



Using the OpenMRS electronic medical record system to strengthen health care delivery in Rwanda

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Partners In Health

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Harvard Medical School





Overview



- Partners In Health and the PIH-EMR
- OpenMRS and open source systems
- Evaluating the impact of systems
- Building a community for developing and implementing OpenMRS in Rwanda





Partners In Health Model of Care



- Access to health care for all people
- Creation of long-term development by partnering with local people and communities
- Use of community health workers to grow a local and sustainable work force
- Addressing the effects of poverty including poor nutrition, water, and housing
- Drawing on the resources of the world's elite medical and academic institutions and on the lived experience of the world's poorest and sickest communities



PIH-EMR history



- 2001: created a web based EMR system to support the scale up of MDR-TB treatment in Peru
- 2003: created a version of PIH-EMR to support HIV treatment in rural Haiti
- 2004: plan to create a new, general and flexible platform to build EMR systems
- 2006: OpenMRS first used in Kenya and then Rwanda and South Africa
- 2007: OpenMRS released as open source





OpenMRS



- A modular, open source EMR system
- Developed as a collaboration of PIH, the Regenstrief Institute and South African MRC
- Uses a concept dictionary for data storage
- Modular design simplifies adding new functions
- Open standards for interoperability
- Multiple languages, English, French, Spanish +
- Core of paid programmers and growing community
- www.openmrs.org



