Patient/Clinical Skills Lab
Emory University Computer Classrooms
**Atlanta, GA**

**EST. 1854**

**NEW BUILDING 2007**

**CLASS SIZE 138-150**

<table>
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<th>Undergraduate Medical Education</th>
<th>Graduate Medical Education</th>
<th>Continuing Medical Education</th>
<th>Interprofessional Education</th>
<th>Hospital Safety and Certifications</th>
<th>Community Health and Safety</th>
<th>Industry</th>
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<td><strong>✓</strong></td>
<td><strong>✓</strong></td>
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11,520 SIM LEARNER HOURS / YEAR

15,360 SP LEARNER HOURS / YEAR

19,200 TASK LEARNER HOURS / YEAR

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**$3.41M**

**FIRST COST $320 / SF**

**$10,676 SF**

**5.571K SF**

**4,865K SF**

**5K**

**ANNUAL BUDGET 800K**

**2.05M**

**5811 SF**

**4685 SF**

**7.6**

**FULL TIME EMPLOYEES**

**$73K**

**TUITION**

**$1.17M**

**EQUIPMENT COST**

**$2.05M**

**AV EQUIPMENT COST**

**$320 / SF**

**$320 / SF**

**$4,865K SF**

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- **Clinical Skills**: 5811 SF
- **Simulation**: 4685 SF
Lab & Support 6,940
SIMULATION ROOM (in-patient) 360
SIMULATION ROOM (LDR) 360
SIMULATION ROOM (HPS) 360
SIMULATION ROOM (IR/OR) 440
SIMULATION ROOM (ED) 440
SIMULATION ROOM (ICU/PACU) 470 2,430
TASK ROOM (2 @ 300 nsf) 600
SKILLS LAB 1,400
CONTROL CENTER 250
CONTROL ROOM 70
FACULTY VIEWING ROOM 160
SCRUB SINKS 100
STORAGE 300
AV ROOM 80
LOCKER ROOMS (2) 1,300
LOUNGE 250
Debrief/Conference 2,700
DEBREIFING/CLASSROOM (40 sts) 1,600
BREAKOUT ROOMS (6 @ 150 nsf) 900
DEBRIEF STORAGE 75
TOILET (3 @ 25 nsf) 75
DEBRIEF PANTRY/KITCHEN 50
Office & Support 480
RECEPTION/WAITING 300
PRIVATE OFFICE (2 @ 90 nsf) 180

10,120

NSF # Rms Lv. Total NSF
Clinical Skills Area
Standardized Patient (SP) Suite
Large SP Exam w/ Observ. Window 140 16 3 2,240
AV Control 123 2 3 246
Patient Lounge 237 1 3 237
Student Write-up/ Group Area 429 4 3 1,716
Subtotal: Clinical Skills Area 4,685
Simulation Lab Suite
Simulation Workarea 1,103 1 B 1,103
Simulation OR 590 1 B 590
Master Control Room/Tech Space (per Waveguide) 383 1 B 383
Medical Supply/Storage 500 1 B 500
Debriefing Room 250 2 B 500
Reception 100 1 B 100
Simulation ER 730 1 B 730
Simulation Patient Room 384 1 B 384
Scrub 139 1 B 139
Task Trainers 1,142 1 B 1,142
Subtotal: Teaching Laboratories 5,571
Total 10,256
Western Michigan University Building Section
Western Michigan University Simulation
Western Michigan University Simulation Center
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<th>Lv</th>
<th>Total NSF</th>
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<tr>
<td>Standardized Patient (SP)</td>
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<td>Large SP Exam w/ Observ. Window</td>
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<td>AV Control</td>
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<td>Patient Lounge</td>
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<td>Student Write-up/Group Area</td>
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<td><strong>Subtotal: Clinical Skills Area</strong></td>
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<td><strong>Simulation Lab Suite</strong></td>
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<td>Simulation Workarea</td>
<td>1,103</td>
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<td>Simulation OR</td>
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<td>Master Control Room/Tech Space (per Waveguide)</td>
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<td>Medical Supply/Storage</td>
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<td><strong>Subtotal: Teaching Laboratories</strong></td>
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<td><strong>Total</strong></td>
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Duke University (Existing Facilities)
Duke University Building Section

- Future Expansion Fl.
- Simulation and Clinical Skills
- Student Affairs
- Admissions
- CTL
- Lecture hall
- Main Entry
- Meeting Room
Duke University Standardized Patient Exam Rooms
Duke University Simulation
<table>
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<tr>
<th>Mission</th>
<th>FIRST COST</th>
<th>TUITION</th>
<th>EQUIPMENT COST</th>
<th>ANNUAL BUDGET</th>
<th>LEARNER HOURS / YEAR</th>
<th>FULL TIME EMPLOYEES</th>
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<td>UME Mission</td>
<td>$3.41M</td>
<td>$73K</td>
<td>$2.05M</td>
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Strategic Integration of Simulation Into the Duke Curriculum
DukeSim is an institutional-level program that is led by and works collaboratively with Duke simulation leaders to coordinate efforts, **improve efficiency**, identify and develop inter-center simulation projects, and **maximize the overall value** of simulation to **improve education**, research, and **quality of care** throughout Duke Medicine.

**INITIAL WORK**
- Current Simulation Activity
- Inventory of Equipment
- Articulated Cost
- Delineated Funding
- Competitor Analysis
- SWOT Analysis

**POTENTIAL OUTCOMES**
- Savings
- Improved Operational Resilience
- Increased Course Capacity
- Improved Educational Curricula
- Expansion in Scope
- Innovation
Identifying Target User Group(s)

- School of Medicine Faculty and Students
- School of Nursing Faculty and Students
- Residents – Anesthesiology, Surgery
- Durham VA Faculty
- Duke Hospital Employees
Inter-Professional Education

- Organized Implementation of Inter-Professional & System Wide Ventures
  - Code Team Training
  - Trauma Management
  - Obstetric Hemorrhage Response
  - Disaster Planning
- 3DiTeams
- ILE@D
- Inter-professional student clinic

“there is a need for stakeholders to function as a unified team to achieve common vision and goals.”
Research

- Quality
- Patient Safety
- Applied Informatics
- Human Factors
- Teamwork
- Communication
- Education
- Leadership
Tradeline Three

1. Your simulation center will never be a profit center

2. Medical student education needs will drive the space program and design but creative strategies can improve utilization (and generate income)
   - Interprofessional programs
   - Professional development programs
   - Industrial partnerships
   - Research

3. Consolidated simulation centers deliver the highest value
   - Shared functions and flexible/adaptable spaces = reduced footprint = reduced first cost
   - Staffing efficiencies impact operating cost