Becoming more involved in the fidelity of your training equipment while lowering your consumable costs.

Presented By: David E. Biffar, MS
Disclosure Information

Research / Education: Karl Storz Endoscopy – America
Learning Objectives

1. Determine how maintaining an artificial tissue laboratory will contribute to your own simulation center in regards to fidelity of training and overhead costs.

2. Identify the methods and strategies necessary to create useful artificial tissue models at a low cost.

3. Assemble the components that are required to implement an artificial tissue laboratory.

Models for Education – Industry Partnerships - Research
# ASTEC Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>Allan J. Hamilton, MD, FACS</td>
<td>Professor of Surgery</td>
</tr>
<tr>
<td>David Biffar, MS</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Lisa Grisham, MS, NNP</td>
<td>Simulation Specialist</td>
</tr>
<tr>
<td>John Jarred, EMT-P</td>
<td>Simulation Specialist</td>
</tr>
<tr>
<td>Hannes Prescher, BA</td>
<td>Research Specialist</td>
</tr>
</tbody>
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Arizona Simulation Technology & Education Center (ASTEC)
University of Arizona, College of Medicine
University of Arizona Health Network
Old ASTEC

Old Artificial Tissue Laboratory
Regular Users of ASTEC

**College of Medicine**
- Medical Students
  - Emergency Medicine Elective
  - Surgery Clerkship
  - Internal Medicine Clerkship
  - Pediatric Clerkship
  - Year I and II Societies
  - Year III Internships
  - Year III Transition Block
  - Year I Interprofessional CPR
  - CPR Elective
  - Telemedicine and Telehealth
  - Emergency Medicine Club
  - Surgery Club

**University Medical Center**
- NP, RN, Paramedics, PCT’s, etc.
  - Emergency Medicine Competency Codes
  - In Situ CDU Codes
  - In Situ Diamonds Center PICU Codes
  - In Situ Diamonds Center NICU Codes
  - In Situ Diamonds Peds Step-down Codes
  - In Situ Radiology Code Review
  - In Situ CT Surgery Codes
  - In Situ Emergency Medicine Codes
  - Undergraduate Healthcare Clubs and Groups
  - Middle and High School Healthcare Programs

**Residents (UMC & Kino)**
- Surgery Residents / FLS Testing
- Emergency Medicine Residents
- Internal Medicine Residents
- Family Practice Residents
- Pediatrics Residents
- OB/GYN Residents
- Pulmonary Fellows
- Anesthesia Residents
- Neurosurgery Residents
- Residency Simulation Elective

**Outside Users**
- First Responder Organizations
  - Tucson Fire Department
  - Northwest Fire Department
  - LifeNet Helicopter Program
  - Air Evac Helicopter Program
  - Arizona Lifeline Helicopter Program
  - United States Air Force Pararescuemen
  - United States Border Patrol (BORSTAR)
  - Pima County S.W.A.T.

**Community Outreach**
- Neonatal Codes in Nogales
- Neonatal Codes in Sierra Vista
- Office of Multicultural Affairs Internship
- ACLS Skills for Mexican Medical Students
- High School Pre-Health Fellowships
- ACLS Skills for Mexican Medical Students

**Other Groups**
- UA Campus Health
- Nurse Practitioner Acute Care Students
- Physiology Club
- Med Cats Pre-Health Club
- International Fellowships
- Bioengineering research rotations
- Electrical and Computer Engineering rotations
- Camp Scrubs
- Telemedicine Fellowship

8,000 LCH / YR
New ASTEC

New Artificial Tissue Laboratory
Moulage on the Go…

Siemens Innovations

Collaboration Across Borders III
Model Design Introduction
Rationale for Simulated Tissue Models

1. To address a need that the current market does not fulfill

2. Provide an alternative to available vendor products

3. Provide an adjunct that increases the fidelity of a vendor product you already own
Methods for creating models

Cast from a mold

Layering or brush on
Enhancing existing models
Providing an Adjunct to Noelle
New Model Testing
Customized Procedural Models
Considerations

Learner group and objectives determine fidelity, fidelity determines cost and time