Partners In Health



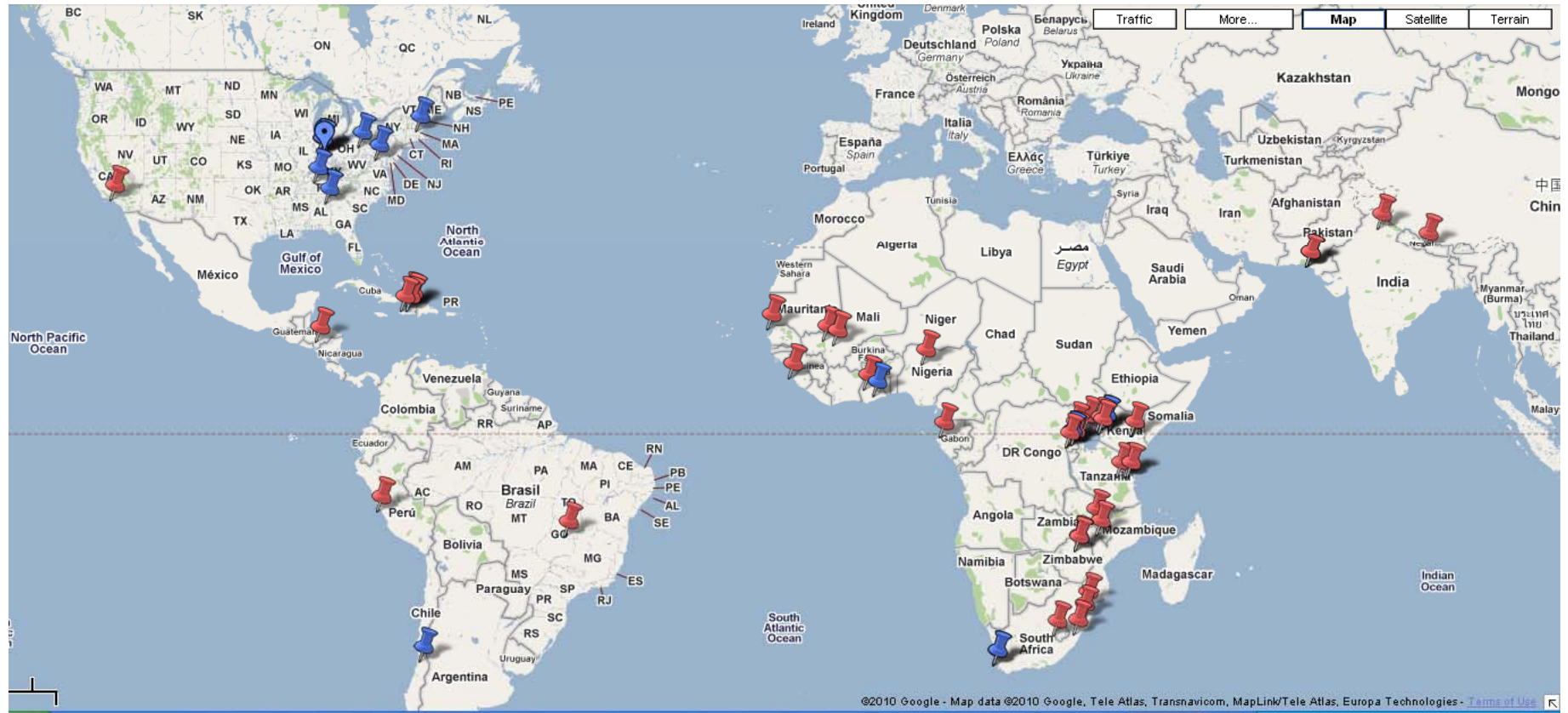
Regenstrief Institute



Medical research
council SA



OpenMRS sites (partial list)



Red clinical use, blue development





OpenMRS at PIH sites in Rwanda

- Currently used for 12 PIH supported health centers
- Data for patients with HIV, TB and now heart failure
- Over 10,000 patients tracked
- Team of Rwandan data officers trained to enter data, ensure data quality & produce reports





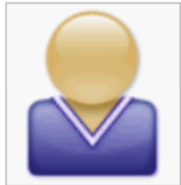
OpenMRS uses in Rwanda



- Access to up to date clinical data including drug regimen and lab results
- Direct point of care use in HIV clinics
- Analysis and reporting function with new framework for non-programmers
- Support for drug forecasting
- Primary care version being implemented
- Research data collection including DDCF primary care research center (PHIT)



