Design and impact of health information systems in developing countries

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Overview

- Global health informatics (eHealth)
- The PIH-EMR system in Peru
- The OpenMRS platform
- OpenMRS in Rwanda
- Other ehealth projects
- Lessons learned

Original problem:

- Can HIV and MDR-TB care be delivered
  1. In settings with limited or absent infrastructure?
  2. To thousands or tens of thousands of patients?
  3. Over long periods of time?
  4. With outcomes equivalent to treatment in the US?
  5. At a “manageable” cost?

Status of Global Health Informatics

- Rapid development over the last 2 years
  - Bellagio meeting on e-Health in July 2008
- Driven by the coincidence of:
  - need for better Global Health Delivery
  - increased resources for health system strengthening such as the Global Fund
  - more effective, robust, low-cost technologies

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

Courtesy of Partners in Health. Used with permission.

Chronic disease management

1. Identifying patients requiring treatment
2. Starting patients on the correct medication
3. Ensuring stable and economical supply of medication
4. Ensuring compliance with treatment
5. Monitoring treatment progress and outcomes and addressing adverse events promptly

Core Functions of e-Health Systems

- Clinical care and quality improvement
- Monitoring and reporting
- Drug supply management
- Research

Example: MDR-TB in Lima, Peru

- Highest incidence of TB in South America
- 40,000 patients treated with DOTS per year
- > 3% have MDR-TB
- Require up to 9 drugs to treat MDR-TB

DOTS = directly observed therapy

Courtesy of Partners in Health. Used with permission.

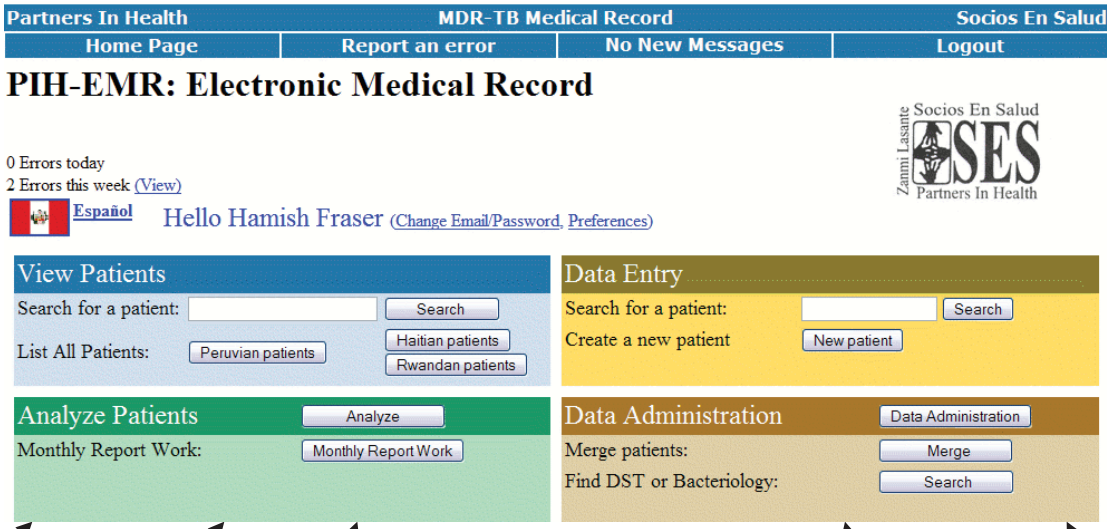
PIH photo

PIH-EMR System in Peru

- Secure web-based EMR
- Operational since 2001
- Usable with low-speed dialup connections
- Bilingual (Spanish/English)
- 100,000+ patients tracked
- 13,000 patients treated for MDR-TB
- Now the national system for MDR-TB Rx

Fraser HSF, et al. Proc AMIA Symp 2006: 264-268

PIH-EMR Data

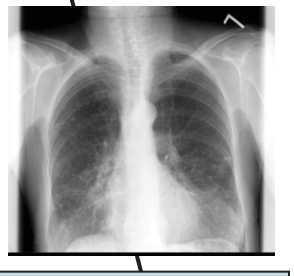


Courtesy of Partners in Health. Used with permission.

Smears
Cultures
Drug sensitivity (DST)

Biochem.
Hematology

Registration form
History/exam
Previous Rx
Previous Dx
Contacts



Follow up
Chest X-ray

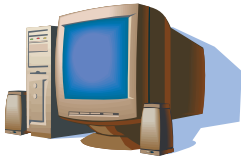
Drug regimens
Pharmacy

PDA Data Management

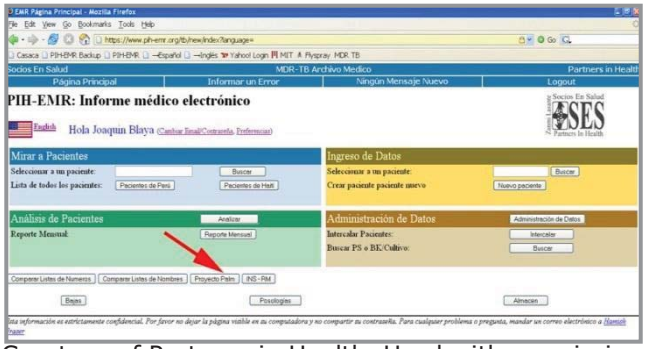
Collecting lab data in sites without internet

Palm Pilot

Sync through local PC



Processing & Verification



Courtesy of Partners in Health. Used with permission.

