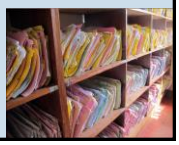
Computing and Global Health
Lecture 4
Medical Record Systems

Winter 2015
Richard Anderson



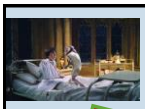
Today's topics

- Paper to Digital, Nicki Dell
- Readings and assignments
- Medical Records in the US
- Global context
- Open MRS
- iSante
- General discussion

Readings and Assignments

- Homework 3
  - Fahad!
- Readings
  - Implementing electronic medical record systems in developing countries
  - Clinical decision support challenges
  - Open MSR

Date	Topic
Jan 7, 2015	Overview
Jan 14, 2015	Surveillance
Jan 21, 2015	Tracking
Jan 28, 2015	Medical records
Feb 4, 2015	Logistics
Feb 11, 2015	Patient support
Feb 18, 2015	Treatment support
Feb 25, 2015	Health worker support
Mar 4, 2015	Behavior change
Mar 11, 2015	Finance



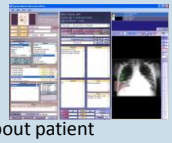
Assignment 4

- Ins standalone instance of nMRS from
- Co Po at Hogwarts Infirmary

Write a review of the 2005 "Implementing electronic medical record systems in developing countries" paper by Hamish Fraser et al. Assess how well this paper has withstood the test of time. How much of the paper is still relevant in 2015?

Expected length: one or two pages.

Electronic Medical Records



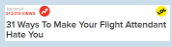
- Developed world context
  - Paper versus electronic records
- Multiple views
  - Container for holding information about patient
  - Tool for aggregating information for secondary uses (billing, test management)
  - Source of data for monitoring an reporting
- In US
  - Many different products available
  - $$$$

Medical Records in the US

- Hospitals / Clinics slow to adopt
  - 2008 use, about 20%
  - IT Spending in Healthcare is low (2%)
- Growing mandates for use
  - Medicare fines
  - HITECH incentives
- Debates on cost savings
- Issues about security and privacy

9 Reasons Doctors Hate EMRs

1. **Time-Consuming Data Entry**
2. **User Interfaces That Do Not Match Clinical Workflow**
3. **Interference with Face-to-Face Care**
4. **Insufficient Health Information Exchange**
5. **Information Overload**
6. **Mismatch Between Meaningful-Use Criteria and Clinical Practice**
7. **EHRs Threaten Practice Finances**
8. **EHRs Require Physicians to Perform Lower-Skilled Work**
9. **Template-Based Notes Degrade the Quality of Clinical Documentation**

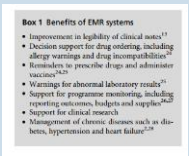


EMR Summary

- Some clear advantages
  - Information available to health care providers
  - Simplification of some actions
  - Possibility of a patient sharing information across providers
- However
  - Disruptive to care process
  - Mismatch of benefits
  - Component of larger change to health care system

Benefits of Electronic Medical Records

- Ease of locating
- Legibility
- Validity checks
- Data extraction for research
- Link to external information relevant to health status (e.g., documents on drug interactions)
- Data available to multiple users
- Safe backup


Box 1 Benefits of EMR systems

- Improvement in legibility of clinical notes[15]
- Decision support for drug ordering, including allergy warnings and drug incompatibilities[16]
- Reminders to prescribe drugs and administer vaccines[16,25]
- Warnings for abnormal laboratory results[25]
- Support for programme monitoring, including reporting outcomes, budgets and supplies[26,27]
- Support for clinical research
- Management of chronic diseases such as diabetes, hypertension and heart failure[27,28]

Key considerations for EMRs

Usability and Use in Clinic Workflow	Improvement of patient care and health system operation
Implication on organizational structure	Technology: robustness, accuracy, security, privacy

Medical Record Systems in Developing World

- Healthcare setting
  - Private urban hospitals
  - Public hospitals and clinics
- Different approach to treatment
  - Services by lower skilled workers: Nurses, CHWs
  - Very fast evaluation / treatment by physician

