Appropriate Technology in Healthcare Delivery

eHealth, mHealth, telehealth and telemedicine ….
Appropriate Technology?

- What technology do you use in your professional work?
- What sort of technology do you think should be used in your work?
- What sort of technology would you like to use in your work?
- What is “appropriate” technology
Analyse

“Introduction to mHealth in Tanzania
Improving access to high quality health care”
Information is Key

Healthcare, eHealth, mHealth, Telehealth etc is all about providing the:

• Correct Information
• In the Correct Place(s)
• To the Correct Person(s)
• At the Right Time
Evidence Based Practice

Any health intervention, regardless of the medical or electronic technologies used should be based on evidence for its effectiveness. This is just as true for any intervention labelled as:

- eHealth
- mHealth
- Telehealth or
- Telemedicine
Childcount+  Kenya, Tanzania, Ghana

Primary healthcare and MDG-related issues focusing on maternal-newborn-child health services:

- malnutrition, malaria, and other diseases that affect early childhood development, HIV and vaccinations
- pneumococcal vaccination coverage

Using any standard phone, community health extension workers (CHEWs) are able to use text messages to register patients and send in health reports to a central web dashboard to closely monitor the health of their community and reduce gaps in treatment.
mTRAC - Uganda

Tracks disease outbreaks and medication at Uganda’s 5,000 health facilities and 8,000 community based drug dispensers

- workers at district health centers submit weekly HMIS reports, with a current focus on disease outbreaks and essential medicines.,
- Ugandan Parliamentarians and over 35,000 community-based leaders receive updates on the performance of their constituencies.
Pesinet - Mali

Child health with a focus on respiratory illnesses, diarrheal disease and malaria; early detection and disease prevention in urban populations:

- A mobile application collects and transfers data on the ground to a database. It allows for remote monitoring of health data by the local doctor, activity management and tracking of key impact indicators.
- Weekly home visits to enrolled patients, looking for five key symptoms (fever, vomiting, diarrhea, cough, and weight loss), recorded into a mobile application, and sent to a doctor at the local healthcare center.
Health workers receive a paper booklet with Integrated Management of Childhood Illness (IMCI) protocols. Poor adherence to the IMCI impacts under-five morbidity and mortality.

- An electronic version of IMCI (eIMCI) runs on a Personal Digital Assistant (PDA) and can easily adapt to laptops, tablets, or smartphones.
- The eIMCI protocol guides healthcare workers assessment, classification, treatment, and instructions to caregivers.
A mobile tablet, currently an iPad, with very simple access buttons to applications is provided to the patient. Patients use software applications to communicate, track progress and monitor wellbeing and are provided:

- Access to the Internet
- Video conferencing on the tablet for direct video access to a Clinical Nurse or therapist.
- A self-assessment application in the form of easy to complete questions, completed on a regular basis
- An activity monitor, and in some cases, scales linked by wireless to the tablet
- Access to self-management websites
Aged Care in the Home - Adelaide
Aged Care in the Home - Adelaide

CareSearch Patient Tool

Are you a Patient or a Carer?

I am a Patient

I am a Carer

More Information...

For each symptom, please select a number between 0 and 10 that most closely matches how you have felt over the last 24 hours.

A score of 0 means the symptom is absent. A score of 10 means you are having the worst possible experience with that symptom.

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>ABSENT</th>
<th>WORST DISTRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty Sleeping</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Appetite Problems</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Bowel Problems</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Breathing Problems</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>Legs are really weak</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
Rehabilitation in the Home (RITHOM) offers early discharge with home based rehabilitation programs for people when they have been discharged from hospital. The program is designed to replace part of a long hospital stay with therapy at home.

**Sit To Stand**

- Repetitions: 5
- Sets: 2
- Frequency: weekly
Applications of mHealth Technology (1)

• Management of treatment through reminders and alerts eg HIV
• Patient registration and tracking to enable targeted, timely health visits and care.
• Management of supply chains to ensure adequate stocks (eg medicines and vaccines)
• Saving money to help pay for health services
• Clinical Decision Support to assist health workers provide medical advice, or patients to receive basic support for self care.
Applications of mHealth (2)

• Recordkeeping. Electronic Health Record (EHR) systems can lower costs and save health workers time if properly managed.
• Real-time information capture. Transfer information to central agencies about the progress of diseases, and track public health issues such as water and sanitation quality.
• Management of disasters. Mobile phone infrastructure can survive natural disasters, communicating information and advice (eg by SMS)
Attributes of mobile technology (mHealth)

• Accessibility. Many countries now have extensive mobile phone coverage, even in areas where other infrastructure (eg roads) are absent.