PIH-EMR

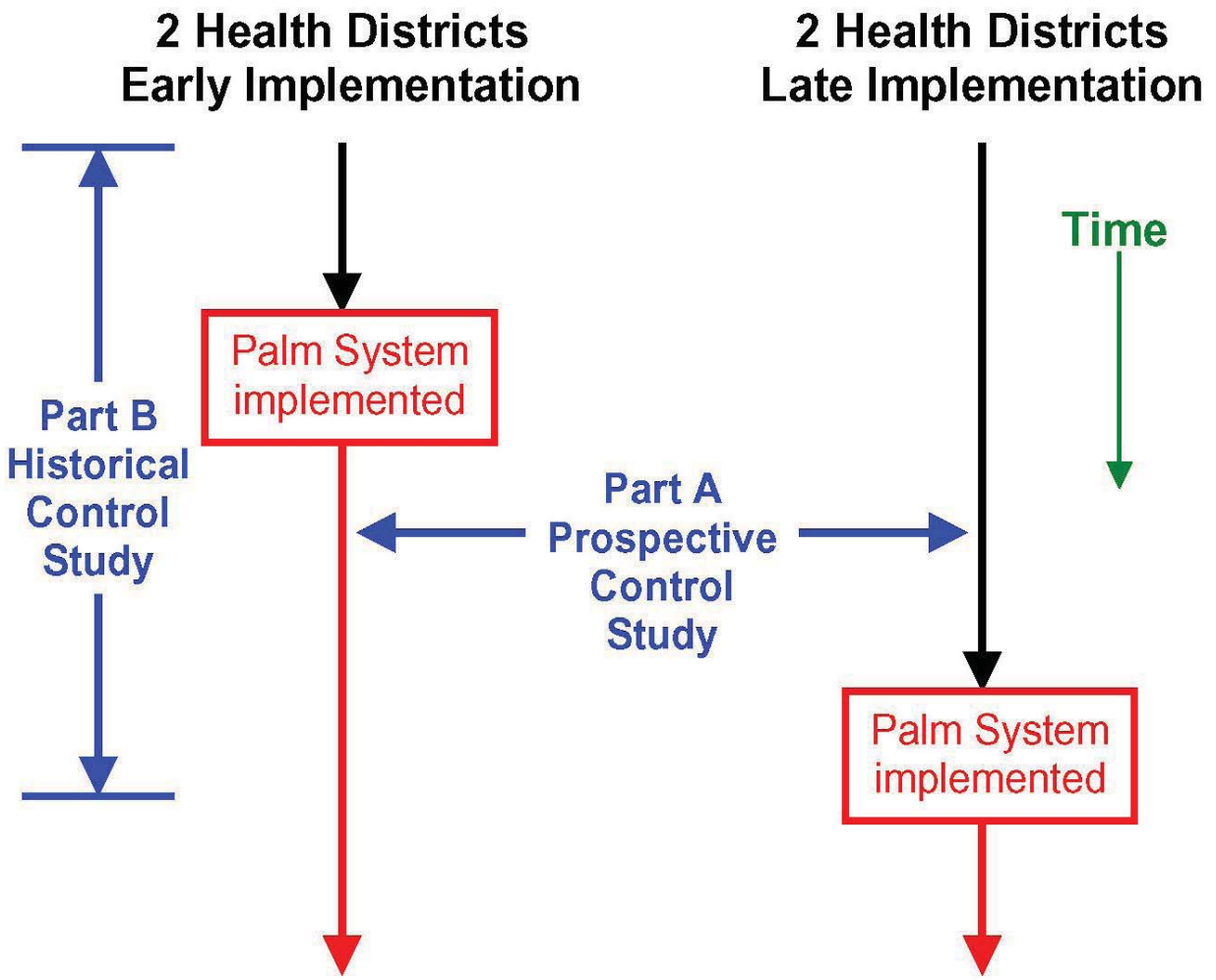
Processing Section

clinical Bacteriology Section

Palm Project: Study Design

Controlled study

- (A) Prospective
- (B) Historical



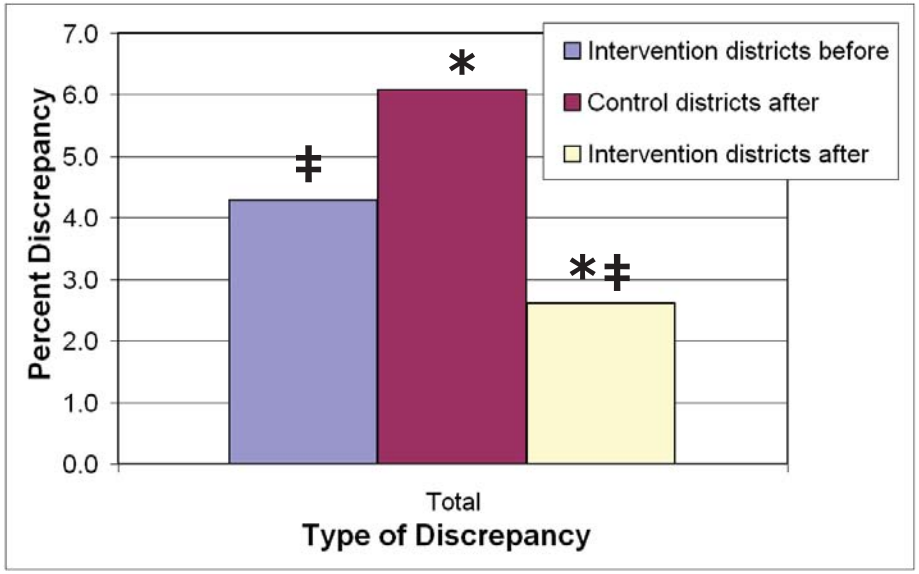
Palm Project: Study Results

Median processing time

	Intervention Districts days (n)	Control Districts days (n)
Pre-Palm	**30.5 (4876)***	**30.8 (5954)**
Post-Palm	**7.7 (2890)*†**	**22.7 (3263)†**

* p<0.001
† p<0.001

Frequency of Errors



* p < 0.001
‡ p = 0.055

Blaya, J et al, Int J Infect Dis. 2009 May;13(3):410-8.

Drug Sensitivity Lab Data Flow

Baseline problems with DST data

- 10% of results took > 60 days to arrive at clinic

-16% of patients waited > 100 days to start treatment

- 17% of DSTs were duplicates

Yagui et al. Int J Tuberc Lung Dis. 2006 Aug;10(8):838-43

E-CHASQUI
Sistema electrónico para pruebas de TBC

Laboratory Reporting System

1. Connects laboratories to health centers
   - Email notifications to health center personnel
2. Tools to improve data quality
3. Reporting functions for laboratory personnel

cluster randomized controlled trial of 1760 patients

BWH

Blaya, J. BMC Med Inform Decis Mak. 2007 Oct 28;7(1):33

Harvard Medical School

eChasqui study results: error rates

- Intervention HCs showed:
  - 82% less errors compared to controls for DST results (2.1 vs. 11.9%, p<0.001)
  - 87% fewer errors compared to controls for cultures (2.0 vs. 15.1%, p<0.001)
- eChasqui allowed missing results to be viewed online - 72% of all errors
- 66% of control and 55% of intervention HC users responded they were missing at least 10% of **paper** results

Blaya J et al, Int J Tuberc Lung Dis. 2010 Aug;14(8):1009-15

eChasqui study results

- Intervention health centers took significantly less time to:
  - receive both DST (median 11 vs. 17 days, p<0.001)
  - Receive cultures (5 vs. 8 days, p<0.001)
- Patients in intervention health centers had 20% lower time to culture conversion (p=0.047).

