CS431 – Mobile Computing and Application Development

Topic 4: Mobile Health

Acknowledgment

A good portion of the contents in this presentation is based on a literature review titled as:

Towards the Development of an mHealth Strategy: A Literature Review

prepared by Patricia N. Mechael

for

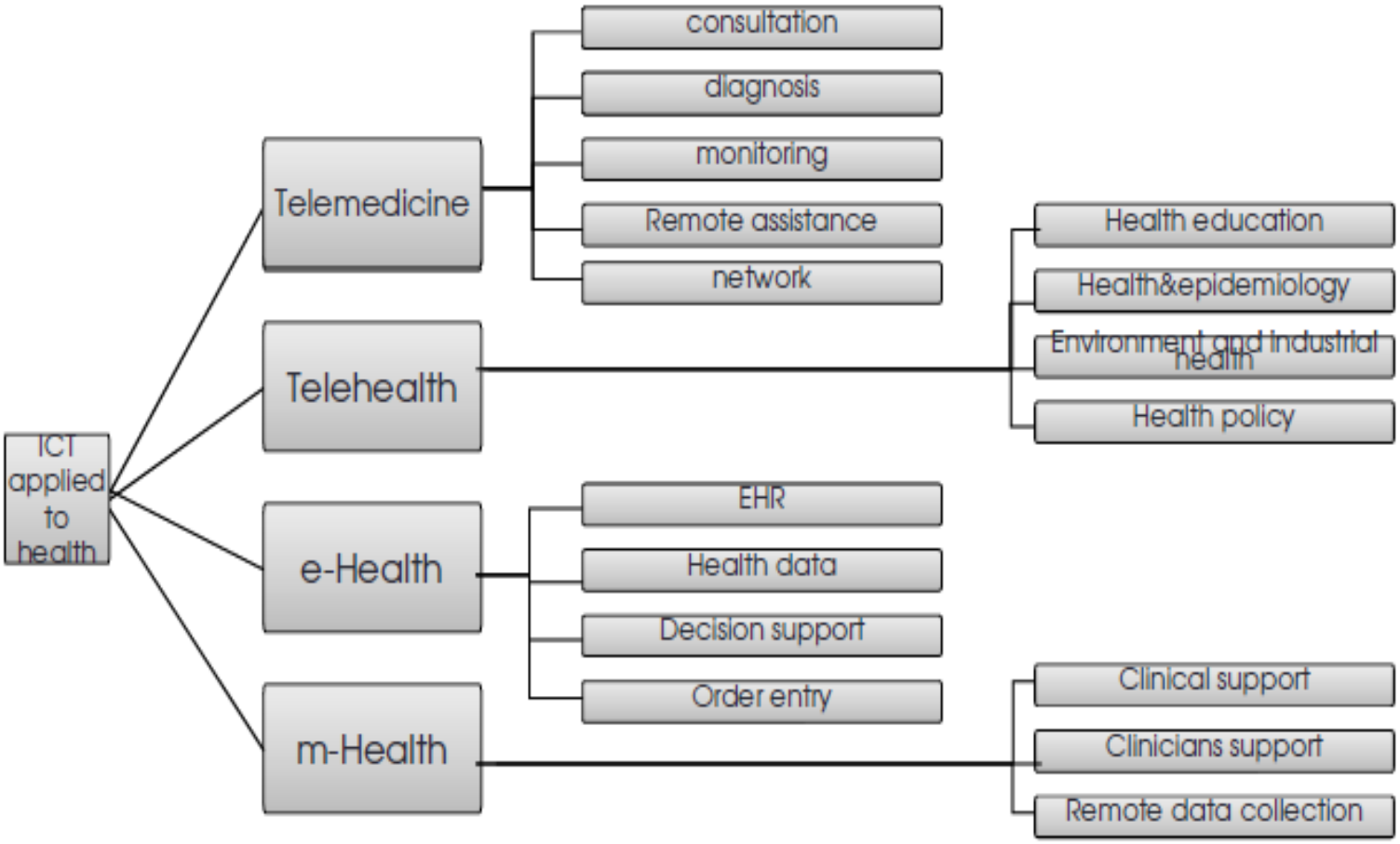
the World Health Organization (WHO)

August 2008 [4].

