

A computer-based simulator for diagnostic peritoneal lavage

Alan Liu
Christoph Kaufmann
Thomas Ritchie

Surgical Simulation Laboratory
National Capital Area Medical Simulation Center
Uniformed Services University of the Health Sciences
<http://simcen.usuhs.mil>

Introduction

- Background
 - Advanced Trauma Life Support®
 - What is DPL?
- Motivation
 - The need for a DPL simulator
- Hardware
- Simulation walkthrough
- Preliminary results
- Discussion

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Advanced Trauma Life Support®

- Assessment and resuscitation skills for treating seriously injured patients
- Taught to all fourth year medical students at USU.
- Surgical skills
 - Diagnostic Peritoneal Lavage
 - Pericardiocentesis
 - Surgical airway management
 - Tube thoracostomy

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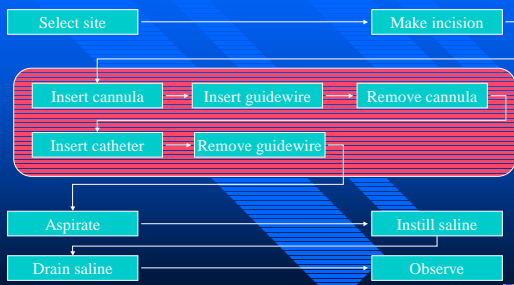
Diagnostic Peritoneal Lavage

- A diagnostic procedure to determine the presence of inter-abdominal bleeding
- Used when
 - Other diagnosis methods are unavailable
 - Patient cannot be moved
 - Not enough time

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Diagnostic Peritoneal Lavage



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Teaching DPL

- Animals or cadavers have shortcomings
 - single use
 - different anatomy (animals)
 - uniformly negative response (cadavers)
 - can be difficult to procure (cadavers)
 - maintenance overhead
 - » Storage (cadavers)
 - » upkeep (animals)

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Computer-based DPL trainer

- Intel-PC
 - graphics display
 - user interface
 - procedure monitoring
- CathSim AccuTouch
 - haptic interface
 - accepts DPL kit

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Computer-based DPL trainer

- 3 dof orientation sensor (pitch/yaw/depth)
- 1 dof passive haptics
 - variable resistance to pushing/pulling



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Simulator GUI



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Walkthrough

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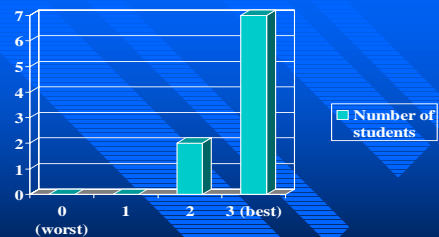
Preliminary deployment

- Conducted ATLS® course using simulators and mannequins
 - Special permission from ACS
- DPL was performed using our system
- 3 staff surgeons, 6 surgery residents
 - All had prior ATLS® training
- Survey conducted after the course

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Results



Average = 2.8

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Results

- Comments
 - “More useful than animal lab”
 - “Simulations allow for rapid setup, thoughtful application and repetitive efforts”
 - “Feedback is ‘realtime’, encouraging understanding of application”

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Discussion

- Strengths
 - Multiple use
 - Customizable scenarios
 - Low maintenance
 - No ethical issues

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Discussion

- Weaknesses
 - Limited realism
 - » Haptics
 - » Graphics
 - High initial cost

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Future directions

- Validation studies
- Improved anatomical model

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