OpenMRS

Requirements for general purpose medical record system

- Simple to setup
- Multiple computing platforms
- Local users can create EMR forms and reports
- Web based (but can also be run locally)
- Open standards - HL7, LOINC, SNOMED, ICD10
- Fully open source
  - supported by a community of programmers
  - using best ideas and software from many projects

- Able to be setup, modified and owned by the countries where we work, not just a “present from the US” but a full transfer of technology, skills and ownership

OpenMRS:
a modular, open source, EMR platform

- Developed as a collaboration of PIH, the Regenstrief Institute and South African MRC
- Uses concept dictionary for data storage
- Modular design simplifies adding new functions and linking to other systems
- Supports multiple languages
- Released with open source license (April 2007)
- Core of paid programmers with growing community support
- www.openmrs.org

Partners In Health

Regenstrief Institute

Medical reseach council SA

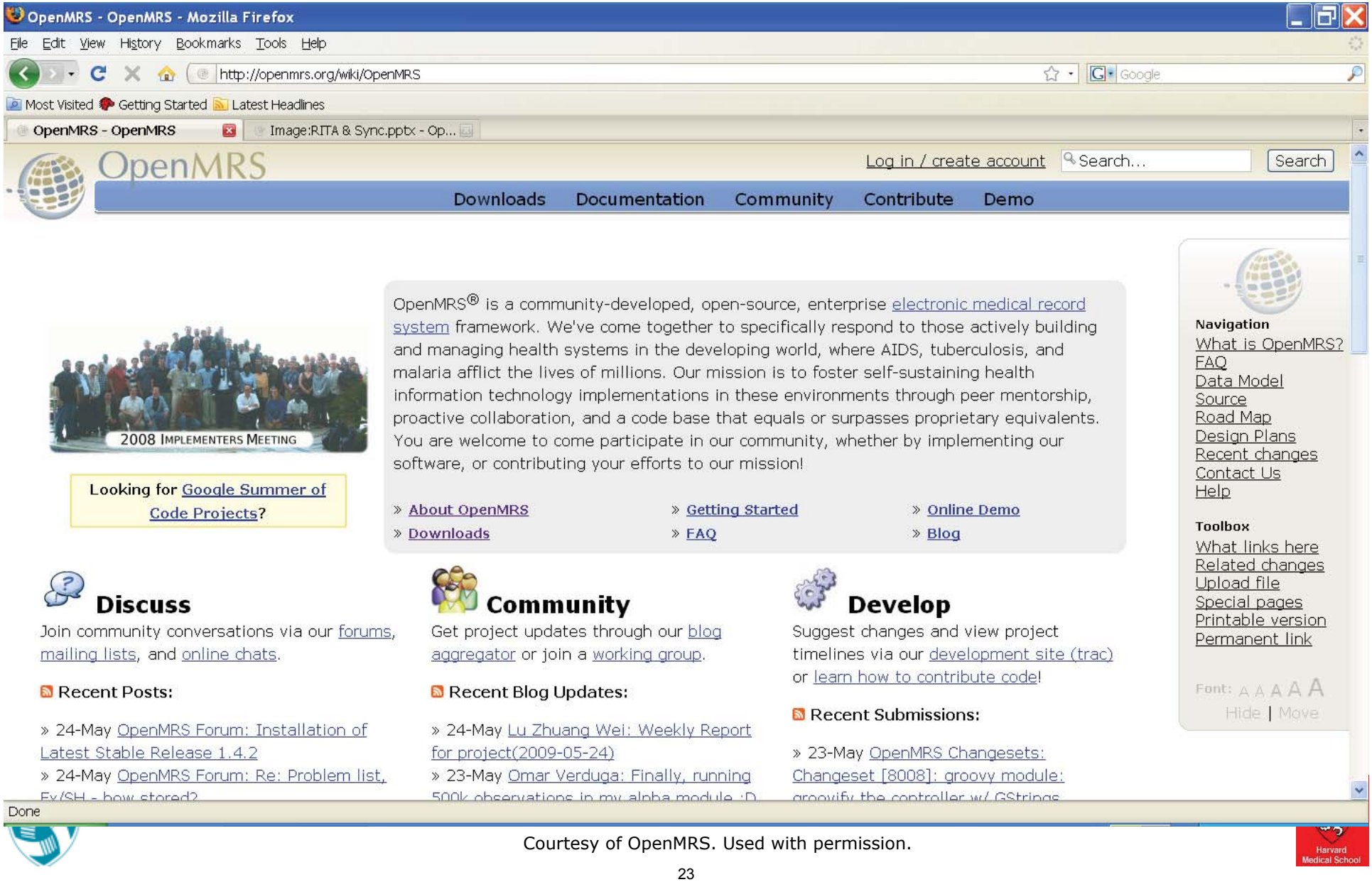
The concept dictionary

Concept Form

Previous | Edit | Next | New Search:

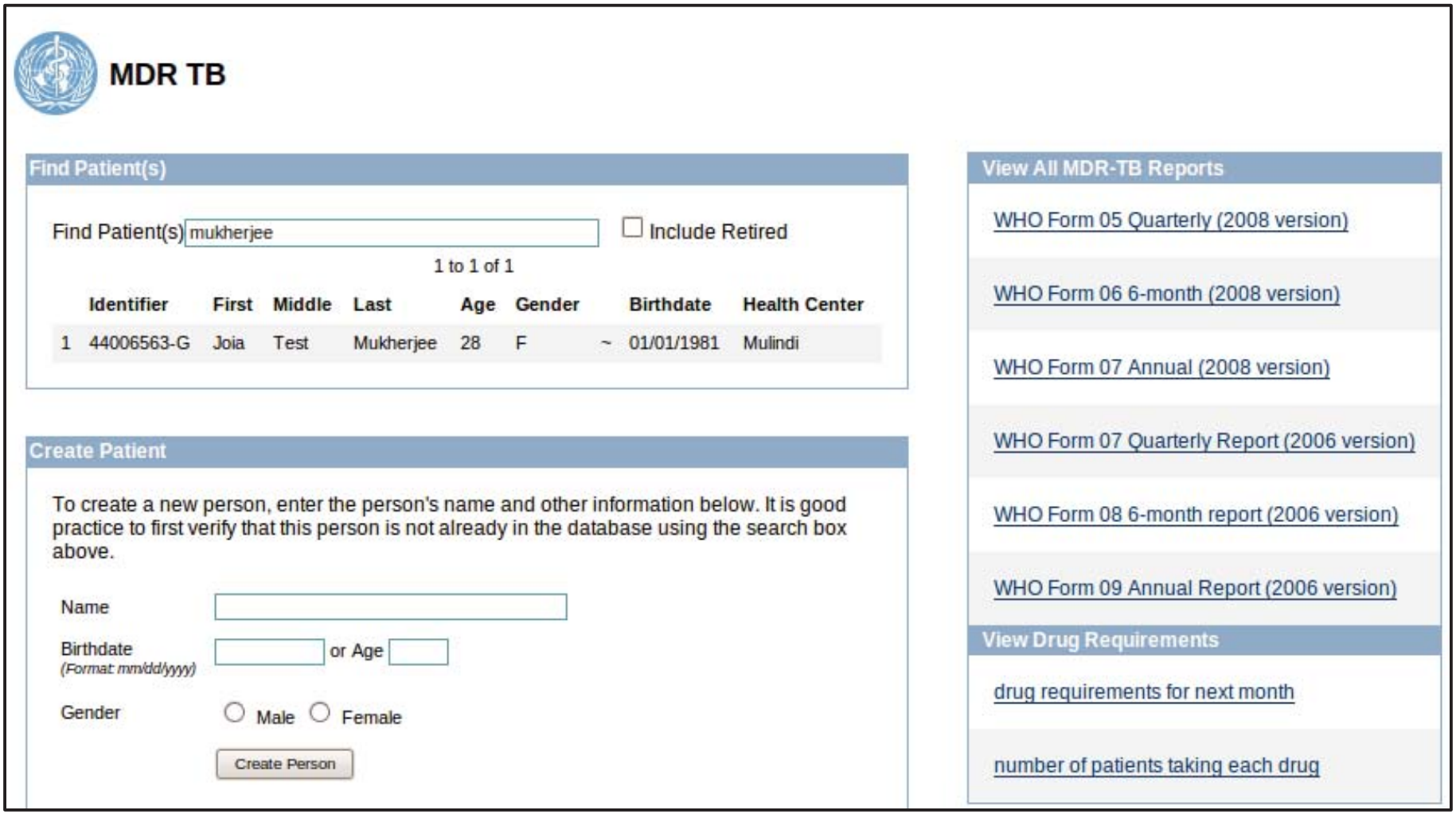
Id	1293
Locale	English | French
Name	FUNCTIONAL REVIEW OF SYMPTOMS
Short Name	
Description	Review of symptoms on presentation by different systems
Synonyms	
Class	Question
Datatype	Coded
Answers	WEIGHT LOSS GREATER THAN TEN PERCENT (1352) COUGH LASTING MORE THAN THREE WEEKS (1430) DIARRHEA CHRONIC (GREATER THAN OR EQUAL TO 1 MONTH) (1431) SEIZURE (206) JAUNDICE (215) RASH (512) FEVER (5945) FATIGUE (5949) VISION DIFFICULTIES (5953) SHORTNESS OF BREATH (5960) NAUSEA (5978) VOMITING (5980) PARESTHESIA (6004) CONFUSION (6006) NIGHT SWEATS (6029) HEADACHE (620) PRURITIS (879) DYSPHAGIA (881) HEMOPTYSIS (970)

Community: OpenMRS Wiki



Courtesy of OpenMRS. Used with permission.

Disease-specific EMR (MDR-TB)



MDR-TB treatment history flowsheet

Charles Virunga MDR-TB Program Identifier: **44**

35 yrs (~01-Jan-1975) Health Center: **Cange**

BMI: 24.7 (Weight: 67.5 kg , Height: 165.0 cm)

Regimen: **Ethionamide (Eto) , Ciprofloxacin (Cfx) , Pyrazinamide (Z) , Cycloserine (Cs) , P-aminosalyicylic acid (PAS) , Capre (Cm) , Moxifloxacin (Mfx)**

Last encounter: **Specimen Collection @ Cange | 19-Aug-2010 | Louise Allen**

MDR-TB program start date: **05-Apr-2007** Treatment start date: **05-Apr-2007**

Culture Status: **Unconverted**

Overview | Visits | Specimens | Regimen | Status

Find Patient(s)

Patient Overview

Patient Enrollment Date: 05/04/2007

View Main Patient Dashboard | Edit Patient Information (Short Form) | Edit Patient Information (Long Form)

Month	Date Collected	Smears	Cultures	Bacteria	INH	E	S	KM	CM	Ethio	CPX	R	Z	LFX	AMK	CFZ	CS	CLR	RFB	PAS
PRIOR																				
BASELINE																				
0	05/04/2007	Treatment Start Date																		
1	01/06/2007	POSITIVE/++ N/A	++ N/A	M. TUBERCULOSIS COMPLEX	R	R	S	S	S	S	S	R	S				S			
2	04/06/2007	POSITIVE/POSITIVE N/A																		
	03/07/2007	- N/A																		
3	04/07/2007	-/- N/A																		
4	16/08/2007	-/- N/A																		
	17/08/2007	- N/A																		
5																				
6																				
7	10/11/2007	- N/A																		
	12/11/2007	-/- N/A																		
	20/11/2007	- N/A																		
	21/11/2007	-/- N/A																		