VS
Reproduction for large groups
Advanced Moulage for Trauma
Alternate Feature for Patient Simulator
Enhancing Feature on Patient Simulator
Chest Tube Model in Use
Chest Tube Model in Use
Customized Procedural Model
Multi-Station Training
Patient Simulator Prosthetic for Specialized Training
Customized Model in Action
Industry Partnership
EC-IC Model in Use
Industry Partnership
Industry Partnership

xeridiem®
Research: Quality Improvement Grant

University Risk Management

Improving interprofessional skills during robotic cardiothoracic surgery
Research: Quality Improvement Grant
Considerations
Research: Human Factors Grant

Department of Defense, 2012 Ovarian Cancer Research Program

Testing of a Falloposcope for ovarian Imaging
Research: Medical Education Grant

Academy of Medical Education Scholars (AMES)
Demonstration of a Bleeding Tissue Model
Directed Research – Resident Electives

Ultrasound Line Placement
Directed Research – Resident Electives

Ultrasound compatible paracardiocentesis model
Directed Research – Resident Electives
# Materials for Start-up

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<tr>
<th>Items</th>
<th>Cost</th>
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<tr>
<td>Silicone material - casting</td>
<td>$600.00</td>
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<tr>
<td>Silicone material - molding</td>
<td>$400.00</td>
</tr>
<tr>
<td>Mold box and supplies</td>
<td>$300.00</td>
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<tr>
<td>Multi-cooker, vacuum chamber, refrigerator</td>
<td>$350.00</td>
</tr>
<tr>
<td>Release agent, hot glue gun, acrylic spray, isopropyl alcohol</td>
<td>$70.00</td>
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<tr>
<td>Silicone Pigments and powder</td>
<td>$210.00</td>
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<tr>
<td>Assorted tubing</td>
<td>$120.00</td>
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<tr>
<td>Assorted bone models</td>
<td>$400.00</td>
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<tr>
<td>Assorted foam material</td>
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<tr>
<td>Simulated blood products</td>
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<td>Silicone disposables (cups, stirrers, brushes, etc.)</td>
<td>$250.00</td>
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<td><strong>$2,980.00</strong></td>
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Artificial Tissue Materials and Resources

Artificial Tissue Casting Materials:

- Platinum- Cure Silicone Rubber
- Dermasol: ThermoPlastic Elastomer
- Ballistic Gelatin
- Hydrogels

Smooth-on: [www.smooth-on.com](http://www.smooth-on.com)

Paint and Powder Cosmetics: [www.paintandpowderstore.com](http://www.paintandpowderstore.com)
Optional Materials for Start-up

[Image of Captair® and MakerBot Replicator™ 2X]
Materials for Start-up
<table>
<thead>
<tr>
<th>Company</th>
<th>Website</th>
</tr>
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<tbody>
<tr>
<td>Syndaver</td>
<td><a href="http://www.syndaver.com">www.syndaver.com</a></td>
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<tr>
<td>Simulab</td>
<td><a href="http://www.simulab.com">www.simulab.com</a></td>
</tr>
<tr>
<td>Smooth-on</td>
<td><a href="http://www.smooth-on.com">www.smooth-on.com</a></td>
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<tr>
<td>SimPortal / CREST</td>
<td><a href="http://www.crest.umn.edu">www.crest.umn.edu</a></td>
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<td><a href="http://www.prodelphus.com">www.prodelphus.com</a></td>
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<td><a href="http://www.pulsernd.com">www.pulsernd.com</a></td>
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<td>Operative Experience</td>
<td><a href="http://www.operativeexperience.com">www.operativeexperience.com</a></td>
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<td>LifeLife bioTissue</td>
<td><a href="http://www.lifelikebiotissue.com">www.lifelikebiotissue.com</a></td>
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<tr>
<td>Military Moulage</td>
<td><a href="http://www.militarymoulage.com">www.militarymoulage.com</a></td>
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<tr>
<td>Strategic Operations (Silicones)</td>
<td><a href="http://www.strategic-operations.com">www.strategic-operations.com</a></td>
</tr>
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Future Projects

• Wound models depicting the different stages of healing on the foot of a diabetes patient for testing an intelligent wound assessment device

• Silicone heart valve for mastery of robotic--assisted mitral valve techniques

• Testing the sensitivity of an ultrasound machine for objects as small as microns – embedding objects in ballistic gelatin

• Biodegradable electronic technology for measuring novice suturing techniques
Whoa! what did you do!... it’s beating on its own now
ASTEC Website

www.astec.arizona.edu