Physician looking up ARV patient



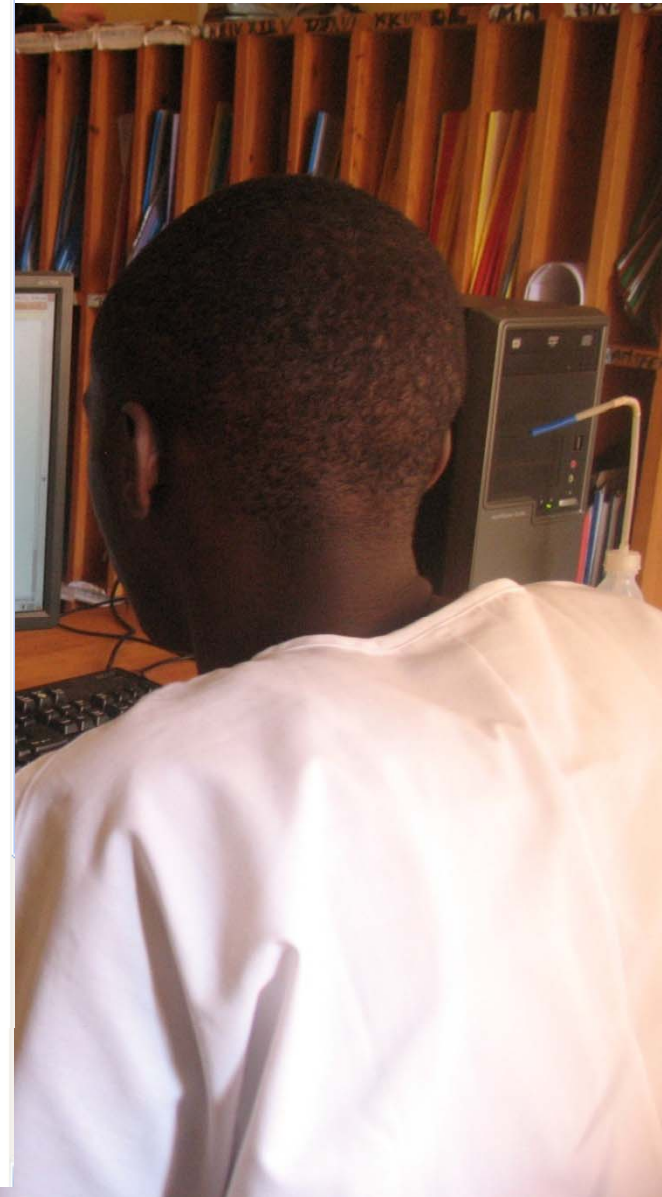
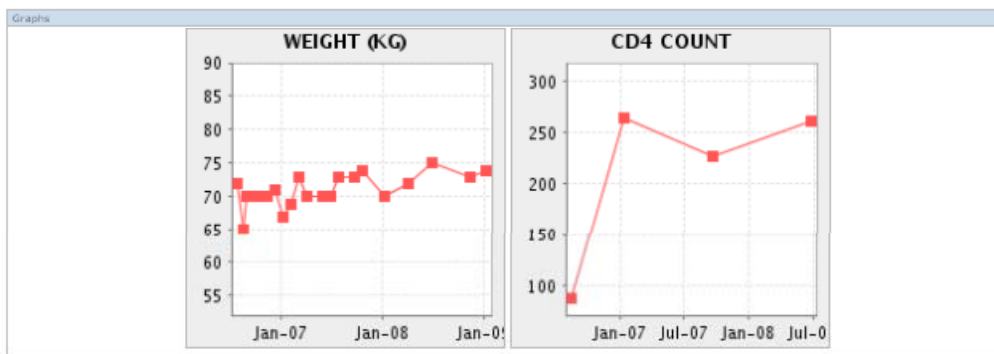
IMB ID: [REDACTED] HIVEMR-V1: 10257
Gender: Male TRACnet ID: [REDACTED]
Age: 39 yrs (~Jan 1, 1970)
Adult HIV PROGRAM: GROUP 19
ON ANTIRETROVIRALS
Last Visit: 4 months ago (Jan 7, 2009)
ADULT RETURN VISIT by [REDACTED]
[REDACTED] @ Kirehe

Alerts	Comments
NO CHEST XRAY	No adverse effects
NO CD4 IN THE LAST 6 MONTHS	No opportunistic infections
	No previous diagnoses

Recent Symptoms	Date
FEVER	Jun 27, 2007
NIGHT SWEATS	Jun 27, 2007
COUGH	Jun 27, 2007
PRODUCTIVE COUGH	Jun 27, 2007
NIGHT SWEATS FOR LESS THAN 3 WEEKS	Jun 27, 2007

Drug Orders	Dose	Frequency	Start Date	Stop Date	Comments
Triomune-30	1.0 tab(s)	2/day x 7 days/week	Aug 12, 2008		
TMP/SMX 800/160	1.0 tab(s)	1/day x 7 days/week	Aug 18, 2006		
Triomune-40 (stopped)	1.0 tab(s)	2/day x 7 days/week	Jul 26, 2006	Aug 12, 2008	TREATMENT GUIDELINE: CHANGED

Lab Tests						
	7/25/06	8/14/06	1/10/07	5/30/07	9/19/07	6/25/08
CD4		88.0	265.0		227.0	262.0
AST	20.8			50.64		
ALT	18.5			24.15		
Cr	55.51			89.8		





CD4 Access, Rwinkwavu, Rwanda



- We evaluated whether the ID physicians had access to the latest CD4 count for their patients in Rwinkwavu, Rwanda
- The physicians record the result they have on the follow-up form based on paper lab result forms
- We checked if they were up to date before and after a new lab component was added to the EMR to generate results forms



Results – Access to CD4 counts



- The proportion of CD4 counts conducted within the past 60 days but unknown to the clinician at the time of consultation was:
- 24.7% in the pre-intervention period
- 16.7% in the post intervention period
- This is a 32.4% reduction in CD4 loss ($p=.002$)
- We will evaluate the effect of direct clinician access to the EMR next



Amoroso C, et al: in press





Systematic review of evaluation studies



POLICIES & POTENTIAL

By Joaquin A. Blaya, Hamish S.F. Fraser, and Brian Holt

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HEALTH AFFAIRS 29,
NO. 2 (2010): 244-251
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The People-to-People Health
Foundation, Inc.

