DIY mid-fidelity simulation: It takes less space, less money, and more time than you think!

Carl Fairburn, DPT
Cathy Peterson, PT, EdD
Anna Barrett, DPT
Patrick Cawneen, DPT

Conflicts of Interest

We will be presenting about our experiences with Laerdal products; however, our experiences range from thrilled to disappointed and we anticipate this would be the same regardless of the make of simulator manikin and software. That said, we have no conflicts of interest, financial or other.

Course Objectives

1. Analyze simulator manikin and lab features in the context of programmatic objectives.
2. Identify internal and/or external funding sources for developing a patient simulation lab.
3. Identify barriers and opportunities for creating a patient simulation lab.
4. Develop a simulation program for integration within the curriculum.

Origins of Simulation

- Aviation
- Driver's ed.
- Nursing
- Medicine

Simulation in Physical Therapy

Not a new component
- role play
- standardized patients (SPs)
- practical examination
- clinical skills
- clinical reasoning

The next generation of patient simulation...

Programmable Patient Simulation

- High-Fidelity Human Simulation (HFHS)
  - clinical decision making
  - acute care skills
  - confidence
  - preparedness and perceived readiness
  - response to adverse events
  - interprofessional education

- 44% of accredited programs report use of programmable simulators

https://www.simulationinformation.com/sites/all/themes/ncsimulation/global-images/ehfs-1.jpg

https://www.simulationinformation.com/sites/all/themes/ncsimulation/global-images/1.jpg
So, “should our program invest in high fidelity patient simulation?”

- Clinical performance
- Interest
- Recruitment

Thomas J. Long School of Pharmacy and Health Sciences

- DPT: 36 per class; 72 total
- SLP: 30 per class; 60 total
- PharmD: 220 per class; 650 total
- Virtually no IPE

Preliminary Research

- Observation and Consultation
  - California State University Sacramento
  - Des Moines University
  - San Joaquin Delta College
  - Chatham University
  - Lynchburg University

Initial Proposal

- Initial proposal for self-sustained Pacific Health Sciences High-Fidelity Simulation Center: $1,972,000.00
- Focus on IPE and community partnerships

Message from our Dean...

“Great news! The Administration was excited about your grant proposal and they want to move forward. Please revise your proposal and submit it for internal funding through the Strategic Educational Excellence Development Grant application process.”

<table>
<thead>
<tr>
<th>Initial Estimation</th>
<th>Startup</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manikins (6)</td>
<td>$600,000</td>
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<td>Staff coordinator (half-time)</td>
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<td>Staff technician</td>
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<tr>
<td>Dedicated faculty</td>
<td>$120,000</td>
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<tr>
<td>Maintenance</td>
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### Invaluable advice...

- Learning objectives should drive your choice of manikins and how you set up your space
- Physical, conceptual, and psychological realism

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### Maximizing Learning with Minimal Funding: Level of Fidelity

- **MegaCode Kelly:** $17,000
  - Programmable cardiovascular and pulmonary responses
  - Articulated joints (most)
  - Tetherless
  - Remote voicing
  - Software and Hardware
  - 3 year warranty

- **SimMAN 3G:** $105,000
  - Bleeding
  - Vomiting
  - Drug recognition
  - Cyanosis
  - Stomach distention
  - Light sensitive pupils
  - Blinking eyelids

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### Maximizing Learning with Minimal Funding: Numbers of Manikins

- **Budget**
- **Objectives**
- **Student : Manikin**
- **Faculty : Manikin**

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### Maximizing Learning with Minimal Funding: Space

- **Share existing space**
  - $2000 wall shades and mobile stands for monitors and headboards
  - Everything mobile

- **Remodel space**
  - $300,000 minimum
  - Dedicated
  - Permanent

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### Maximizing Learning with Minimal Funding: Equipment and Supplies

- **Minimal new/mostly used**
  - $550 (monitor stands)
  - $3900 (ICU headwalls and stands)
  - $870 (Roller shades for lab)
  - $2000 (laptop and cameras)
  - $1500 (simulation supplies)
  - $0 (hospital furnishings)
  - $0 (expired medical supplies)
  - $8,820

- **New equipment**
  - $655,000 (AV and classroom furniture)
  - $47,000 (hospital simulation furnishings)
Equipment Donation Received

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Estimated Value</th>
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</thead>
<tbody>
<tr>
<td>Hospital Beds (3)</td>
<td>$11,000.00</td>
</tr>
<tr>
<td>IV-Poles (3)</td>
<td>$150.00</td>
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<tr>
<td>Tray-table (4)</td>
<td>$200.00</td>
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<tr>
<td>Miscellaneous (peripheral/central lines, chest tubes, Foley catheters, ETT, tracheostomy tubes, ventilator circuits, etc)</td>
<td>$2,000.00</td>
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<td><strong>Total</strong></td>
<td><strong>$13,350.00</strong></td>
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Budget Comparison

