

Smartphone use in Medicine & Biosensors

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iPhone 2007

Telephone

iPod

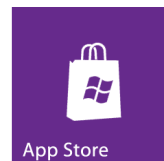
Internet Communicator



Other Smartphones



Smartphone applications



Expansion of Function

From: Phone, iPod, Internet Communicator

To: Photo Camera, Video Camera, Audio Recorder, TV, Social Networking, Gaming, Book Reader, News, Business Productivity, Shopping, Map, Travel, Finance, Scanner, References, Language, Payment Device, Entertainment, Medical, Music, Cloud, Catalogs, Education, Entertainment, Food & Drink, Health & Fitness, Kids, Lifestyle, Sports, Utility, Weather.....

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

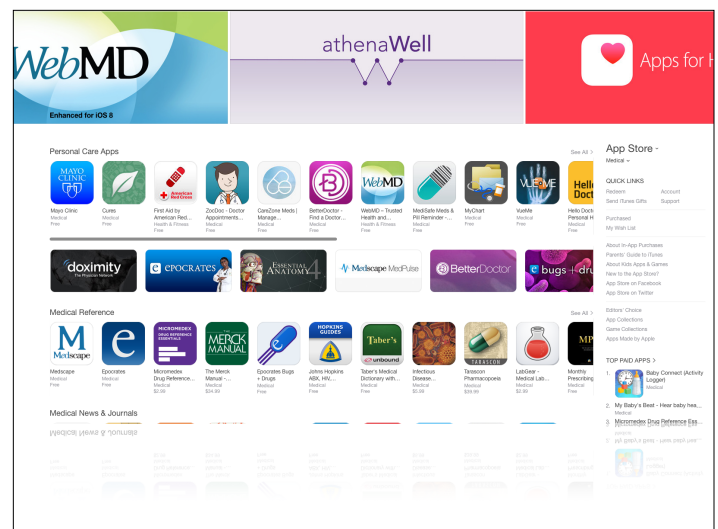
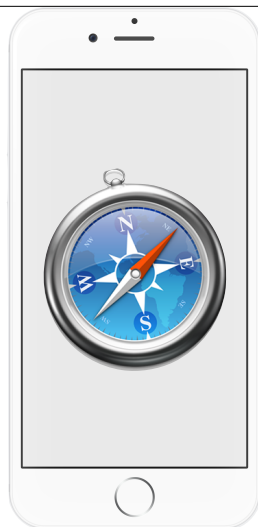
Consumer Technology: Not reliable