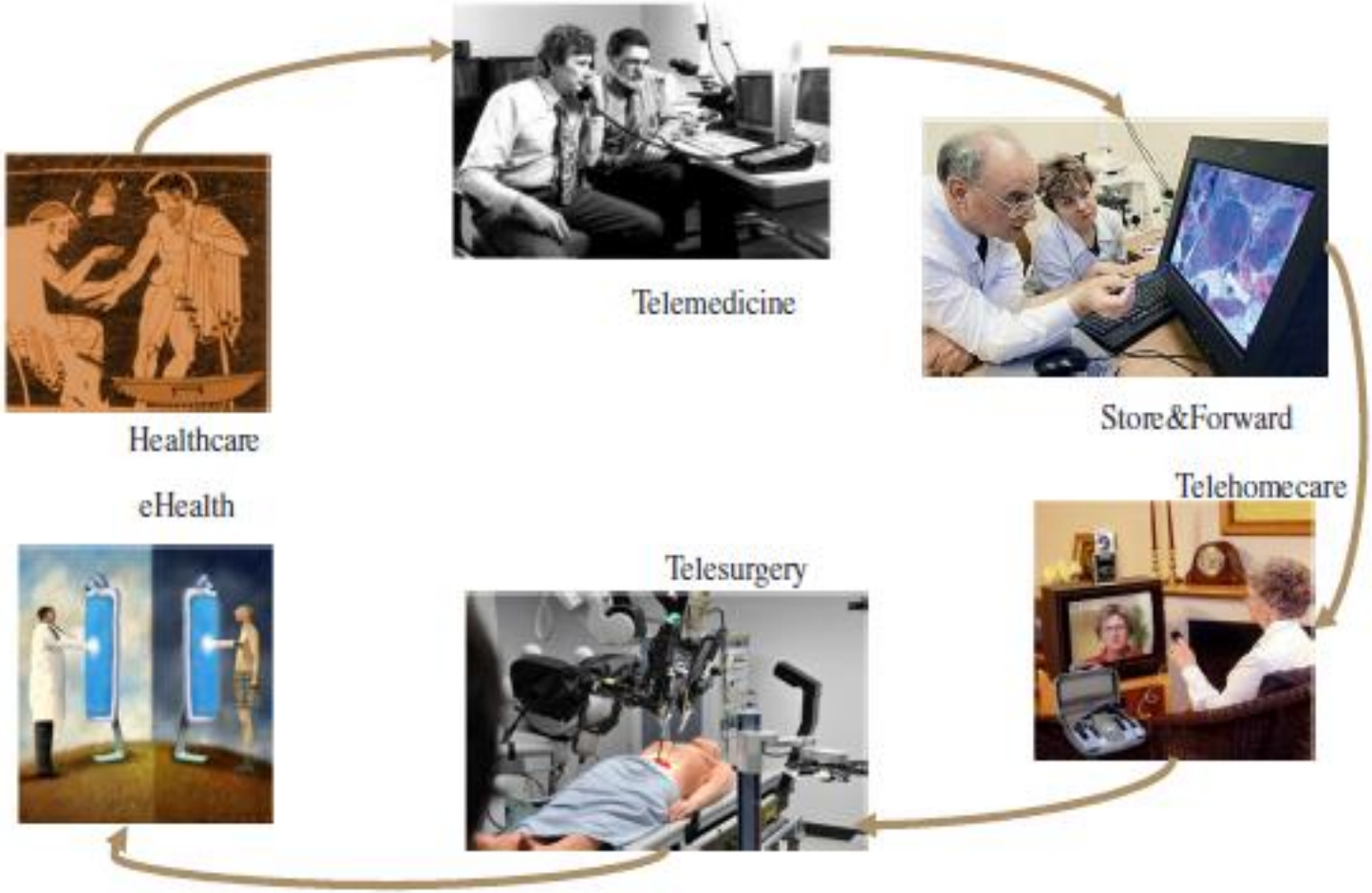
Agenda…

- eHealth and mHealth
- Key areas of mHealth
- Emerging mHealth Trends
- Mobile Telehealth
- Devices and Patient Monitoring Systems
- Potential Benefits, Issues and Challenges
- Class Activity

