

# A computer-based simulator for diagnostic peritoneal lavage

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## 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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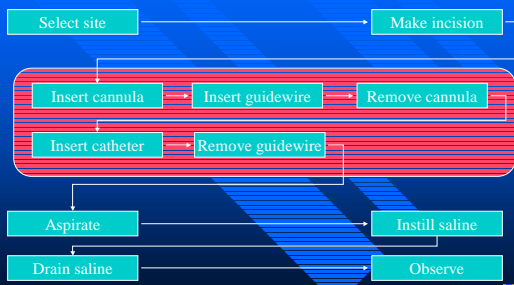
## Diagnostic Peritoneal Lavage

- 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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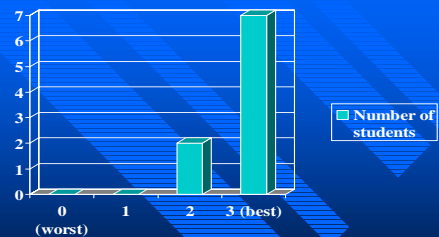
## Preliminary deployment

- 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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