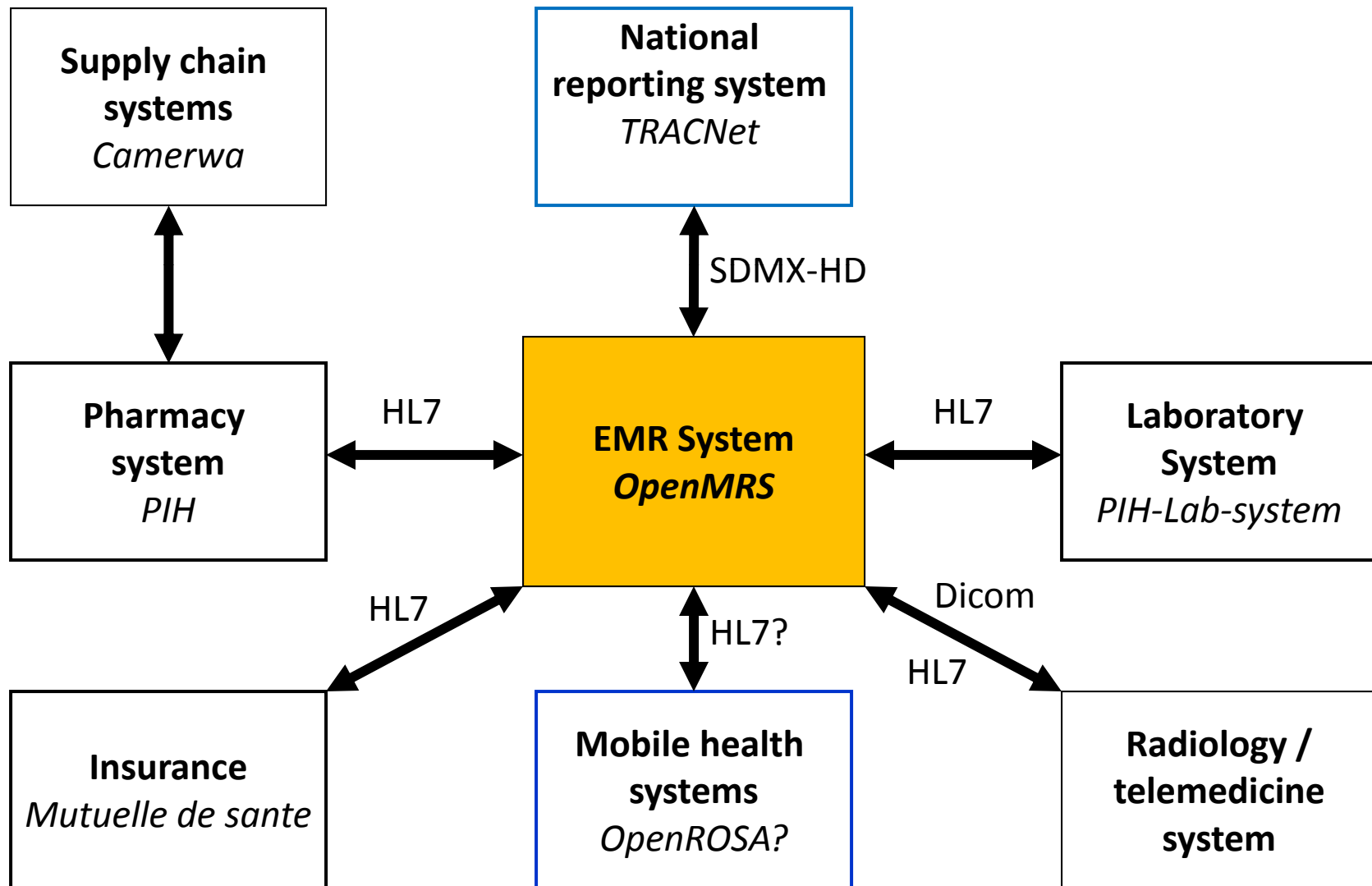
E-Health Technologies Show Promise In Developing Countries