ICT Applied to Healthcare



ICT Applied to Healthcare



eHealth

According to the World Health Organization (WHO), eHealth (or electronic health) is the "use of information and communication technology for health" [1].

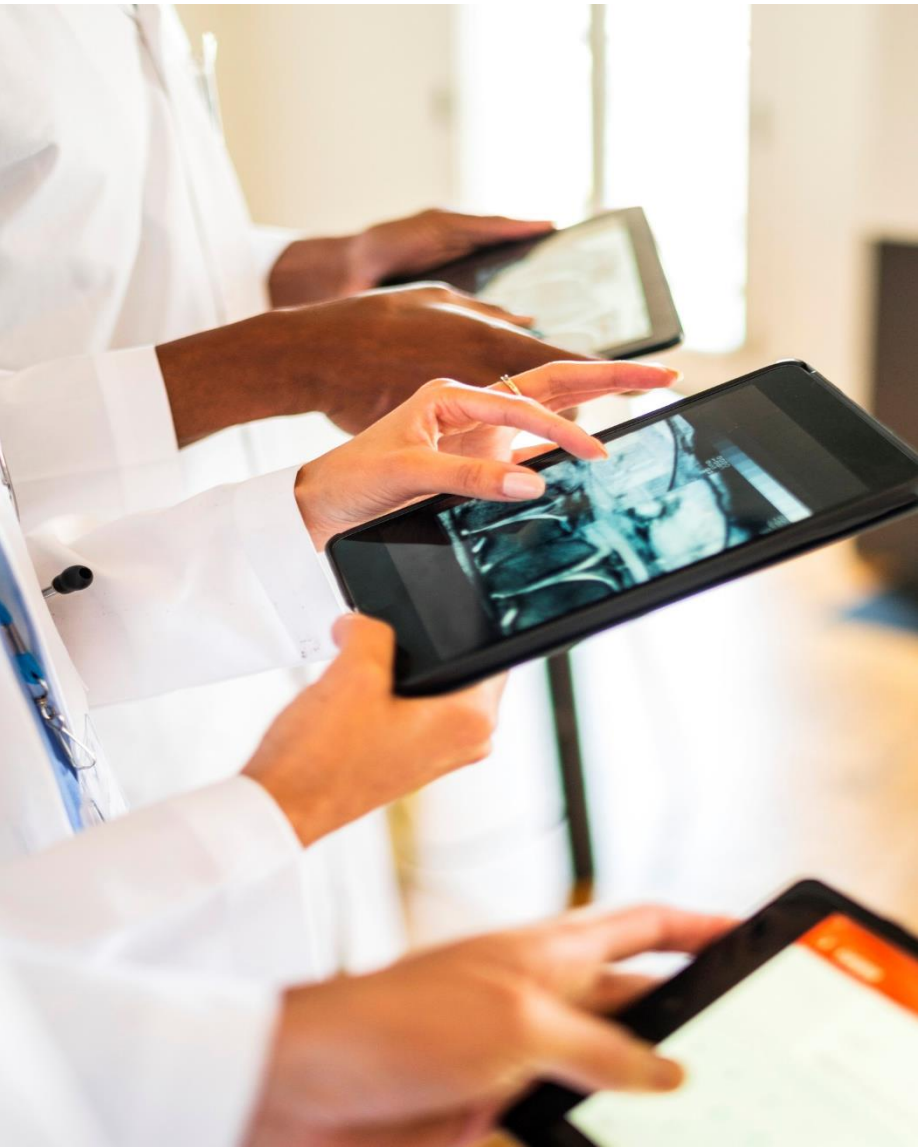
Key areas:

- Health Information Systems (HIS)
- Knowledge Management
- Electronic Patient Health Records(EPHR)
- open access to electronic medical journals
- eLearning and training for health care professionals

[1] World Health Organization , 2005, "eHealth Tools and Services: Needs of Member States", Geneva: WHO.