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

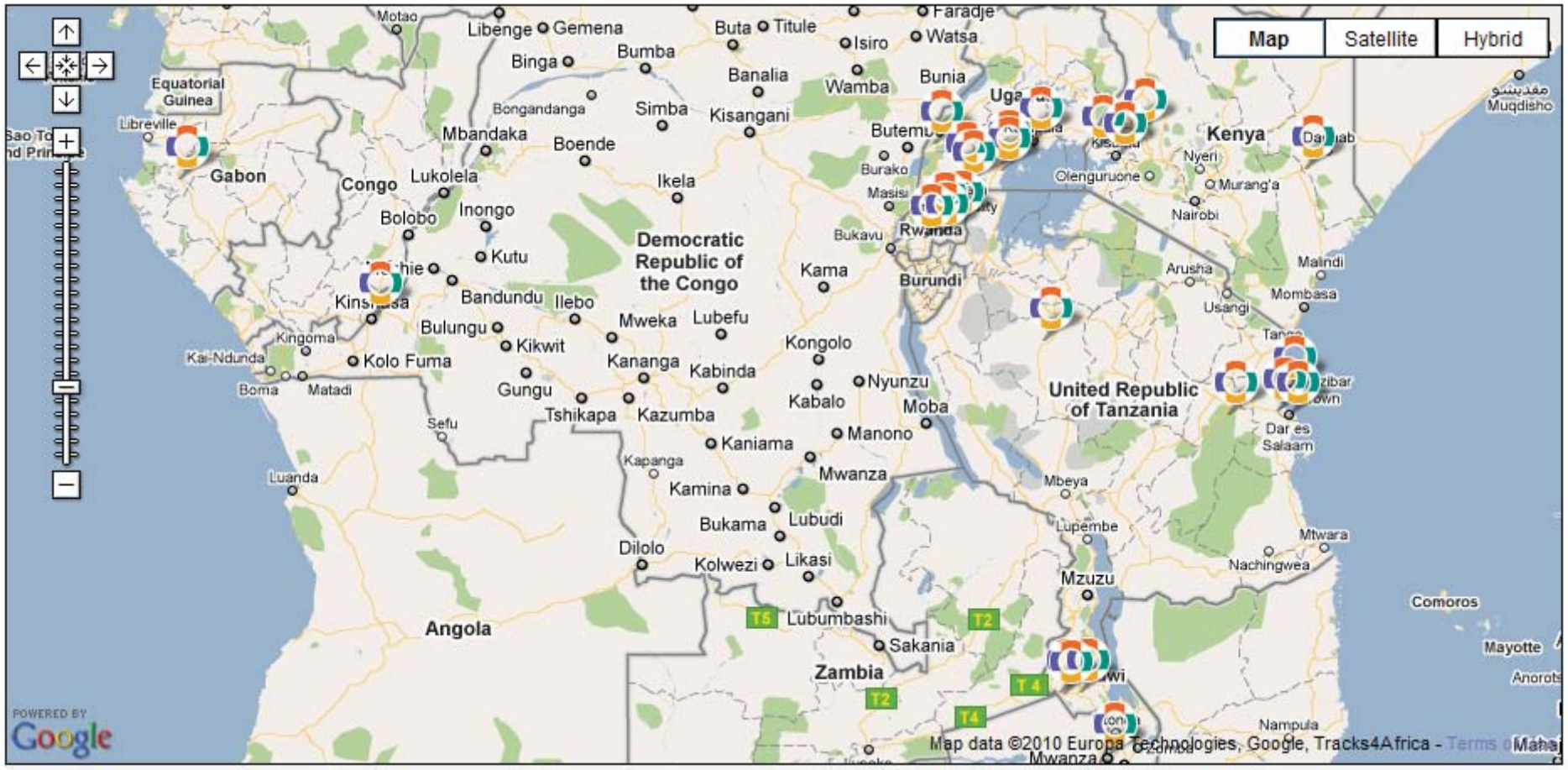
Bacteriologies

Sample Collection Date	Smear	Culture
10/30/07	[illegible]	
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

24°54'32.04" N 67°04'40.81" E

Credit: Owais Ahmed, Aamir Khan

OpenMRS sites - fall 2010



OpenMRS sites - fall 2010

Rwanda health indicators

- A small central African country:
  - Population 9 M people
  - Highest population density in Africa, 85% rural

- Achieved rapid economic growth since genocide in 1994, but still has very poor health outcomes:
  - Life expectancy 38-44 years
  - Infant mortality 152/1000
  - Maternal mortality 1071/100K
  - Medium income $230
  - HIV prevalence 3%
  - Malaria prevalence 46%

OpenMRS at PIH sites in Rwanda

Courtesy of Partners in Health. Used with permission.

H Fraser, PIH photo

- Currently used for 21 PIH – supported health centers
- Data for patients with HIV, TB and now heart failure
- Over 16,000 patients tracked (Dec. 2010)
- Team of Rwandan data officers trained to enter data, ensure quality & produce reports
- Many sites have their own server and maintain a synchronized copy of the entire database

Clinical Alerts (Rwinkwavu, Rwanda)

Consultation, 04 Nov 2006

e	Age	Attend?	Weight	New weight	Food support today?	Alerts	CD4	TB (current regimen, TB start date)	arv (current regimen,initiation, last change)	accompangateur
	37	Y N	54 kgs@19Janv06 64 kgs@12Juil06 66 kgs@9Aug06	.	Y N	.	151 @23Janv06 344 @11Aug06	.	Triomune-40 (1 Co, 2/j) 20Janv06 2Mai06	MBUZUKONGIRA Thadee
	31	Y N	61 kgs@16Fevr06 65 kgs@22Aug06 69 kgs@18Sep06	.	Y N	late CD4	237 @27Fevr06	RHEZ (4 Co, 4/j) 2006-06-16	3TC 150 mg (1 Co, 2/j); D4T 40 mg (1 Co, 2/j); EFV 200 mg (1 Co, 1/j); EFV 600 mg (1 Co, 1/j) 3Mars06 16Juin06	MUPENZI Faustin
	36	Y N	55 kgs@19Janv06 63 kgs@12Juil06 65 kgs@9Aug06	.	Y N	.	99 @23Janv06 183 @21Juil06	.	Triomune-40 (1 Co, 2/j) 19Janv06 21Avril06	UWINGABIRE Pacifique
	33	Y N	60 kgs@12Juil06 60 kgs@9Aug06	.	Y N	.	134 @23Janv06 361 @11Aug06	.	Triomune-40 (1 Co, 2/j) 20Janv05	MUREYIREGE Yvonne
	46	Y N	59 kgs@14Juin06 60 kgs@12Juil06	.	Y N	very late CD4	288 @23Janv06	.	Triomune-40 (1 Co, 2/j) 3Janv06 3Fevr06	NIKUZE Rahabu
	46	Y N	48 kgs@19Janv06 49 kgs@12Juil06 51 kgs@9Aug06	.	Y N	.	196 @23Janv06 660 @11Aug06	.	Triomune-30 (1 Co, 2/j) 20Janv06	NIYONSABA Jeannette
	43	Y N	61 kgs@19Janv06 60 kgs@12Juil06 61 kgs@9Aug06	.	Y N	.	381 @5Janv06 708 @27Juil06	.	Triomune-40 (1 Co, 2/j) 20Janv06	MPINGANZIMA Marie
	27	Y N	53 kgs@13Avril06 55 kgs@12Juil06 45 kgs@9Aug06	.	Y N	wt decline(10 kgs)	250 @10Aug06	.	Triomune-30 (1 Co, 2/j) 8Juin06	NDITURENDE Silas
	30	Y N	58 kgs@19Janv06 54 kgs@25Mai06 57 kgs@9Aug06	.	Y N	very late CD4	249 @23Janv06	.	3TC 150 mg (1 Co, 2/j); D4T 30 mg (1 Co, 2/j); NVP 200 mg (1 Co, 2/j) 20Janv06 25Mai06	MUKAMURIGO Veneranda
	35	Y N	60 kgs@19Janv06 65 kgs@19Juil06 65 kgs@9Aug06	.	Y N	.	43 @23Janv06 153 @11Aug06	.	Triomune-40 (1 Co, 2/j) 20Janv06	URAYENEZA Maurice

