Human-based Training Methods to Replace the Use of Live Animals in Hennepin County Medical Center’s “Skills Maintenance in Emergency Medicine” Lab

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Training Methods Available to Replace the Use of Sheep

Blue Phantom Gen II Ultrasound Central Line Training Model
High-fidelity partial-body mannequin
- Ultrasound-guided central line placement

Blue Phantom IV and Arterial Line Vascular Access Ultrasound Model
High-fidelity arm mannequin
- Ultrasound-guided intravenous and arterial line insertions

Blue Phantom Transthoracic Echocardiography and Pericardiocentesis Ultrasound Training Model
High-fidelity partial-body mannequin
- Chest and abdominal ultrasound training (heart, lungs, ribs, liver, and pericardial fluid)
- Ultrasound guided pericardiocentesis

CAE Healthcare Apollo Patient Simulator
High-fidelity full-body mannequin
- Cardiac pacing, defibrillation, and cardioversion using defibrillators
- Cricothyroidotomy, optional bougie-guided technique
- Endotracheal intubation, optional bougie-guided technique
- Humeral intraosseous cannulation (left deltoid)
- Needle and surgical cricothyroidotomy
- Responds to defibrillation
- Retrograde intubation
- Thoracostomy (bilateral chest tube insertion with fluid removal)
- Transtracheal needle ventilation
- Urinary catheterization
CAE Healthcare Caesar Trauma Patient Simulator

*High-fidelity full-body mannequin*
- Bilateral intravenous cannulation with flashback
- Cardiac pacing performed virtually
- Cricothyroidotomy, optional bougie-guided technique
- Defibrillation (performed virtually using the Defib parameter in Mūse)
- Endotracheal intubation, optional bougie-guided technique
- Needle cricothyroidotomy
- Sternal intraosseous cannulation
- Transtracheal needle ventilation

CAE Healthcare Human Patient Simulator

*High-fidelity full-body mannequin*
- Cardiac pacing with use of hands-free pads
- Cricothyroidotomy, bougie-guided technique
- Defibrillation and cardioversion using defibrillators
- Diagnostic peritoneal lavage with fluid removal
- Endotracheal intubation, optional bougie-guided technique
- Intravenous cannulation
- Needle and surgical cricothyroidotomy
- Pericardiocentesis
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation
- Right jugular and left femoral intravenous lines support infusions
- Thoracostomy (bilateral chest tube insertion with fluid removal)
- Transtracheal needle ventilation
- Urinary catheterization with interchangeable genitalia

CAE Healthcare iStan Patient Simulator

*High-fidelity full-body mannequin*
- Cardiac pacing with the use of hands-free pads
- Cricothyroidotomy, optional bougie-guided technique
- Defibrillation and cardioversion using defibrillators
- Endotracheal intubation, optional bougie-guided technique
- Needle and surgical cricothyroidotomy
- Retrograde intubation
- Right jugular and left femoral central intravenous access; bilateral peripheral intravenous ports
- Sternal and tibial intraosseous cannulation sites
- Transtracheal needle ventilation
- Urinary catheterization with interchangeable genitalia
CAE Healthcare Vimedix

Ultrasound simulator with cardiac and abdominal units
- Chest and abdominal ultrasound

Gaumard Code Blue III Adult Advanced Life Support Training Simulator

High-fidelity full-body mannequin
- Defibrillate and pace using real medical devices
- Intraosseous access at right tibia

Gaumard Trauma HAL Simulator

High-fidelity full-body mannequin
- Internal fluid bladder for catheterization
- Retrograde intubation
- Thoracostomy

Human Cadaver
- All procedures except those requiring vascular access

Human Cadaver Skull
- Skull trephination/burr hole drilling

Kyoto Kagaku CVC Insertion Simulator II

High-fidelity, partial-body mannequin
- Landmark- and ultrasound-guided central venous catheterization

Laerdal Adult I.O. Leg

High-fidelity leg mannequin
- Tibial intraosseous needle placement, medication, and fluid administration