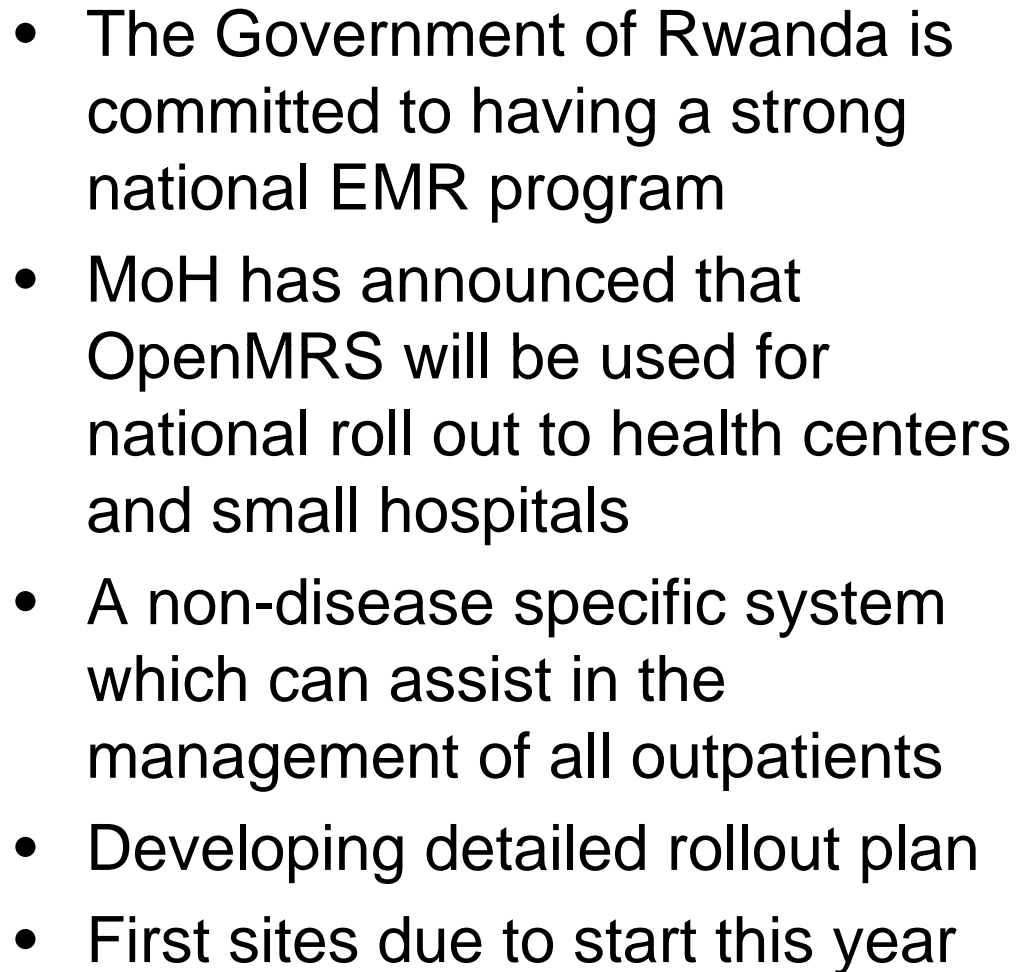
Health Affairs 2010, 29;2: 244-251





National eHealth architecture for Rwanda, potential components and links







Developer training, Rwanda



- Training program in Kigali for computer science graduates
- One year, mentored training course
 - Web development
 - Java programming
 - OpenMRS programming
 - Medical informatics
- Ten students graduated last fall
- Now supporting OpenMRS rollout as well as building software development capacity in Rwanda