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

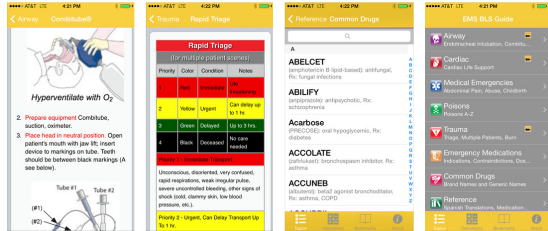


Eponym



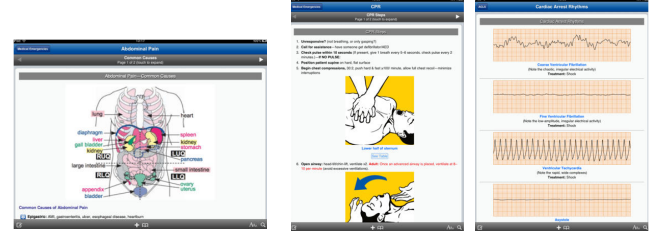
Medical Education, Training & Testing

Medical Education, Training & Testing



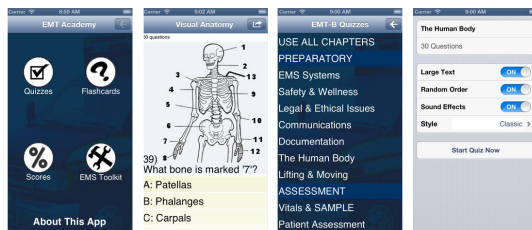
EMS BLS

Medical Education, Training & Testing



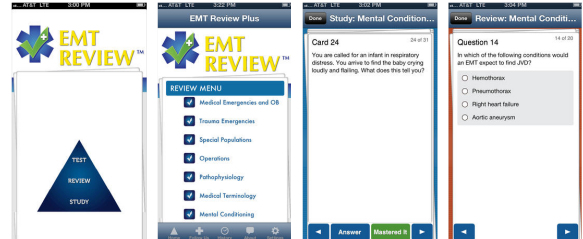
EMS ALS

Medical Education, Training & Testing



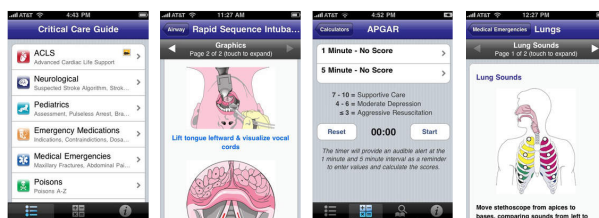
EMT Academy

Medical Education, Training & Testing



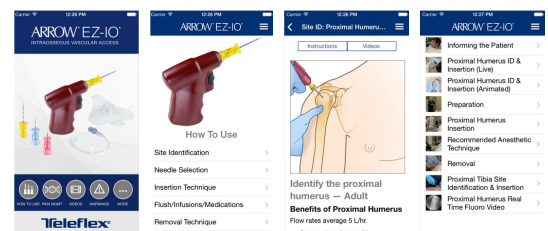
EMT Review

Medical Education, Training & Testing



Critical Care
ACLS Guide

Medical Education, Training & Testing



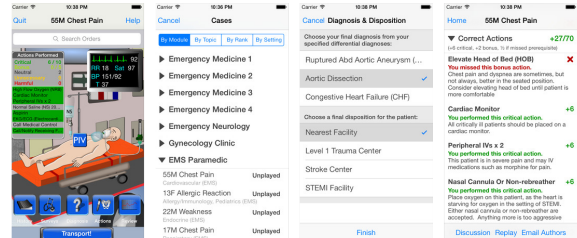
EZ-IO

Medical Education, Training & Testing



Medrills

Medical Education, Training & Testing



Resuscitation!

Communication, Telemedicine

Communication

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).

Government Emergency Telecommunications Service
Office of Emergency Communications

Name: Ira Anslow Organization: PTS Program

Dial GETS Access Number: 1-710-627-4387

After Tone, Enter Your PIN: 0000 0000 0000

When Prompted, Dial Destination Number: Area Code + Number

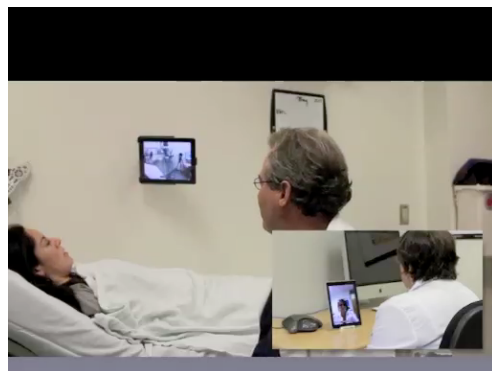
Telemedicine

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

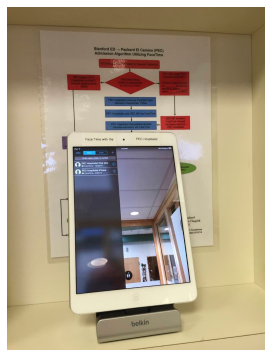
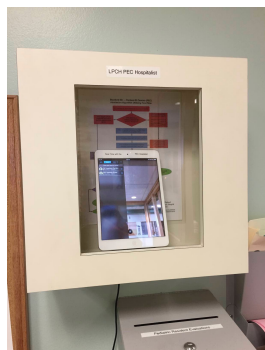
Skype, Jabber, iMessage, Face Time, GoogleTalk, WhatsApp.....