CD4 Access, Rwinkwavu, Rwanda

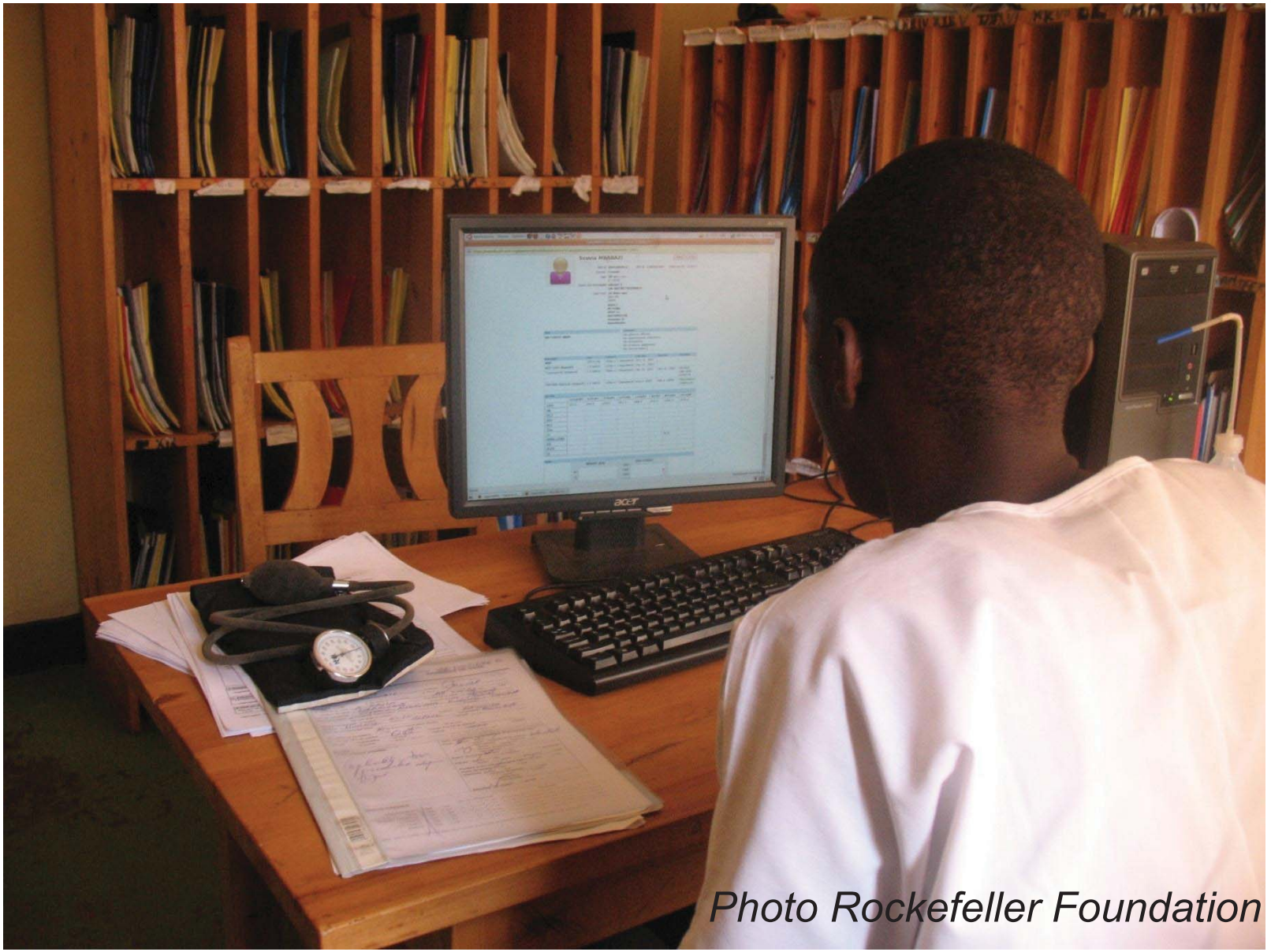
- We evaluated whether the ID physicians had access to the latest CD4 count for their patients in Rwinkwavu, Rwanda
- The physicians record the result they have on the follow-up form based on paper lab result forms
- We checked if they were up to date before and after a new lab component was added to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

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 are now extending direct clinician access to the EMR

Amoroso et al, Stud Health Technol Inform. 2010;160:337-41

Physician looking up ARV patients



Physician looking up ARV patients

[redacted]

Back Print

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
NO CHEST XRAY
NO CD4 IN THE LAST 6 MONTHS

Comments
No adverse effects
No opportunistic infections
No previous diagnoses

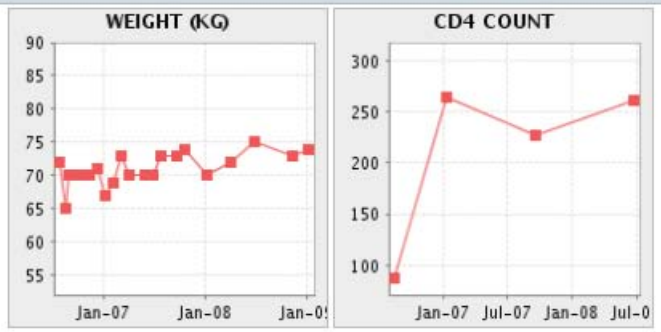
Recent Symptoms	Date
FEVER	Jun 27, 2007
NIGHT SWEATS	Jun 27, 2007
COUGH	Jun 27, 2007
PRODUCTIVE COUGH	Jun 27, 2007
NIGHT SWEATS FOR LESS THAN 3 WEEKS	Jun 27, 2007

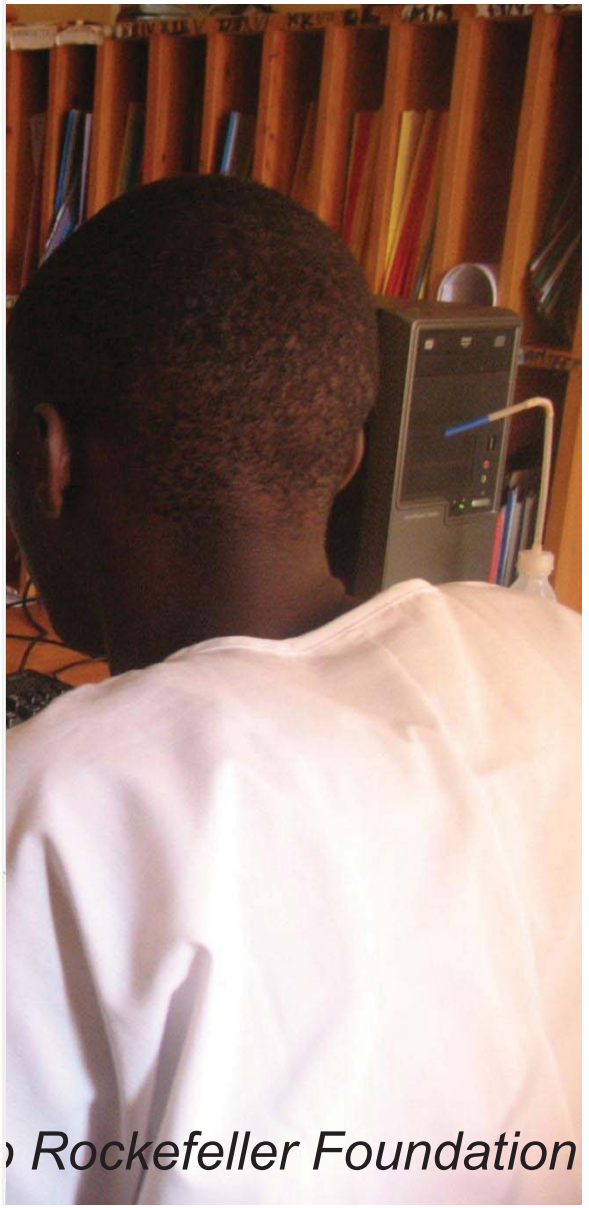
Drug Orders	Dose	Frequency	Start Date	Stop Date	Comments
Triomune-30	1.0 tab(s)	2/day x 7 days/week	Aug 12, 2008		
TMP/SMX 800/160	1.0 tab(s)	1/day x 7 days/week	Aug 18, 2006		
Triomune-40 (stopped)	1.0 tab(s)	2/day x 7 days/week	Jul 26, 2006	Aug 12, 2008	TREATMENT GUIDELINES CHANGED

