Medical Information System in Developing Countries

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Background

- Low healthcare spending per capita in developing countries
  - $32 per capita in developing countries (WHO standard is $60). $3724 per capita in high income countries
  - Tertiary hospitals in developing countries consumed a huge portion and less than a quarter goes to public health measures and clinical cares

How information technology can be employed to improve the quality of healthcare?

EMRs Improve Efficiency

- 2 years after Electronic Medical Records (EMR) was implemented in Colorado and N.W. Kaiser Permanente
  - 9% decrease in office visits
  - 11% decrease in primary care visits
  - 5-6% decrease in specialty care visits
- Long term study of US Veterans Health Admin has shown a 6% improved efficiency per year
- Developing countries still use labor-intensive collection techniques
  - Insufficiently comprehensive, inaccurate and often out of dated

Global Health Resource Tracking System

- It contains valid, detailed data (who, what, where, how much)

  ◦ Impose on any public or private entity no more than a minimal burden in terms of its provision of the information needed to populate the system.

  ◦ Readily harmonize with and connect to the existing data systems of receiving countries and all donor entities.

  ◦ Be easily accessible via the Web and flexibly searchable by every data element in a variety of languages.

  ◦ Enjoy broad ownership, official buy-in, and use, with long-term support from a diversified funding base.

Require that practical data systems exist!

System Designs

- Schema design can be either top-down or bottom up approach (trade-off between efficiency and standardization)

- EMR should be built with open-source software

- EMR should include standardized medical languages (UMLS) which have multi-lingual versions for records

  ◦ Errors due to regional differences in names, medical terms can lead to serious medical errors

Multi-factorial Approach

- There are other factors beyond technology: corruption, inequalities, imposition of sub-optimal policies/technologies, lack of or incorrect information

- The disparities of access and quality of care within the current health system may be further exacerbated by the planned improvements

- Poor infrastructure, but reliable wireless system, over 80%population live in range of cell towers

PIH-EMR in Peru

- A community-based treatment program for drug-resistant tuberculosis in slums of Lima, started in 1996, by Partners In Health (PIH), Socios En Salud (SES), and Peruvian Ministry of Health. It provide high-quality care, lower costs, reduce the risk of spread of MDR-TB.

- Health Electronic Medical Record (PIH-EMR) was implemented in 2001.
  - Web-based EMR based on open-source tech and backed by Oracle database in English and Spanish
  - 29000 patients, 7600 of which have received treatment
  - Include initial history, physical exam, lab results and medications

- Significant fewer errors than paper/spreadsheet; match the usage data in the pharmacy to within 3% and use for ordering medine. TB-Lab module reduce processing delays from 30 to 8 days, reduce errors by 60%

- PIH-EMR has recently been adopted by the Peruvian National Tuberculosis Program - these types of systems are feasible to implement in resource-poor settings.

HIV-EMR in Haiti

- Implemented in 1999 by PIH and Zanmi Lasante, covered 9 clinics in an area with no roads.

- 'Directly Observed Therapy with Highly Active Antiretroviral Therapy' (DOT-HAART) for HIV is modeled on successful tuberculosis control efforts like the PIH-EMR.
  - an open source web-based system based on the PIH-EMR. Satellite-based internet access at each site. Offline client for data entry and review to solve the problem of inconsistent power and internet
  - Over 12,000 patients; 3,051 of which are receiving ART.
  - The system records clinical data including history, physical examination, social circumstances and treatment.
  - Decision support tools provide allergy and drug interaction warnings and generate warning emails about low CD4 counts.
  - Check lab result, reporting tools, drug regimen analysis,
  - drug stockouts have fallen from 2.6% to 1.1% and 97% of stock requests delivered were shipped within 1 day. reduce costs in having stockouts

Key Takeaway

- The most significant barriers is the detailed information concerning disease incidence, health practices and available resources

- Implementing healthcare technologies within larger collaborations that improve the overall public health infrastructure. Open standards and open source development in a collaborative environment.

- The need for community data collection, and feasibility of using ICT to enable data collection, and improve information flow in developing countries.

- EMRs is a foundational technology. The projects illustrate that the creation of long-term relationships to build infrastructure and solving systemic problems to provide health care can be beneficial to both the patients and the projects involved.

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