How Telemedicine Impacts Clinical Decision and Performance In Prolonged Field Care Scenarios: A Preliminary Review

Sena Veazey, MS
Data Scientist
sena.r.veazey.ctr@mail.mil
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Disclaimers

The opinions or assertions contained herein are the private views of the author and not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

Human Statement
This study was conducted under a protocol reviewed and approved by the US Army Medical Research and Materiel Command Institutional Review Board and in accordance with the approved protocol.
Austere Environment

Challenges:
- Equipment
- Medicine
- Diagnostics
- Personnel
- Knowledge & Skills
- Expertise

Telemedicine – Fill the gap

- Clinicians may have limited experience with combat casualty care, particularly of complex, critically ill casualties in austere environments.
- Pre-hospital providers, such as advanced practice medics in the special operations forces (SOF), must provide prolonged field care (PFC) of injured casualties.

Study Development

- We are currently conducting research on the effects of various telemedical capabilities on clinical decision-making in a simulated PFC environment with limited medical resources. We conducted our preliminary review on pilot studies conducted in this multi-site study.
Simulation Development for PFC

» Scenario Development
   » "14 Hour" Scenario
   » Critically Ill Patient
   » Mock austere environment – Limited supplies and equipment

Scenario Development

» Subjects participated in one critical care scenario for 6-8 hours. Video feeds, real-time data collection, and case review forms combined to provide data on cognitive load, stress levels, and clinical decision-making during tasks and procedures.

Scenario Template
Scenarios:

- Multiple, comprehensive scenarios addressing injuries that require critical care.
  - High fidelity (role player, "command", SimMan3G manikin, realistic materials, equipment, supplies)
  - Elicit real response from subjects.

Timeline: 14 hour simulation compressed into 3.5 hours.
1 Sim hour = 15 minutes real time
Procedure time = real time

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Telemedicine Capabilities

Clinical Practice Guidelines

Partial Telemedicine: Phone/Email

Comprehensive Telemedicine: VTC/ Augmented Reality

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Simulation Setup

» Pre-orientation
  » Orient to the simulation room
  » Manikin
  » Equipment/Supplies
  » Research Team/ Contact information

» Day of Orientation
  » Same as above
  » Hand out surveys

» Run the Sim
  » Typically 6-8 hours long

» After Action Review
  » Comprehensive debrief
Data Collection

- Data collection include continuous physiological vitals that were collected through the Hexoskin smart shirt and electroencephalogram caps and demographics data through surveys. We measured cognitive workload using the NASA-TLX.

Surveys:
- Validated NASA-Task Load Index (NASA-TLX): Mental Workload
- Customized Surveys (Demographics, Confidence, AAR)

Resource Intensive - Personnel

- Proctor
- Simulation Technician
- Confederate
- Telementor
- Scheduling:
  - Subject
  - Telementor
  - Duty hours
  - Contractors

Medical Bag
Pilot Study

» We have conducted 16 pilot studies in preparation for the prospective study.

» All subjects were randomized into three groups: 1) No Telemedicine 2) Partial Telemedicine (email and phone) and 3) Comprehensive (audio-video conference, email, and phone).

PFC Simulation Platform

» Scenario development changes after pilot study:
  » Confederate abilities (ex: Foley cath)
  » Adding extra time for first call telementor; No telementor – extra time at the end of Hour 3.
    » 1 hour -> changed to 30 minutes

» Data documentation
  » Synchronization of videos for retrospective analysis
  » Establish inter rater reliability with our case review forms
    » Ensure each team member is rating similarly

Current Prospective Study

» Actively recruiting active-duty medics and other clinical providers at MAMC and USAISR
» Interim analysis at 12 subjects
» Goal to reach 24 subjects for Phase I
» MAMC: 6 (Running sim today!)
» USAISR: 2 (Running sim next week!)
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Research Analyst
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MAJ George Johnson, MS, RN
Nurse Medical Informatics Office
Jose Salinas, PhD
Chief Clinical Decision Support & Automation Research Branch

MAMC
LTC Jeremy Pamplin, MD
Critical Care Intensivist, Principal Investigator
Katy Cohen, RN
Research Nurse
Joanne Kunze, BS
Research Assistant
Suscie Barczak, BS
Research Assistant
MAJ George Johnson, MS, RN
Nurse Medical Informatics Office

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MAJ Douglas Powell, MD
Battalion Surgeon 4th Battalion, 3rd Special Forces
CDR Konrad Davis, MD
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QUESTIONS

AR – Drawing Tool (blue)