• Affordability. While mobile phones and charges are more expensive in many Low and Middle Income Countries than they should be, there has been significant takeup.

• Consequently the coverage of health care using this technology can be extended.
mHealth Technology Issues (1)

1. Many mHealth services are not built to scale. Interventions aimed at specific services and devices continue to be the dominant format for mHealth services.

2. mHealth implementations created outside a health system may not share platforms with or interact with other health applications.

3. Evidence of the mHealth benefits is to date limited, particularly for better health outcomes, since this research takes longer.
mHealth Technology Issues (2)

4. Rural settings are still challenging for implementing mHealth services because skilled workers are scarce in these areas.

5. As with all electronic application it is important to design mHealth service to align with the privacy expectations of governments and the community.

6. In rural areas, poor network coverage can limit services and there are fewer customers to attract mobile network operators.
mHealth Guidelines (1)

1. Developers and backers of mHealth services should create technologies and business models that can be replicated and expanded.

2. mHealth services benefit cooperation occurs to standardize and connect the health information systems of governments, NGOs and private healthcare providers.

3. mHealth initiatives need to build in evaluations of the whole of health impact of an initiative.
mHealth Guidelines (2)

4. Training in information and communication technology for health workers to provide the new skills they need for mHealth services.

5. Development of a systematic approach to health information system planning will mitigate risks to patients privacy.

6. As network infrastructure improves, mHealth initiatives can provide more complex services on smarter devices.
Appropriate Technology

A question of judgement:
• Bicycles may not be appropriate
• A mobile phone may be appropriate
• An iPad may not be appropriate

Expect the unexpected:
• How to switch on
• Use of keyboard
• Theft, loss, damage etc
WHO Recommendations (1)

(1) to consider, as appropriate, options to collaborate with relevant stakeholders, including national authorities, relevant ministries, health-care providers, and academic institutions, in order to draw up a road map for implementation of health data standards at national and subnational levels;

(2) to consider developing, as appropriate, policies and legislative mechanisms linked to an overall national eHealth strategy, in order to ensure compliance in the adoption of health data standards by the public and private sectors, as appropriate, and the donor community, as well as to ensure the privacy of personal clinical data;
WHO Recommendations (2)

(1) to provide support .......... in order to integrate the application of health data standards and interoperability in their national eHealth strategies ..

(2) to provide support .......... for the full implementation of health data standards in all eHealth initiatives;

(3) to provide guidance and technical support, to facilitate ...... evaluation of information and communication technologies in health interventions,..

(4) to promote, in collaboration with relevant international standardization agencies, harmonization of eHealth standards;
WHO Toolkit

The Toolkit provides a framework and method for the development of a national eHealth vision, action plan and monitoring framework. It is a resource that can be applied by all governments that are developing or revitalizing a national eHealth strategy, whatever their current level of eHealth advancement.

• Part 1: A national eHealth vision that responds to health and development goals
• Part 2: A national eHealth action plan that reflects country priorities
• Part 3: A plan to monitor implementation and manage associated risks.
The Role of Standards

• The power of information systems is multiplied by their ability to work together, operate on common platforms, and share information across new and existing health information systems.

• In Kenya a survey of health information systems in 2009 found 33 applications, almost all of which were using different protocols for electronic medical records.

• When public and private providers standardize their information systems and funders make interoperability a prerequisite for new applications, they reduce the inefficiencies of isolated systems.
Types of Standards

• Formal standards are developed by national or regional standard development organisations
• Proprietary standards are developed for private use by profit driven industry organisations
• Open standards are developed by non profit organisations for public use free of charge
Architecture - Standards that work together

- Full interoperability between health information systems requires systems and technologies based on compatible standards. Interoperable systems requires a systematic architectural approach.