Laerdal Airway Management Trainer

Partial task trainer
- Endotracheal intubation, optional bougie-guided technique
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation

Laerdal Cricoid Stick Trainer

Partial task trainer
- Cricothyroidotomy, optional bougie-guided technique
- Needle and surgical cricothyroidotomy
- Transtracheal needle ventilation
Laerdal Deluxe Difficult Airway Trainer

Partial task trainer

- Cricothyroidotomy, optional bougie-guided technique
- Endotracheal intubation, optional bougie-guided technique
- Needle or surgical cricothyroidotomy
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation
- Transtracheal needle ventilation

Laerdal SimMan

High-fidelity full-body mannequin

- Endotracheal intubation, optional bougie-guided technique
- Pericardiocentesis
- Thoracostomy

Laerdal SimMan ALS

High-fidelity full-body mannequin

- Cardiac pacing
- Chest and abdominal ultrasound
- Cricothyroidotomy, optional bougie-guided technique
- Defibrillation and cardioversion with live shock (manual and automatic)
- Endotracheal intubation (optional bougie-guided technique) and suctioning techniques (includes vomiting)
- Foley catheterization without fluid output
- Intravenous insertion with volume infusion
- Needle and surgical cricothyroidotomy
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation
- Thoracostomy
- Tibial intraosseous cannulation
- Transtracheal jet ventilation

Laerdal SimMan 3G

High-fidelity full-body mannequin

- Cardiac pacing
- Chest and abdominal ultrasound
- Cricothyroidotomy, optional bougie-guided technique
- Defibrillation (manual and automatic)
- Endotracheal intubation (optional bougie-guided technique) and suctioning techniques (includes vomiting)
- Foley catheterization
- Intravenous insertion
- Needle and surgical cricothyroidotomy
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation
- Thoracostomy, bilateral
- Tibial intraosseous cannulation
- Transtracheal jet ventilation

**Laerdal SimMan 3G Trauma**

*High-fidelity full-body mannequin*
- Cardiac pacing
- Cricothyroidotomy, optional bougie-guided technique
- Defibrillation (manual and automatic)
- Endotracheal intubation, optional bougie-guided technique
- Foley catheterization
- Intravenous insertion
- Needle and surgical cricothyroidotomy
- Retrieval of intratracheal and laryngeal foreign bodies
- Retrograde intubation
- Thoracostomy, bilateral
- Tibial and sternal intraosseous cannulation
- Transtracheal needle ventilation

**Laerdal 12-Lead Task Trainer**

*Partial task trainer*
- Cardiac pacing with option to respond or fail to capture
- Defibrillation (manual and automatic)

**Laerdal Virtual I.V. Simulator**

*Virtual reality-based learning system and simulator*
- Intravenous cannulation

**Limbs and Things Advanced Catheterization Trainer**

*Partial-body mannequin*
- Urethral and suprapubic catheterization with interchangeable genitalia

**Limbs and Things Advanced Venipuncture Arm**

*High-fidelity arm mannequin*
- Intravenous cannulation

**Limbs and Things AirSim Advance Combo**

*High-fidelity head and neck simulator*
- Cricothyroidotomy, optional bougie-guided technique
- Needle or surgical cricothyroidotomy
- Transtracheal needle ventilation
Limbs and Things Chester Chest with New Advanced Arm

*High-fidelity chest and arm simulator*
  - Central venous catheterization

Limbs and Things Cutdown Pad

*Multilayered pad containing filled simulated veins*
  - Venous cutdown and cannulation