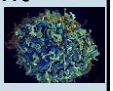
Country	Pop/Doc
Cuba	170
Russia	230
Iceland	280
Germany	300
USA	390
Japan	500
Brazil	900
Pakistan	1400
Zimbabwe	6300
DRC	9100
Uganda	12500
Niger	25000
Ethiopia	33500
Tanzania	50000

Driving case, infectious disease

- HIV and MDR TB
- Conditions requiring multiple rounds of treatment
  - Case history and test results
- Donor funding
  - Commitment to treating disease
  - Introduction of focused treatment and direct support for doctors
  - Developed country management of treatment programs

The Global Fund
To Fight AIDS, Tuberculosis and Malaria

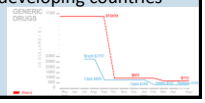
History of HIV and treatment



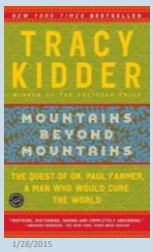
- c. 1910 Emergence of HIV in Congo
- 1960 Earliest documented cases
- 1980 AIDS cases identified in US
- 1984 HIV identified
- 1986 C. Everett Koop releases surgeon generals report
- 1987 AZT approved by FDA
- 1988 First world AIDS Day

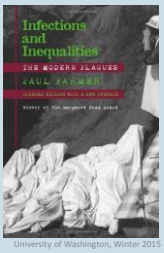
History of HIV and Treatment

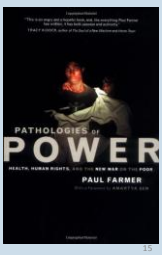
- 1997 HAART Therapy becomes standard in US
- 2000 Millennium Develop Goals targets end of HIV transmission in 15 years
- 2001 Indian generic drug manufacture starts development of HIV drugs ($350 per year, vs. $10,500 for branded)
- 2002 Global fund established, FDA develops framework to allow poor countries to produce HIV drugs
- 2002 ART started in developing countries
- 2005 George W. Bush announces PEPFAR, $15 Billion over five years
- 2008 PEPFAR reauthorized
- 2010 Greatly expanded use of ARVs in developing countries



Paul Farmer







Partners In Health

- Founded by Paul Farmer
- Initial project, Zanmi Lasante (1987) in Haiti
  - Expanded to serve central plateau of Haiti, catchment population 1.2 million, employs 4,000 people
- Socios En Salud, Lima, Peru (1997)
  - Community health programs
  - Large scale TB study
- Other countries
  - Burundi, Malawi, Russia, Rwanda
  - Often a focus on HIV or TB
  - Multiple health facilities, large scale training, ties with MOH

AMPATH

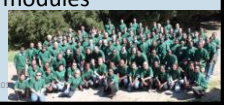
- Academic Model Providing Access To Healthcare
- Moi University and teaching hospital
  - Partnership with a consortium of US universities led by Indiana University
- Manage health care in hospital/clinics across western Kenya

OpenMRS History

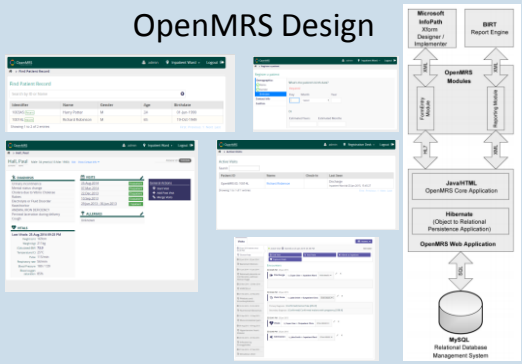
- Motivated by AMPATH model of using data in treatment
- (2004) Modeled after US system (Regenstrief)
- Connection with PIH
- Started with the data model
- Name selected with no reference to Open Source
- Launch February 2006 in Kenya
- Expanded with real software developers and Google Summer of Code

OpenMSR Development

- Philosophy of Participatory Design
  - Ask the doctors what they need
- 2008 – Rwanda rolls out OpenMRS with local capacity
- Formal non-profit organization
- A small number of software developers manage and implement key modules



OpenMRS Design



Concepts in OpenMRS

Inclusion of medical ontologies and concept sources

Basic requirements

- Capture information about encounter
  - Vital signs
  - Test results
  - Observations and notes tied to medical terminology
- Link together encounters by individual