- An eHealth architecture maturity model enables planning and assessment of national systems.

- An architectural components and maturity model eg ISO/TR 14639 provides a guide to best practice business requirements and principles for planning and implementing technology to support healthcare.
Informed health policy
Improved access to care
Evidence-based practice
Informed health service planning
Efficiency, productivity, cost-effectiveness
Improved quality of care – to individuals & populations

Health Process Domain Components

Patient Path – supporting continuity of care

Community-based services
Primary care services
Hospital institutional services
Public health & disease surveillance
Emergency response
Diagnostic services
Pharmacy services
Healthcare supply chain
Human resources in health
Health finance and insurance
Vital records collection & management
Environmental monitoring
Knowledge management & e-learning

HS planning, monitoring & evaluation

Foundation - eHealth Infrastructure

EHR & health information repositories
Identification registries & directories
Clinical terminology & classifications
Data interchange interoperability & accessibility
Consent/access control & workflow management
Privacy, security & safety regime
Census, population information, & data warehouse

Foundation - ICT Infrastructure

Local access to ICT equipment and facilities
Electronic communications infrastructure
ICT processing and storage services
ICT professional & technical support

Standards, methods, guidelines, frameworks

Governance & national ownership

Executive sponsorship
National leadership of e-Health program
e-Health standards adoption & implementation
Development of e-Health capability & capacity
e-Health financing & performance management
e-Health planning & architecture maintenance
EHR information repositories

Health data is about the patient and may reside solely in the healthcare provider's system. The goal is to make this health data available, to other clinical stakeholders who require information for treatment purposes.

Maturity Scale

- **Low** - No national policy for interoperable sharing of health data through an EHR repository.
- **Medium** - A national policy for interoperable sharing of health data contained in an EHR repository.
- **High** - EHR repositories are interoperable according to national policy, compliant to international standards.
Electronic Communications Infrastructure

Maturity Scale

- **Low** - Healthcare workers and patients can obtain mobile phone coverage in only urban and regional centers.

- **Medium** - Healthcare workers and patients can obtain mobile phone coverage in urban and regional and rural centers; and

- **High** - Healthcare workers and patients can obtain 3G or 4G mobile phone data coverage in urban and regional and rural centers.
Resources

• A review of interoperability standards in e-Health and imperatives for their adoption in Africa, Funmi Adebesiny, Rosemary Fosteryz, Paula Kotzey, Darelle van Greuneney
• Working Solutions for Telehealth, MedInfo 2013 Panel Session, IMIA Working Group on Telehealth
• Strengthening National Health Systems through a Capacity-based eHealth architecture, ISO Brochure in draft
• Barriers and Challenges to the Adoption of E-Health Standards in Africa, Funmi Adebesina, Paula Kotzéb, Darelle van Greunenc, Rosemary Foster
• HL7 Mobile Health News, November HL7 Mobile Health Work Group 2013 Volume 1, Issue 2
Resources

• Leveraging eHealth to improve national health systems in the African Region, Asamoah-Odei Dereje Kebede Chris Zielinski Edoh-William Soumbey-Alley Miguel Peixoto Matshidiso Moeti
• Introduction to mHealth in Tanzania - Improving access to high quality health care, Steve Ollis, D-tree International
• Mobile Applications for the Health Sector, Christine Zhenwei Qiang, Masatake Yamamichi*, Vicky Hausman, Robin Miller, and Daniel Altman, ICT Sector Unit, World Bank
• Mobile Health Elements Necessary for the Successful Scale Up of Mhealth in Developing Countries, Advanced Development For Africa
• Development of National mHealth Strategy Framework in Tanzania, mHealth Working Group Meeting
Resources

- Proposal to Strengthen Health Information Systems in Tanzania, Ministry of Health and Social Welfare (MOHSW)
- Mobile Phone Support Maternal, Newborn, and Child Health (MNCH) programs in Tanzania, World Vision
- WHO Resolution, eHealth standardization and interoperability
- WHO eHealth Toolkit
- TELEMEDICINE in Member States, Global Observatory for
- eHealth series – Volume 2, WHO
- ISO TR 14639-1 Health informatics -- Capacity-based eHealth architecture roadmap, Part 1: International Initiatives on eHealth Systems