Limbs and Things Diagnostic Peritoneal Lavage Trainer

*Abdominal wall trainer*
  - Diagnostic peritoneal lavage

Operative Experience, Inc. Emergency Thoracotomy Simulator

*High-fidelity partial-body mannequin*
  - Thoracotomy
  - Thoracostomy

Operative Experience, Inc. Trauma Craniotomy Simulator

*High-fidelity head mannequin*
  - Skull trephination/burr hole drilling

Simulab CentraLineMan

*High-fidelity partial-body mannequin*
  - Central venous catheterization

Simulab CentraLineMan System with Articulating Head

*High-fidelity partial-body mannequin*
  - Central venous catheterization

Simulab SonoMan Diagnostic Ultrasound Simulator

*High-fidelity partial-body mannequin*
  - Chest and abdominal ultrasound examination

Simulab TraumaMan System

*High-fidelity partial-body mannequin*
  - Chest and abdominal ultrasound examination (using the SonoSkin Ultrasound Diagnostic Wearable platform)
  - Cricothyroidotomy, optional bougie-guided technique
  - Intravenous cutdown
  - Needle and surgical cricothyroidotomy
  - Pericardiocentesis
  - Peritoneal lavage
- Thoracostomy
- Transtracheal needle ventilation

**SimQuest Burr Hole Training System**
*Virtual workbench with task simulator*
- Skull trephination/burr hole drilling

**Strategic Operations 6-in-1 TCCC Trainer**
*High-fidelity head and torso mannequin*
- Cricothyroidotomy, optional bougie-guided technique
- Sternal and proximal humerus intraosseous catheter insertion
- Surgical cricothyroidotomy
- Transtracheal needle ventilation

**Strategic Operations Surgical “Cut Suit”**
*Human worn task surgical simulator*
- Cardiac wound repair (suturing of gross organ structures)
- Cricothyroidotomy, optional bougie-guided technique
- Foley catheterization and external bladder tap
- Hemorrhage control
- Sternal intraosseous cannulation
- Surgical cricothyroidotomy
- Thoracostomy, bilateral
- Thoracotomy and intrathoracic exploratory surgery
- Transtracheal needle ventilation

**Synbone SYNMAN**
*High-fidelity partial-body mannequin*
- Cricothyroidotomy, optional bougie-guided technique
- Diagnostic peritoneal lavage
- Pericardiocentesis
- Suprapubic bladder decompression
- Thoracostomy
- Transtracheal needle ventilation

**SynDaver Labs Lateral Canthotomy Trainer**
*Partial task trainer*
- Lateral and medial canthotomy
Pediatric Training Methods Available to Replace the Use of Rabbits

**CAE Healthcare BabySIM**
*High-fidelity full-body pediatric mannequin*
- Endotracheal intubation
- Intraosseous cannulation using anterior tibia
- Intravenous access via left femoral catheter
- Thoracostomy (unilateral chest tube insertion with fluid output)

**Laerdal Infant Airway Management Trainer**
*High-fidelity head and neck infant mannequin*
- Oral and nasal intubation

**Laerdal Neonatal Intubation Trainer**
*High-fidelity head and neck neonatal mannequin*
- Oral and nasal intubation

**Laerdal Newborn Anne**
*High-fidelity full-body newborn mannequin*
- Endotracheal intubation
- Intraosseous cannulation using bilateral tibial tuberosity and medial malleolus

**Laerdal Premature Anne Task Trainer**
*High-fidelity full-body preterm newborn mannequin*
- Endotracheal intubation

**Laerdal SimBaby**
*High-fidelity full-body pediatric mannequin*
- Endotracheal intubation

**Laerdal SimNewB Standard**
*High-fidelity full-body pediatric mannequin*
- Endotracheal intubation

**Limbs and Things AirSim Baby**
*High-fidelity head and neck infant mannequin*
- Nasal and oral endotracheal intubation

**Limbs and Things AirSim Child**
*High-fidelity head and neck pediatric mannequin*
- Nasal and oral endotracheal intubation
**Limbs and Things Cutdown Pad**

*Multilayered pad containing filled simulated veins*
- Venous cutdown and cannulation

**Simulab TraumaChild Pediatric Surgical Simulator**

*High-fidelity partial-body pediatric mannequin*
- Venous cutdown