From Telehealth to mHealth: Lessons from the Department of Defense

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Loretta Schlachta-Fairchild, RN, PhD, FACHE, LTC (ret)
President & CEO, iTelehealth Inc.
www.itelehealthinc.com
Lschlachta@itelehealthinc.com
Objectives

- Describe mHealth as a consumer informatics tool
- Identify my own journey with military telehealth and mHealth applications
- Describe key mHealth success criteria
- Provide an Invitation to participate with the Military Health System
Context: mHealth

- **Consumer informatics**: patient/consumer perspective and use of electronic information and communications technologies to improve medical outcomes and the health care decision-making process...to optimize the healthcare partnership of providers and patients

- **Telehealth/Telemedicine/mHealth**: the removal of time and distance barriers for the delivery of health care services and related health care activities through telecommunication technologies; interchangeable terms encompassing a wide range of remote healthcare.
  - mHealth is wireless telehealth/telemedicine as opposed to wired

- **TeleNursing**: The use of telehealth/telemedicine/(mHealth) technology to deliver nursing care and conduct nursing practice
Force Multipliers

- mHealth can be a force multiplier
  - Whole is greater than the sum of its parts
1996 The Electronic Housecall:
US Army Eisenhower Army Medical Center, Medical College of GA, George Institute of Technology

- Two guys and a truck to install
- PC with tower and peripherals; touch screen interface using local Cable Company
- Cost: $20,000.00
- Telenurse monitors to catch problems
- Outcome: Decreased frequent hospital admissions

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Patient’s family takes home and installs equipment Day 5 after open heart surgery

- Videophone over POTS with peripheral monitoring devices
- Cost: $5000
- Telenurse monitors to catch problems
- Outcome: Decreased hospital admissions
Low stigma, continuous data acquisition and intelligent alerting platform via sensors in watch format

- Zigbee mesh network; pt installs
- Cost: $1000-$2500 depending on peripherals used
- Telenurses engage when alerts occur**
- Outcome: decreased hospital admissions

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DARPA Challenge

- Develop Warfighter post-combat ‘Safety Net’ using latest sensor technologies and networked cognitive software
- Fully automated situational awareness with intelligent predictive alerting
- Non-intrusive and warfighter acceptable
- Dual-use and low cost
Operational Medicine with Personal Area Network: tested with Special Forces

- Color-coded modules
- Fit in uniform pockets
- GPS example shown

Core Temperature Sensor Suite

Blast Overpressure Sensor Suite (alternate location)

EKG Sensor Suite

Blood Pressure Sensor Suite

Respiratory Rate Sensor Suite

Air Contagion Sensor (alternate location)

GPS

Monitor Watch PAN Info Center

Respiratory Rate Sensor Suite

PAN Sensor

• GPS Amplified Antenna
• GPS Module
• PAN Radio Node
• Inductive Charge Port

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Active Military Version of Monitor Watch

- Part of Personal Area Network
- Current FDA-cleared features:
  - Accelerometer
  - Temperature (for status)
  - Messaging
  - Software-defined buttons
  - Heart Rate novel wrist-based design
- To add:
  - Blast Overpressure and heat sensors
  - GPS
  - Packaging
Provide Safety Net in Facility: pending research with San Antonio Military Medical Center
Developing Intelligent Learning Platform of Disease and Injury Models: Brooke Army Medical Center

- 650 patient records
- IRB protocols and USAMRMC second-level oversight approval
- Data collection, de-identification and cleansing
- Principal Component Analysis (PCA)
- Neural Net
- Bayes Net using PCA and time-series data
- Bayes Net with Unsupervised Machine Learning
  - Sodium/Chloride, Heart Rate, GCS found clinically significant and predictive of outcome in several time-based scenarios
Dual Use: MobileCare Monitor: Real-Time Sensing, Analysis, Alerts

- Validated Activity and Health Status
- Fall Detection, Location Tracking
- Personalized Positive ID
- Independence and Security

“I don’t want to take it off”

www.aframedigital.com
Current Use in Civilian Healthcare

Current Customers

Hospital/Rehab
Long-Term Care
Assisted Living
Community Care

Global Market for the Aging Demographic

Actively Installed in 15 facilities in 6 states + Australia
MobileCare Monitor System

Wireless Network connects wristwatch information to CareStation software

Wristwatch Monitor
myPhD (personal help device)

Other Monitoring Devices if Needed

Watch Charger

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Real-Time Status and Alerts

Real-time Status Dashboard

Real-time Alert

Real-time Location

Personalized  Predictive  Proactive

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Success Criteria/Key Lessons Learned

- Technology can empower and inspire consumers to improve health outcomes
- Technology will change (smaller/cheaper), but improved clinical outcomes using the technology should not change so focus on outcomes
- Ease of use, and integration with clinical workflow is paramount
Electronic Health Record (EHR)/Privacy Standards and Agile Development Research and Support in the Military Health System


**GOAL:** Identify and research patient identity management, patient privacy and Agile development best practices for use in the Military Health System
Electronic Health Record (EHR)/Privacy Standards and Agile Development Research and Support for the Military Health System

- If you have/use unique Agile development, patient privacy and identity management best practices

- If you are a researcher in patient privacy/identity management and wish to participate in developing a proposed program of research in this arena

You are invited to participate!
Thank you!

- Loretta Schlachta-Fairchild, RN, PhD, FACHE, LTC (ret), US Army

www.itelehealthinc.com
Lschlachta@itelehealthinc.com
301-305-9034 (cell)
321-250-8810 (office)
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