Smartphone use in Medicine & Biosensors

Bernard W. Dannenberg, MD, FAAP, FACEP
Medical Director Pediatric Emergency Department
Stanford HealthCare

Other Smartphones

Expansion of Function

From: Phone, iPod, Internet Communicator

iPhone 2007

Specific Applications

Smartphone 2007

Other Smartphones

Smartphone applications

Smartphones in EMS and EDs

Medical Reference
Medical Education, Training & Testing
Communication, Telemedicine, Tracking
Personal Care, Patient Information
Medical Hardware and Smartphones
Limitations to Smartphone use

- Consumer Technology: Not reliable
- Security: HIPAA
- Competing Systems
  - Information Technology Departments: Slow adoption rate

Medical Reference

- PediSTAT
- Medcalc
- Eye Chart
- PregWheel
- Simply Sayin'
- Code Runner
- I Translate
- Word Lense
- Eponym

Medical Education, Training & Testing
Medical Education, Training & Testing

Communication, Telemedicine

Radio:
- GMRS, MURS, Trunked Radio Systems, LMRS

Satellite:
- Low Orbit
  - Globalstar, Iridium
  - Geosynchronous Orbit
    - Inmarsat, Thuraya, Terrestar

Mobile Phone (Cell Phone):
- Voice, Text, Data

Cellphones
- Omnipresent - Everybody has one
- Unreliable service
- Fragile devices

Cellphones
Government Emergency Telecommunications Service

GETS is a White House-directed emergency telephone service provided by the Department of Homeland Security’s Office of Emergency Communications (OEC).
Telemedicine

Mobile Phones play increasing role in Telemedicine for EMS and health care staff

Skype, Jabber, iMessage, Face Time, Google Talk, WhatsApp…………..

Camera and Audio quality improving

Telemedicine Interpreter Services

Telemedicine with admitting service at outside hospital

Wearable Devices

The future of healthcare is here!

HIPAA concerns

Any EHR needs to be secure

Dangers of Social Networking

Acceptable if for patient care, continuity of care and exchange of relevant medical information between EMS and Medical Staff

Personal Care & Patient Information
Personal Care & Patient Information

Medical Alert Bracelet

Medical Hardware and Smartphones

Crash Sensor

Example: ICEdot Crash Sensor

BP Monitor

Example: Withings Blood Pressure Monitor
Thermometer
Example: Kinsa Smart Thermometer

Pulse Oximeter
Example: Masimo iSpO2 Pulse Oximeter

Glucose Meter
Example: Sanofi iBGStar

Breathalyzer
Example: BACKtrack Mobile Breathalyzer

Portable EKG
Example: AliveCor

Ultrasound
Example: Mobisante's MobiUS SP1
Medical Hardware on Smartphones

Biometrics

Biosensors

Fitness & Sleep Biosensors

Nike Fuelband

Jawbone Up 24

The Next Frontier

Implantable Devices

Example: Senseonics

*We will see inside ourselves as never before with wearable, even internal, sensors that monitor our most intimate biological processes*

The New York Times

*Ultrathin, flexible sensors could adorn packaging, accessories, even our bodies*

Wall Street Journal

*Smart clothing that can monitor wearer's vital signs, miniature devices that conform to the shape of the body or sensors that expand or contract with the beating of a human heart*
Biosensors

- Vital Signs
- Hemoglobin
- Carbon Monoxide
- Blood Chemistry

DNA
Cardiac Markers
Cardiac Rythms
Hormon Levels

Summary

Positive:
Smartphones in medicine have changed the way we communicate and interact, access and distribute information, train and treat.

Negative:
While more data and information is now readily available, it has become more difficult to filter out the important with a cost to personal privacy.