What is mHealth?

mHealth-Mobile Health



- It is the delivery of Healthcare services via Mobile Communication Devices.
- MHealth based services allows patients and Healthcare professional to access the data anytime anywhere

What is mHealth?

mHealth (or mobile health) can be defined as “mobile computing, medical sensor, and communications technologies for health care” [2].

mHealth: a term for medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices [3].

Mobile health, a term used for the practice of medicine and public health supported by mobile devices.

M-Health Apps

M-Health Apps have a wide range in scope

- Online apps or on a device
- Health & wellness
- Diagnostic and testing
- Patient education
- Labs & Imaging
- Social Media integration

mHealth Technology

- Tablets
- Smart phones
- Apps
- Wearable
- Implantable

Medical Apps vs. Health Apps

- Health apps help consumers to maintain a healthy lifestyle or offer health-related services.
- Health Apps are targeted at consumers rather than medical professionals.
- The most popular categories of downloaded health apps are exercise, stress, and diet.

Finding Apps

- Apple's App Store for iPod, iPhone and iPad
- Google's Android Market for Android mobile devices
- Blackberry's App World for RIM mobile devices
- Nokia's Avi Store for Nokia mobile devices
- Windows 7 Phone Marketplace
- Third-party app stores (*Caveat emptor*)

mHealth

Key areas:

Health Promotion	Supporting the health work force	Enhancing service delivery

1. Health Promotion

Health promotion includes:

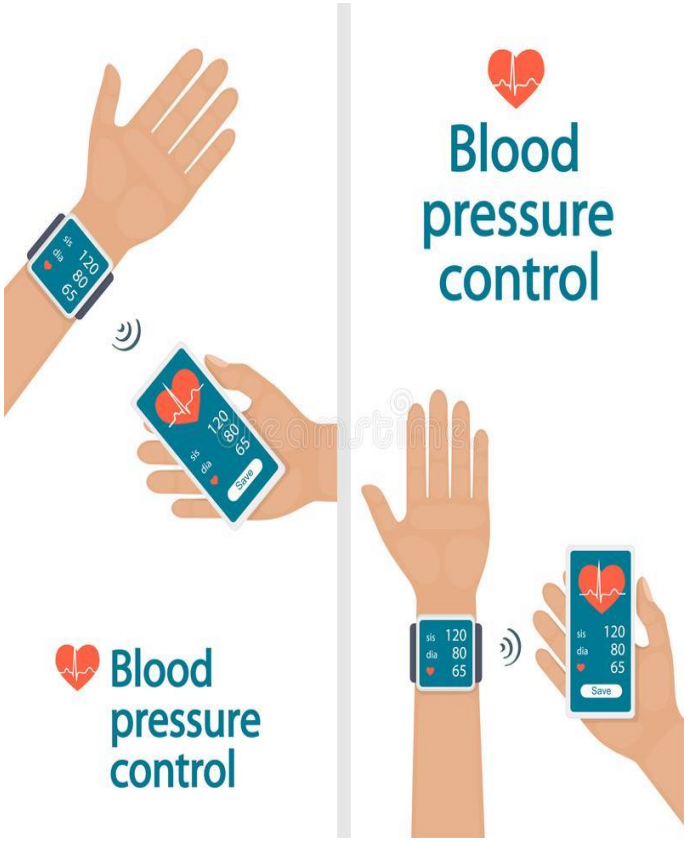
- The prevention of disease

  Examples:

  - Disease monitoring and control
  - Encouraging positive health practices (via SMS campaigns)
  - …

- Individual's efforts to go from a state of illness to wellness.