International Development Research Center





Community: OpenMRS Wiki



OpenMRS - OpenMRS - Mozilla Firefox

File Edit View History Bookmarks Tools Help


http://openmrs.org/wiki/OpenMRS

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2008 IMPLEMENTERS MEETING

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OpenMRS® is a community-developed, open-source, enterprise [electronic medical record system](#) framework. We've come together to specifically respond to those actively building and managing health systems in the developing world, where AIDS, tuberculosis, and malaria afflict the lives of millions. Our mission is to foster self-sustaining health information technology implementations in these environments through peer mentorship, proactive collaboration, and a code base that equals or surpasses proprietary equivalents. You are welcome to come participate in our community, whether by implementing our software, or contributing your efforts to our mission!


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- » 24-May [OpenMRS Forum: Installation of Latest Stable Release 1.4.2](#)
- » 24-May [OpenMRS Forum: Re: Problem list, Ex/SH - how stored?](#)

 **Community**

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Recent Blog Updates:

- » 24-May [Lu Zhuang Wei: Weekly Report for project\(2009-05-24\)](#)
- » 23-May [Omar Verduga: Finally, running 500k observations in my alpha module 'D](#)

 **Develop**

Suggest changes and view project timelines via our [development site \(trac\)](#) or [learn how to contribute code!](#)

Recent Submissions:

- » 23-May [OpenMRS Changesets: Changeset \[8008\]: groovy module: groovify the controller w/ GStrings](#)

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Disease-specific EMR (MDR-TB)



Joia Test Mukherjee



28 yrs (~Jan 1, 1981) Health Center: Mulindi

BMI: 20.9 (Weight: 57.0 kg, Height: 165.0 cm) | Regimen: Tricard

Last encounter: Bacteriology Result @ Unknown Location

MDR-TB program start date: Apr 3, 2008

Treatment start date: Apr 10, 2008

Culture status: **Converted**

Culture Conversion Date: May 10, 2008

Warning: The following drugs from this patient's active orders are contra-indicated by DST results:

RIFAMPICIN (R)
ETHIONAMIDE (ETHIONAMIDE)
ETHAMBUTOL (E)

cheduled visit: 01/22/2008

Status

Form Entry

Drug Regimen

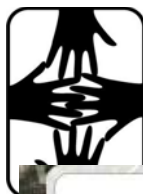
Bacteriologies

Contacts

[Add New Bacteriology](#)

sample collection date	smear	culture
Jan 2, 2008	+	+
Apr 2, 2008	+	+
Apr 3, 2008	MDR-TB PROGRAM START DATE	
Apr 10, 2008	TUBERCULOSIS DRUG TREATMENT START DATE	
May 1, 2008	++	
May 6, 2008	+	++
		+++
May 10, 2008	-	-
	MULTI-DRUG RESISTANT TUBERCULOSIS CULTURE STATUS: CONVERTED	
Jun 11, 2008	-	-

SERINE	AMK	CPX	Moxi	GATIFLOXACIN	PROTHIONAMIDE	Duration (days)
			✓			59
			✓			69
			✓			156
			✓			1
			✓			5
			✓			15



OpenMRS-Google Maps-SMS-Integration, Karachi



MRN: [REDACTED]

Program: DOTS-Plus

Location: Indus Hospital

First Name: [REDACTED]

Last Name: [REDACTED]

Gender: Male

Age: [REDACTED]

Classification: MULTI-DRUG RESISTANT TUBERCULOSIS

Patient Type: On Treatment

Enrollment Date: [REDACTED]

Program Status: STILL ON TREATMENT

Culture Status: CONVERTED

Patient Status: ON TREATMENT

Last Event Date: [REDACTED]