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Seed Est.</th>
<th>Initial Estimation</th>
<th>Startup</th>
<th>Annual</th>
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</thead>
<tbody>
<tr>
<td>Manikins (5)</td>
<td>$86,561.18</td>
<td></td>
<td>$600,000</td>
<td></td>
</tr>
<tr>
<td>Audiovisual</td>
<td>$1286.12</td>
<td></td>
<td>$655,000</td>
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<tr>
<td>Monitor Stands (4)</td>
<td>$550.36</td>
<td></td>
<td>$47,000</td>
<td></td>
</tr>
<tr>
<td>Headwalls (4)</td>
<td>$3142.00</td>
<td></td>
<td>$46,000</td>
<td></td>
</tr>
<tr>
<td>Headwall Stands (4)</td>
<td>$741.85</td>
<td></td>
<td>$14,000</td>
<td></td>
</tr>
<tr>
<td>Roller Shades (4)</td>
<td>$868.96</td>
<td></td>
<td>$300,000</td>
<td></td>
</tr>
<tr>
<td>Hospital Equipment (drips, lines, leads, tubes, drains, gowns, linens, miscellaneous)</td>
<td>$1588.56</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Laptop for SIM Software</td>
<td>$521.85</td>
<td></td>
<td></td>
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<tr>
<td>Labor/Installation</td>
<td>$918.70</td>
<td></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$96,179.58</strong></td>
<td></td>
<td><strong>$1,972,000</strong></td>
<td><strong>$350,000</strong></td>
</tr>
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Funding Sources

- **Internal Grants**
  - Strategic Educational Excellence Development Grant (SEED)
  - Committee for Academic Planning and Development (CAPD)
  - Technology in Education Committee (TEC)

- **Donation/Surplus**

Features of the SEED Grant Writing Process

- IPE was a focus
- Interdisciplinary committee created: PT, SLP, Pharm, ATC, PA
- Accreditation criteria
- Evidence based re improved learning outcomes
Simulation Lab & Features

- Classroom across from SIM lab serves as remote observation/control room

Simulation Lab & Features

- Debrief occurs in lab

Barriers: Communication and Planning

- Units’ priorities
- Selecting location, make, fidelity, and number
- Scheduling training
- Development and implementation of IPE

Barriers: Departmental

- Shared space designated for PT research
- Sharing space with other departments: Creation of P&P
- Equipment committee: maintenance and costs associated with upkeep of all associated equipment (manikins, hospital beds, monitors, etc.)

Barriers: Departmental

- Curriculum: Identifying areas within the curriculum that could potentially incorporate use of simulation
- Faculty training: set up, disassembly, precautions
Barriers: Equipment Acquisition

• First manikin: unable to assemble due to lack of pilot holes; required visit by manufacturer representative
• Need for diverse manikins: cost and delay for exchange
• Donated and surplus equipment from local facilities: many delays; some required return
• Necessity for mobile equipment: evenings and weekend equipment assembly

• Faulty equipment: broken welds on monitor stands
• Environment/Aesthetic transformation: asbestos prevented enhancement of simulated environment
• Donated equipment compatibility issues: flowmeters not compatible with ICU headwall connection

Barriers: Technology and Software

• Hardware
• Software compatibility

Barriers: Remote Observation Room

• Observation/Control Room: proximity for connectivity
• GoPro to live stream to satellite classroom did not work
• Logitech webcam selected

• Selection of appropriate platform to host shared audio-video
• Low bandwidth during periods of high traffic
• Observation Room Scheduling
## Barriers: Time

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time Investment</th>
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</thead>
<tbody>
<tr>
<td>Observation of other SIM Labs and Travel</td>
<td>20 hours</td>
</tr>
<tr>
<td>Surplus Equipment Selection and Transport</td>
<td>20 hours</td>
</tr>
<tr>
<td>Shopping (Equipment/Supplies)</td>
<td>40 hours</td>
</tr>
<tr>
<td>Equipment Assembly</td>
<td>40 hours</td>
</tr>
<tr>
<td>Initial Set Up For Full Operation</td>
<td>20 hours</td>
</tr>
<tr>
<td>Software updates</td>
<td>Inconvenience</td>
</tr>
<tr>
<td><strong>Total Estimate</strong></td>
<td><strong>140 hours</strong></td>
</tr>
</tbody>
</table>

## We’re learning!

- Lab preparation
  - Initial set up time = 90 min (observation and connectivity set up)
  - After elective = 30 min for complete set up in preparation for simulation scenario

## Student Perspectives

- Expectations of elective
- Initial impressions of the environment and manikins
- Development and application of clinical skills
- Clinical decision making
- Observation
- Did the elective experience translate to clinical experience?

## Curricular Integration

- 2016 CSM Preconference Sim Course
- Current Courses
  - Cardiovascular and Pulmonary PT
  - Acute Care Elective
  - Advanced Clinical Problems: skills check off prior to internships
  - Remediation

## Leveraging the lab

- Student/Alumni Engagement
- Grants
- Donations
- Surplus
  - Local Institutions
  - Non-profits
- Continuing education
- Theatre Arts (SPs)
- Research and Publication

## Persistent Challenges

- Staffing – dependent upon activities and objectives
- Time consuming activities
- Planning, coordinating, implementing IPE
In closing... patient simulation

- Can be less expensive
- Can be mobile and in a “smaller” space
- Is very time consuming
- But worth it!

Questions?

THANK YOU!

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References