Disease Management & Control MobileApps



AstmTracker

2. Supporting the Health Work Force

This includes:

- Enhancing the capacity of health care workers to perform their duties more effectively.

Did you hear about

Mobile Telehealth (AKA Mobile Telemedicine)

Mobile Telehealth

Mobile telehealth/telemedicine has been defined by the WHO as:

"*the use of ICT for the support of or the direct provision of health care, particularly where distance and locally available expertise is a critical factor*" [1].

Telehealth categories include:

- **Telenursing**: The use of telemedicine to carry out nursing care
- **Telecare**: The care and monitoring of the elderly at home

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[1] World Health Organization , 2005, "eHealth Tools and Services: Needs of Member States", Geneva: WHO.

Mobile Telehealth Devices and Patient Monitoring Systems

Mobile telehealth devices have been developed in two forms:

- Stand alone technologies transmitting patient information via wired or wireless infrastructure
- Integrated as an add-on to mobile phones.

Examples:

- Self-measurement and monitoring/diagnosis of blood pressure (hypertension)
- Lung function
- Mobile ECG.

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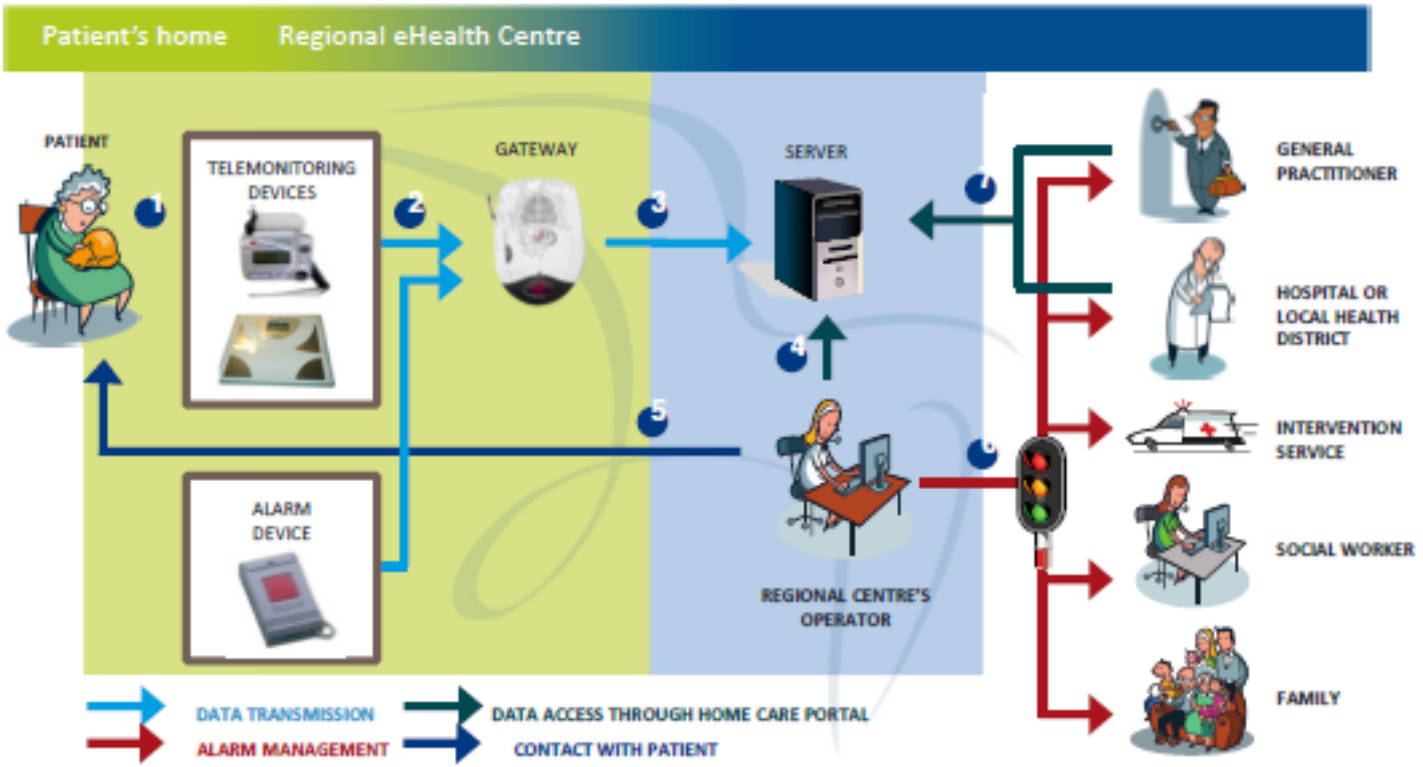
[1] World Health Organization , 2005, “eHealth Tools and Services: Needs of Member States”, Geneva: WHO.