Last Event Type: ADULTINITIAL

Last Event Location: Indus Hospital

Last Encounter Form: MDR-TB Follow Up

Bacteriologies

Sample Collection Date	Smear	Culture
10/30/07	++	+
03/24/08	+	+
04/28/08	+	-
05/30/08	+	+
06/28/08	scanty ()	+
07/28/08	scanty ()	-
09/08/08	scanty ()	-
10/13/08	scanty ()	-
11/10/08	-	-
12/15/08	-	CONTAMINATED



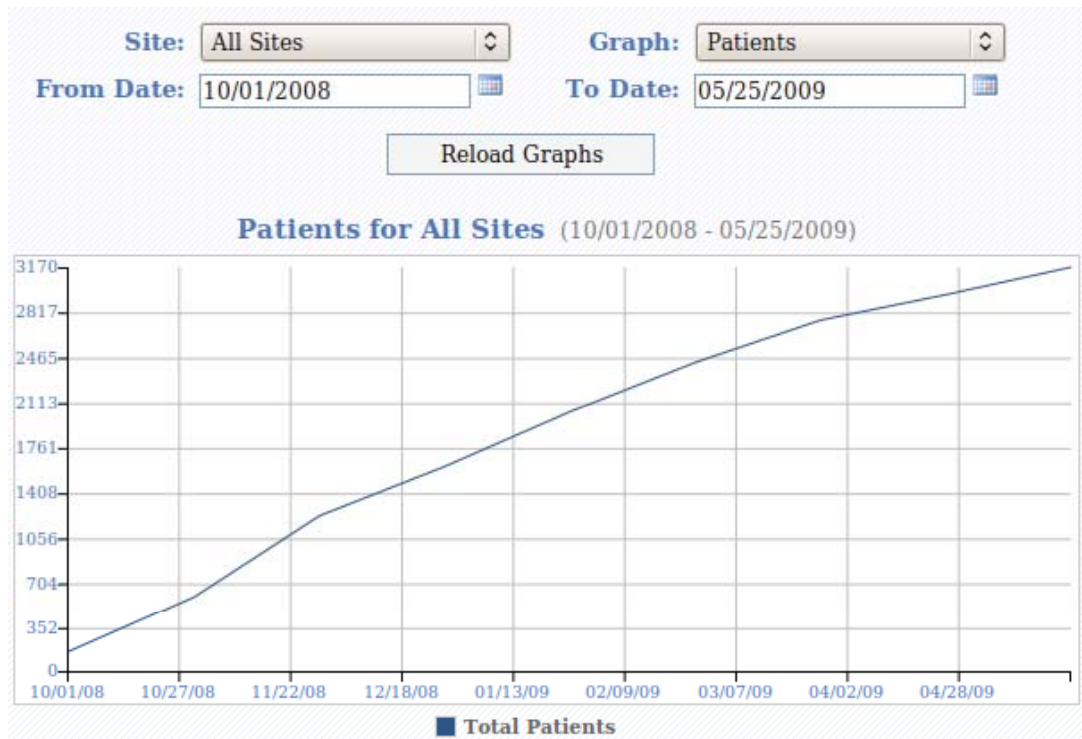
Credit: Owais Ahmed, Aamir Khan



TB in homeless patients in Los Angeles

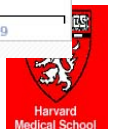


Credit: Monica Waggoner



Encounter Type A (Not Recorded)
 Created By Dec 10, 2008

Where did the patient sleep last night?





Challenges for OpenMRS deployments



- Understanding needs and workflow
- Support for equipment, power supplies and software
- Data management and quality control
- Evaluation
- Training – IT, programming, data management, users, researchers





Collaborators and Funders



- Partners In Health
- Regenstrief institute
- Brigham and Women hospital
- Harvard Medical School
- Medical Research Council, South Africa
- Millennium Villages Project
- JEMBI

-
- International Development Research Centre, Ottawa
 - Rockefeller Foundation
 - World Health Organization
 - US Centers for Disease Control
 - Fogarty International Center, NIH
 - Google Inc