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		

Graphs





Rockefeller Foundation

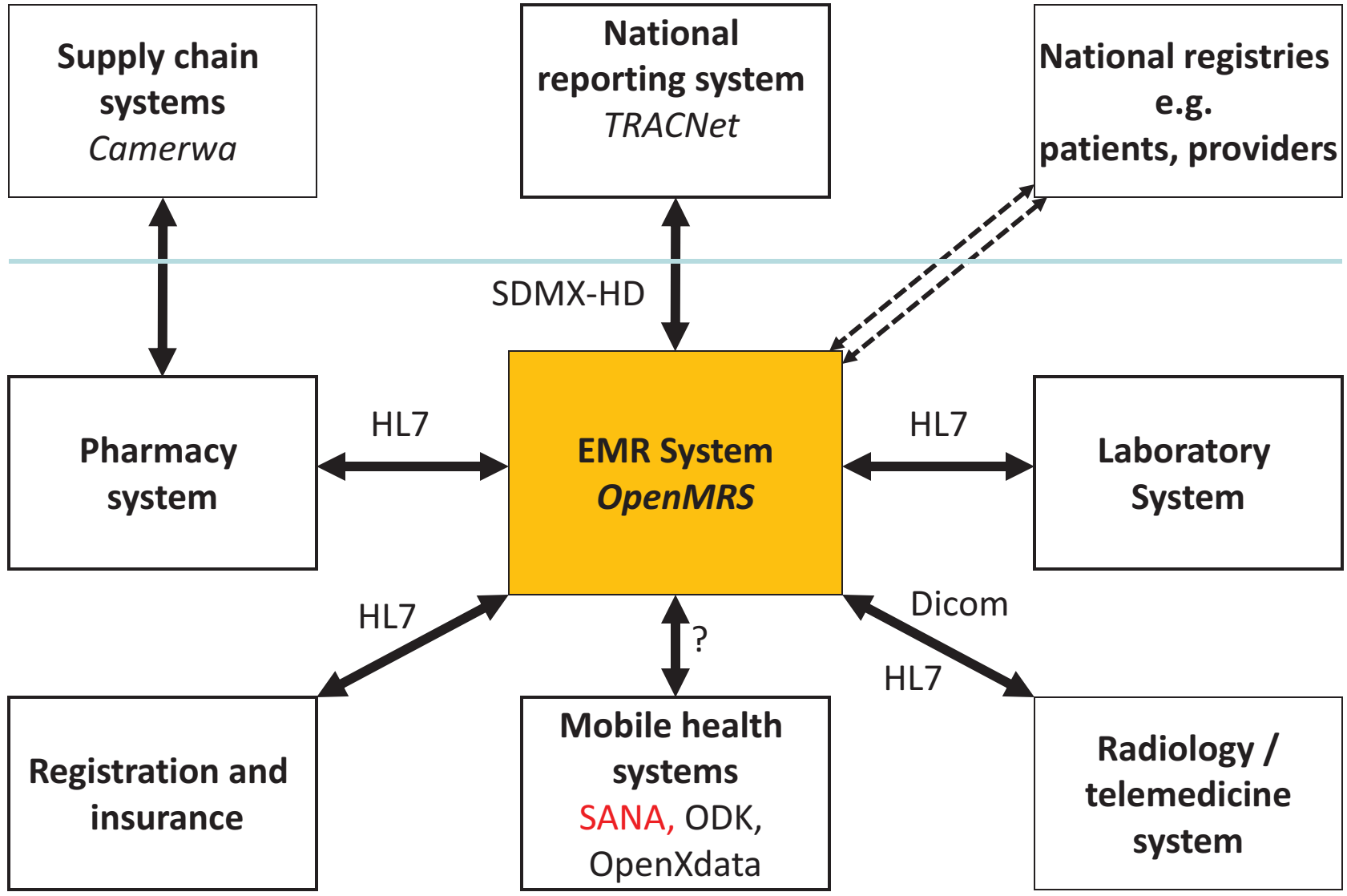
Courtesy of the Rockefeller Foundation. Used with permission.