Mobile Telehealth Devices and Patient Monitoring Systems – Cont.

TeleHealth Monitoring for chronic patient

- ICT allows to physician to manage the chronic patient (COPD, Diabetes) in remote way



3. Enhancing Service Delivery

Enhancing service delivery includes:

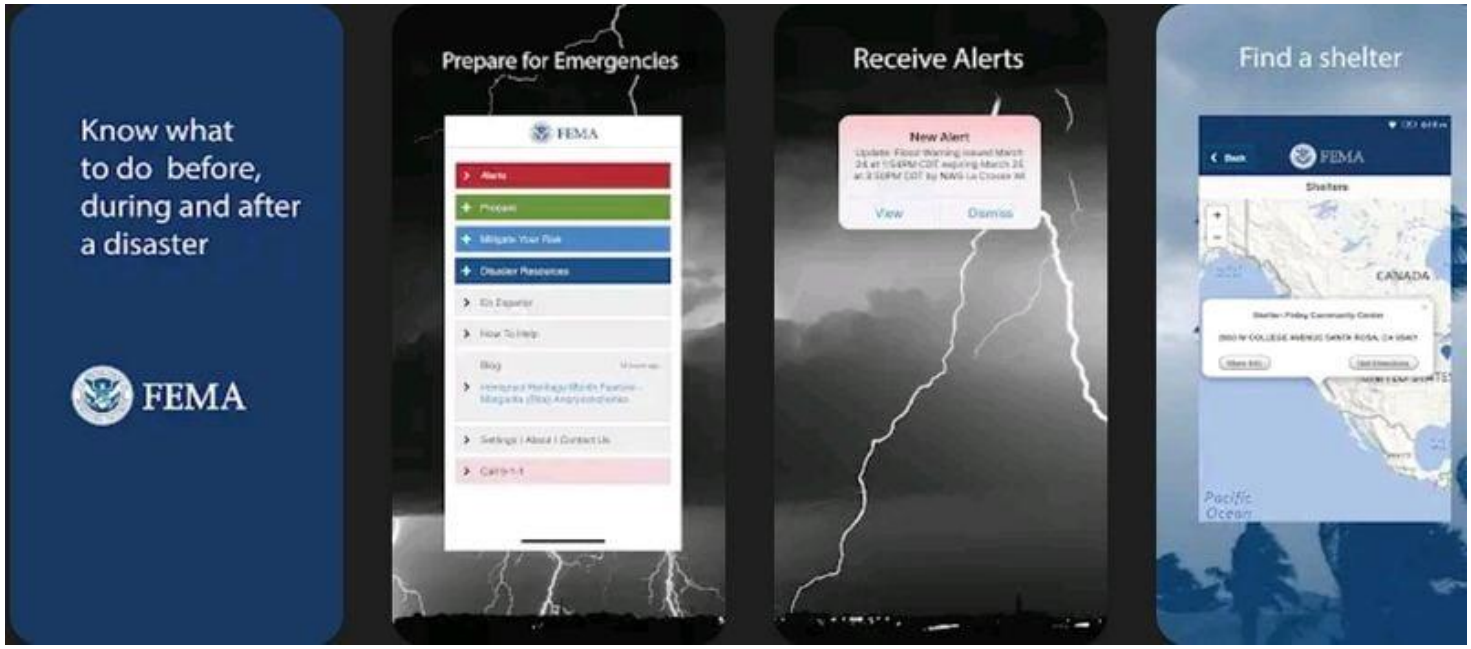
- Emergency response systems

  Three aspects of emergency support that are directly related to health:

  1) Responding to and recovering from natural and man-made disasters. The text messaging is more effective during emergency relief efforts as the messages are more likely to go through on overburdened cellular systems than a phone call.
  2) mobilizing ambulances and informal transportation to the scene of motor vehicle accidents and
  3) Addressing chronic medical conditions particularly among the elderly.

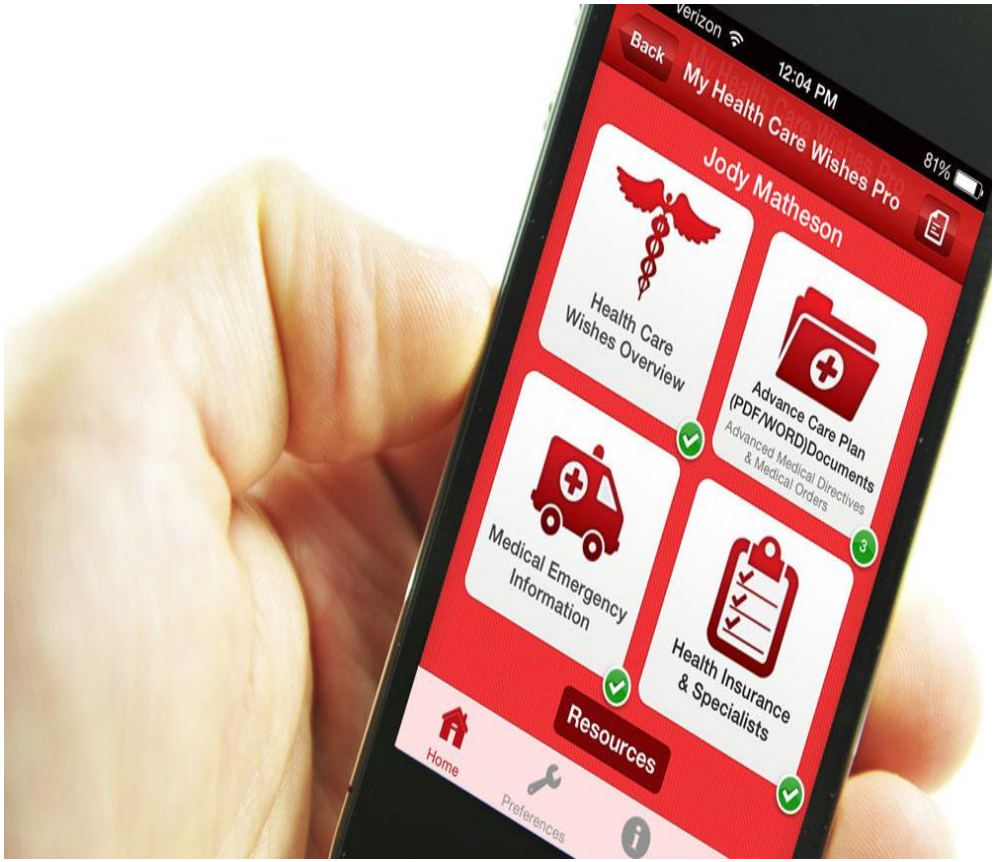
- Health service coordination, delivery, and administration
- Improving access to services for individuals.

