Virtual Intubation Training at Remote Military Site

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Abstract

- This work describes the use of Adobe Connect software to provide the necessary audio visual communication platform for telementoring a complex medical procedure to novice providers located at a distant site.
Background

• Training opportunities are limited for medical personnel deployed to remote locations.

• The goal of this project was to demonstrate low cost telecommunication solutions to support complex medical training missions for deployed medical personnel.
Virtual Simulation Training
Heidelberg to Omaha Virtual Training
Low Cost Telemedicine Solution
C HUB

- Small weight/cube telecommunications device
- Supports video images from endoscopic devices
Scenario

- A Special Operation Forces (SOF) military physician collaborator at a forward operating base in Afghanistan achieved internet connectivity through a wireless router connected to the “off the shelf” laptop computer in his quarters.
View of Airway

- A video laryngoscope was also connected to the laptop via a custom-made USB adapter. This allowed all users to view the video stream from the laryngoscope during intubation.
Simulation Session

- Deployed physician acted as a virtual team leader
- A flight nurse and ward registered nurse acted as medical support to a simulated patient (Laerdal SimMan) at the UNMC Clinical Skills Center Simulation Laboratory
Intubation with Complication

• The simulation scenario used was a developing tension pneumothorax following the initiation of positive pressure ventilation.
Monitoring Vitals

• The virtual team leader monitored the patient’s vital signs through an image shown in the Adobe Connect virtual conference room.
Remote Team Leader

- Directed the primary survey
- Ordered the initial interventions (tracheal intubation)
- Monitored patient response through verbal feedback from the on-site nurses as well as by transmitted images

The assistant holds the Android Cell phone camera which is the main video source for the simulation lab
Complication

• Recognizing worsening patient condition, he correctly diagnosed tension pneumothorax

• Telementored the nurses as they performed a needle decompression, including the identification of thoracic landmarks to determine correct needle insertion site
Results

• The deployed physician was able to successfully act as a virtual team leader and correctly diagnose a complex medical problem and telementor nurses at the distant site through a lifesaving surgical maneuver.

• Audio and visual quality was sufficient to support team communications at both the proximal and distant site.
Clip of Intubation Directed from Afghanistan

- http://unoconnect.adobeconnect.com/p3ixtru cr42/
Training Demonstration – Use of Video Laryngoscope

- Mentors in Spain and Colorado Springs
- Demonstration of just in time virtual training to support novel, far forward equipment insertion.
Inadequate airway management is a major contributor to pre-hospital morbidity and mortality

- Studies examining pre-hospital deaths
- “airway obstruction was thought to have contributed to death from major trauma in up to 85% of patients” ¹,²,³
  - Also Major cause of death during conscious sedation

Pre Hospital Setting

• “Inadequate airway management in this population is the primary cause of preventable mortality”


Why is Airway Management So Difficult?

- limited cervical spine mobility
- large tongues
- short, large circumference necks
- protruding incisors
- small mandibles
- cervical trauma
- or other abnormalities of the neck or mouth
Direct Sight Intubation v Indirect

• Must align
  – Oral
  – Pharyngeal
  – Laryngeal Axis

• Not anatomically easy to do in many patients
Class IV

Minimal Cervical Extension
Visualisation of the airway by video technique

- Camera integrated in handle
- Video view - angle 60°
- Light-fibres surround view-fibres
- Standard view - angle 10°
- Cables to cold light source + imaging processing module
Demonstration

• Col Alberto Hernandez Abadia de Barbara, MD
  – Servicio de Telemedicina
  – Hospital Central de la Defensa 28047 Madrid Spain

• Col John Torres, MD
  – Premier TRICARE Clinic, Colorado Springs, CO
Summary

• Adobe connect can provide low cost telecommunications to support just in time complex training to far forward deployed personnel
Questions?