Challenges with OpenMRS

- Customization needed for different deployments
  - Local instances with programmer support
- PC and networking infrastructure
- Delayed data entry
- Data quality
- Inconsistent level of use
- Patient identity
  - Identities across different facilities or registrations

Mobile devices

- Should one build a mobile device interface to a medical records system?
- Use cases
  - Patient management (e.g., registration)
  - Data entry for clinical notes or cases
  - Access to test results and previous case data
  - Medication ordering
  - Clinical alerts
- Argument in favor
  - Mobile devices will have greater availability than computers
  - Technical challenge: Android application to provide more robust synchronization
- Other issues
  - Security and privacy
  - UI for small form factor

AMPATH deployment of mobile phones and OpenMRS

- Use case: Clinical Decision Support Systems
  - Data available to clinician
  - Reminders of actions to perform
- AMPATH
  - Paper summaries
  - Challenges: making summaries available, timeliness of summaries, printing summaries
- Solution
  - Application built on top of ODK for access to OpenMRS

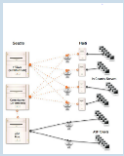
Paperwork

- How does use of paper relate to EMR
  - Completely parallel
  - Data written on paper, then entered in EMR
  - Data entered directly in EMR
- Level of use of EMR often varies substantially
  - Inside a facility
  - Between different facility inside a single system
  - Over time

Use cases

- How is the MRS really used?
- Collection of data for external reporting
- Collection of data for process improvement
- Providing information to clinician during patient care
- Providing decision support for clinician
- Interface with services

iSante MRS

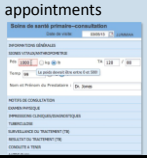


- UW Clinical Research Group / I-Tech
  - CDC Funded project for EMR in Haiti
  - Started 2005
  - Windows IIS application
  - Roughly 70 clinics in Haiti
  - Local implementations, with daily backup of all data to a central server

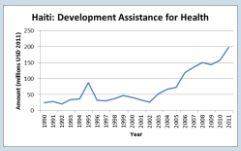
While we subscribe to the widely held opinion that participatory design is almost essential to the successful adoption of an IT intervention, the initial requirements for the project were driven by PEPFAR programmatic needs. S. Wagner et al. [2009]

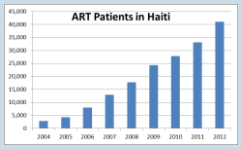
iSante

- Key implementation issues:
  - Infrastructure
  - Distance between implementers and deployment
  - Process of continuous development
- Focus of the tool is data entry and report generation
  - Progress when data entry done at patient visit time (as opposed to batch entry later)
  - Many monthly reports were still tabulated by hand
  - Uses to improve care: generate lists of missed appointments and people late for medication
- Patient privacy
  - Records restricted to individual clinics
  - Complications when people moved



Haiti Context





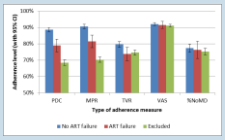
- Expansion of development assistance for health since 1990
- Scale-up of HIV antiretroviral therapy (ART)
- Scale up of electronic health information systems

ART Adherence

- Relationship between HIV antiretroviral therapy (ART) adherence and HIV viral suppression is well-established
- Second-line ART regimens are expensive and not widely available
- No perfect measures of ART adherence
  - Self reported adherence
  - Pharmacy data (considered accurate in iSante)

I-Tech Study

- Compare pharmacy and self-report measures of adherence
  - Adherence measured by CD4 count
- Result
  - Pharmacy data a far stronger predictor
- Use
  - High risk patients can be given extra counseling



PDC, MPR: Pharmacy data
VAS, NoMD: Self-report

Medical Record Systems – Random thoughts and questions

- Is the developing world MRS problem the same as the developed world MRS problem?
- Is the key problem just keeping networked PCs up and running in a facility with poor infrastructure and limited IT support?
- What is the level of technical support necessary to run OpenMRS in a network of health facilities?
- Will OpenMRS be around in 10 years?
- How to do Medical Record Systems tie into the agendas of different ICT and Global Health organizations?