Mobile App: for real-time emergencies



- The Federal Emergency Management Agency mobile app is an emergency alert app that works in real-time. This software warns users of impending disasters before they occur and alerts them to safety measures to take during and after such events.
- All you have to do is add your location to the app so it can notify you of emergencies in your area. Basically, the FEMA mobile app issues alert to survive events like severe weather, floods, hurricanes, fires, and many other disasters.

Mobile App: for real-time emergencies



- The American Bar Association's new mobile app puts a copy of a person's advance directive, a legal document often needed in medical emergencies but not at hand in the moment, within arm's reach.

COVID-19 Mobile App

Emerging mHealth Trends

- Emergency response systems (road traffic accidents, emergency obstetric care, etc.)
- Disease monitoring and control (Malaria, Avian Flu, …etc.)
- Human resources coordination, management, and supervision
- Remote patient monitoring and clinical care
- Health extension services, health promotion, and community mobilization
- Health services monitoring and reporting
- Health-related m-learning for the general public
- Training and continuing professional development for health care workers

A Must To See Report..

Health Mobile and Industry

- According to reports, the mobile health industry will reach a total market size of over **USD 60 billion** by 2020.
- Healthcare apps are a blessing to the medical industry. Not only doctors and patients, but hospital staff and pharmacists.
- Mobile healthcare apps can be used for online consultation, diagnosis, appointments, and medical supply delivery.

Potential Benefits, Issues and Challenges

Potential Benefits include:

Drops in

- doctors' office visits,
- emergency room visits,
- inpatient admissions and
- inpatient length of stay,

all of which imply a decreased cost and easing of the burden on health care systems.

Nevertheless, Health conditions with complicated diagnostic measures might not benefit from remote consultations, requiring in-patient diagnosis and treatment.

Benefits of Mobile Health

- Gives patients faster access to providers and care.
- Improves medication adherence.
- Makes remote patient monitoring possible and easy.
- Improves provider communication and coordination

Issues and Challenges of mHealth – Cont.

Issues and Challenges include:

Quality of service

- Network related issues: hand-over, interruption/delays in transmission, data loss bandwidth problems, etc.

Social acceptance

- Health risks (cell phone usage), economic issues, ethical issues

Legal issues

- Accreditation of the devices and applications
- Protection of health related data
- Privacy, security and encryption of data
- Medical responsibilities / liability

Issues and Challenges of mHealth – Cont.

Importance of Privacy and Challenges:

- Confidentiality – collect data and design data for analysis. Attacker can use data for illegal activity
- Integrity – data sensitive. Need to store data securely and data sent by trusted party
- Audit control – record and examine the activity of system, from which device
- Effective user authentication – verify the identity that the user claim, ensure the collected data is collected for the correct patient
- Access control – could be requested my nurses, insurance company, etc.
- Data availability – should be available to the patient
- Freshness of the health data - Recent and accurate data
- Patient consent – patient permission needed in sharing data

Categories of MHealth Services

- health call centers
- emergency toll-free telephone services
- managing emergencies and disasters
- mobile telemedicine
- appointment reminders
- community mobilization & health promotion
- mobile patient records
- information access
- patient monitoring
- health surveys and data collection
- health awareness raising
- decision support systems

Advantages and Disadvantages

Advantages

- Availability of social networks
- Independence for patients
- Reduce cost
- Efficiency of health service
- Patients control condition

Disadvantages

- Digital divide against patients
- Security issues
- Lack of information control
- Safety and privacy

The Competition….!

Apple Healthkit
Google Fit
Open mHealth
Samsung Health
?

References And Additional Resources

[1] World Health Organization , 2005, “eHealth Tools and Services: Needs of Member States”, Geneva: WHO.

[2] Istepanian, R. , 2004, “Introduction to the Special Section on M-Health: Beyond Seamless Mobility and Global Wireless Health-care Connectivity. IEEE Transactions on Information Technology in Biomedicine, 8(4), 405-413.

[3] Global Observatory for eHealth series, 2011, World Health Organization, Volume 1.

[4] http://www.who.int/goe/mobile_health/mHealthReview_Aug09.pdf

Questions?