Camera and Audio quality improving

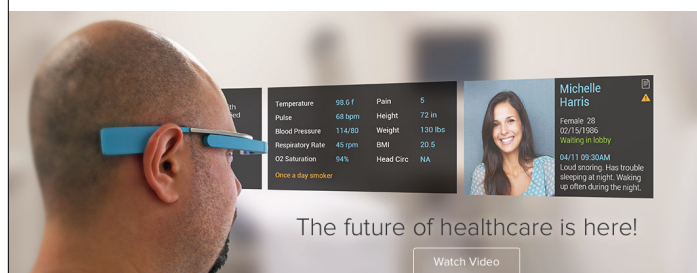
Telemedicine Interpreter Services



Telemedicine with admitting service at outside hospital



Wearable Devices



HIPAA concerns

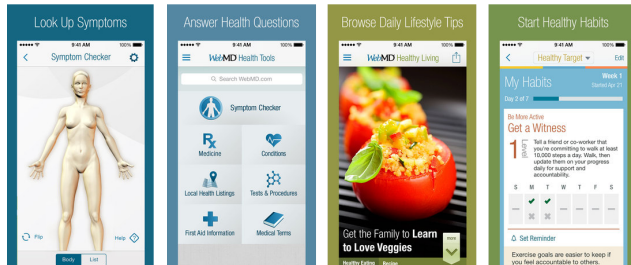
Any EHR needs to be secure

Dangers of Social Networking

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

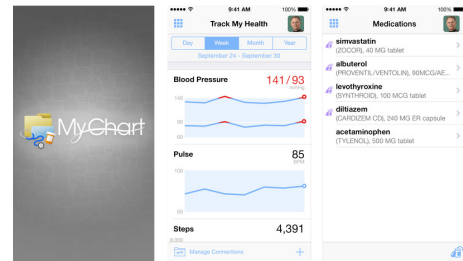
Personal Care & Patient Information

Personal Care & Patient Information



WebMD

Personal Care & Patient Information



MyChart

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

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

The New York Times

The New York Times

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

SCIENTIFIC AMERICAN

SCIENTIFIC AMERICAN

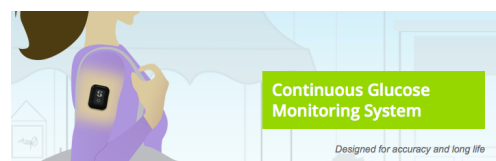
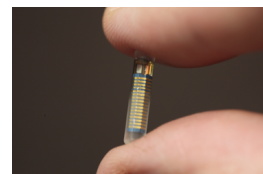
"Smart clothing that can monitor wearer's vital signs, miniature devices that conform to the shape of the body or sensors that expand or contract with the beating of a human heart"

WALL STREET JOURNAL

WALL STREET JOURNAL

WALL STREET JOURNAL

Implantable Devices



Example: Senseonics



Example: mc10 Baby Temperature

Wearable Biosensors



Biosensors

Vital Signs	DNA
Hemoglobin	Cardiac Markers
Carbon Monoxide	Cardiac Rhythms
Blood Chemistry	Hormon Levels

Ten Targets for Wireless Medicine

Disease	No. Affected	Wireless Solutions
Alzheimer's	5 M	Vital signs, location, activity, balance
Asthma	23 M	RR, FEV1, Air quality, oximetry, pollen count
Breast cancer	3 M	Ultrasound self-exam → Web
COPD	10 M	RR, FEV1, Air quality, oximetry
Depression	21 M	Med Compliance, Activity, Communication
Diabetes	24 M	Glucose, Hemoglobin A1C
Heart Failure	5 M	Cardiac pressures, weight, BP, fluid status
Hypertension	74 M	Continuous BP, Med compliance
Obesity	80 M	Smart scales, Glucose, Caloric in/out, Activity
Sleep Disorders	40 M	Sleep phases, quality, apnea, vital signs

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