Impact of OpenMRS patient summaries at AMPATH

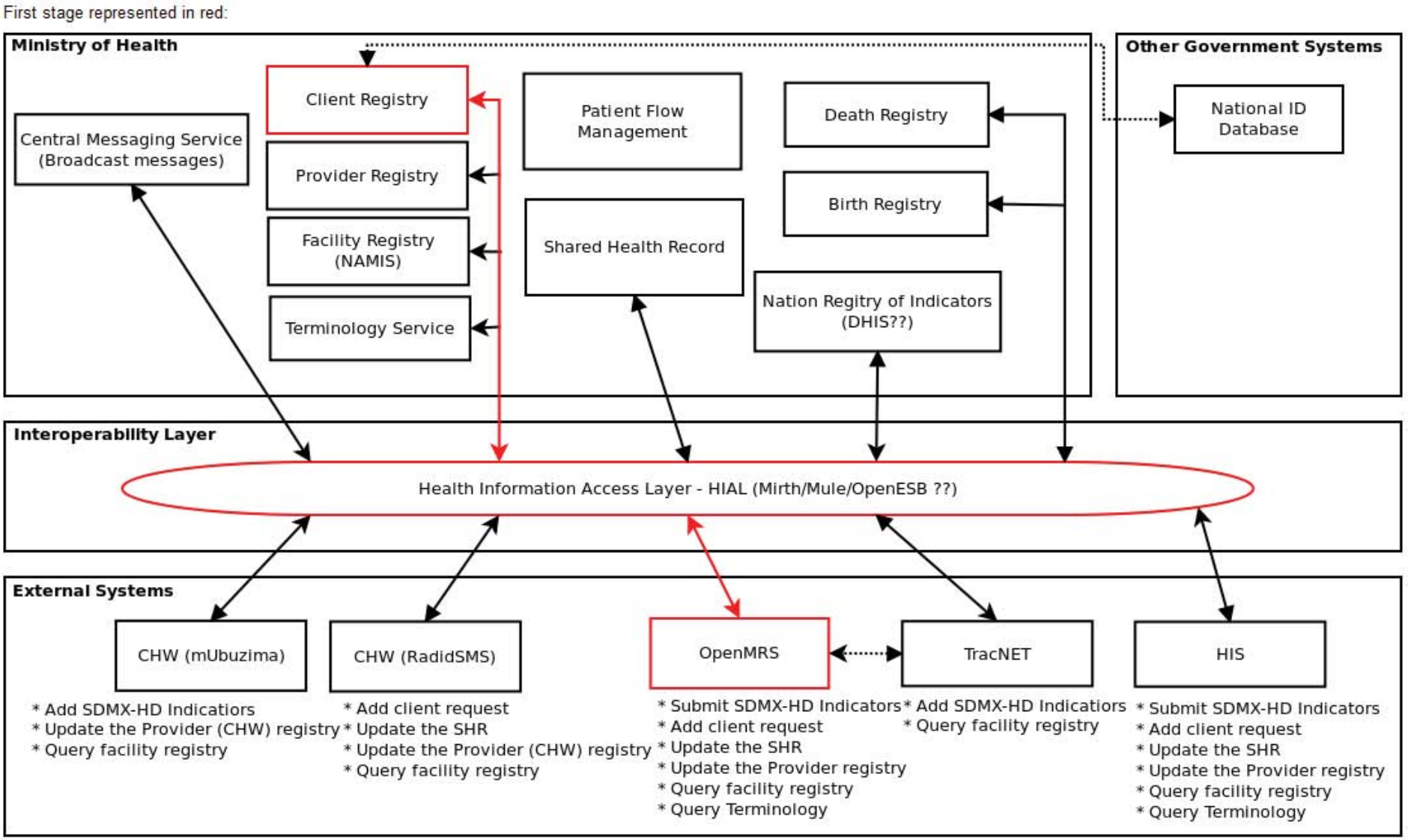
- The OpenMRS EMR system at AMPATH in Western Kenya was used to generate printed patient summaries including reminders for ordering repeat CD4 counts
- The computerized reminder system identified 717 encounters (21%) with overdue CD4 tests.
- In the intervention clinic with computer-generated reminders, CD4 order rates were significantly higher compared to the control clinic:
  53% vs 38%, OR =1.80, CI 1.34 to 2.42, p<0.0001
- When comparison was restricted to encounters where summaries with reminders were actually printed, order rates in intervention clinic were even higher (63%).

Were MC, et al. J Am Med Inform Assoc (2011).doi:10.1136/jamia.2010.005520

Potential components of integrated national eHealth architecture in Rwanda



Initial Rwanda ehealth architecture



Courtesy of the Rwanda Ministry of Health. Used with permission.

Government of Rwanda EMR roll out

- The Government of Rwanda has announced that OpenMRS will be used for the national roll out to health centers and small hospitals
- MoH wants a non-disease specific system which:
  - Can assist in the management of all outpatients
  - Will also continue to be used for HIV management
  - Is integrated into the national ehealth architecture

- First new government site started 2 weeks ago

Developer training, Rwanda

- We are running a training program in Kigali for computer science graduates
- One year, mentored training course
  - Web development
  - Java programming
  - OpenMRS programming
  - Medical informatics
- 10 graduates year 1, 12 in year 2
- They support OpenMRS rollout as well as building software development capacity in Rwanda

PIH photo

Courtesy of Partners in Health. Used with permission.

Testing touch screen patient registration in Rwinkwavu, Rwanda

Photo courtesy Rockefeller Foundation

Other information system projects

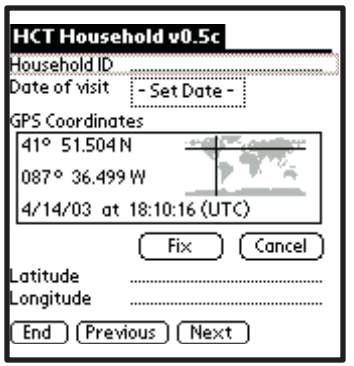
Malawi Patient Management System (Baobab)

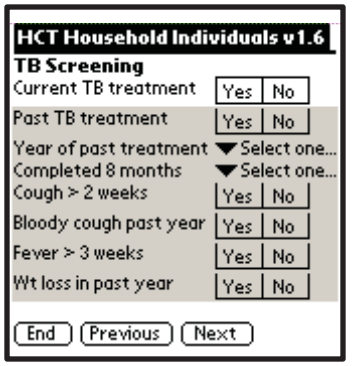
- Touch screen data entry system
- Low cost, robust flat screen terminals
- Large numbers of patients registered (>300,000)
- May be best example of direct data entry system in a developing country

Report CDC Malawi, presented at PHIN2009

Evaluation of PDA system for Home Based Care at AMPATH in Kenya

- Developed a Palm Pilot PDA application, very similar technology to Peru TB study
- Data collected:
  - patient registration, HIV testing, TB screening, maternal care, vaccinations
- Reported data on 14,648 households, 40,111 patients, mean of 12 new patient records per day
- 899 (45%) pregnant women not receiving AN care
- 693/1131 (61.3%) HIV+ patients never been tested
- User satisfaction was high, technical issues rare
- Cost to cover 2 million patients, $0.15/patient





Were et al, Stud Health Technol Inform. 2010;160:525-9.

District Health Information System (DHIS) in rural South Africa

- DHIS is a web based information system for aggregate data
- Used in multiple African countries and India to collect and analyze data
- Health facilities submit reporting data on paper for entry at district level

DHIS study

- PMTCT data in South Africa has been very poor in several studies
- Surveyed the completeness and accuracy of data reported for six key PMTCT data elements between January and December
- Reconstructed reports for the same six PMTCT data elements from clinic registers and assessed accuracy of the monthly reports previously submitted to the DHIS.
- Data elements were reported only 50.3% of the time and were ‘‘accurate’’ (i.e. within 10% of reconstructed values) 12.8% of the time.

Mate et al. Plos One, May 2009 | Volume 4 | Issue 5 | e5483

DHIS evaluation continued

- There was **no computerisation of data collection** and no facility for electronic submission of data in any clinic.
- Clinic staff and supervisors reported that even if the data did not look correct, **checking it was rarely done** due to lack of time.
- **Little analysis of data occurred at the clinic** or by clinic supervisors.
- **Data were not discussed in staff meetings** nor analysed by them.

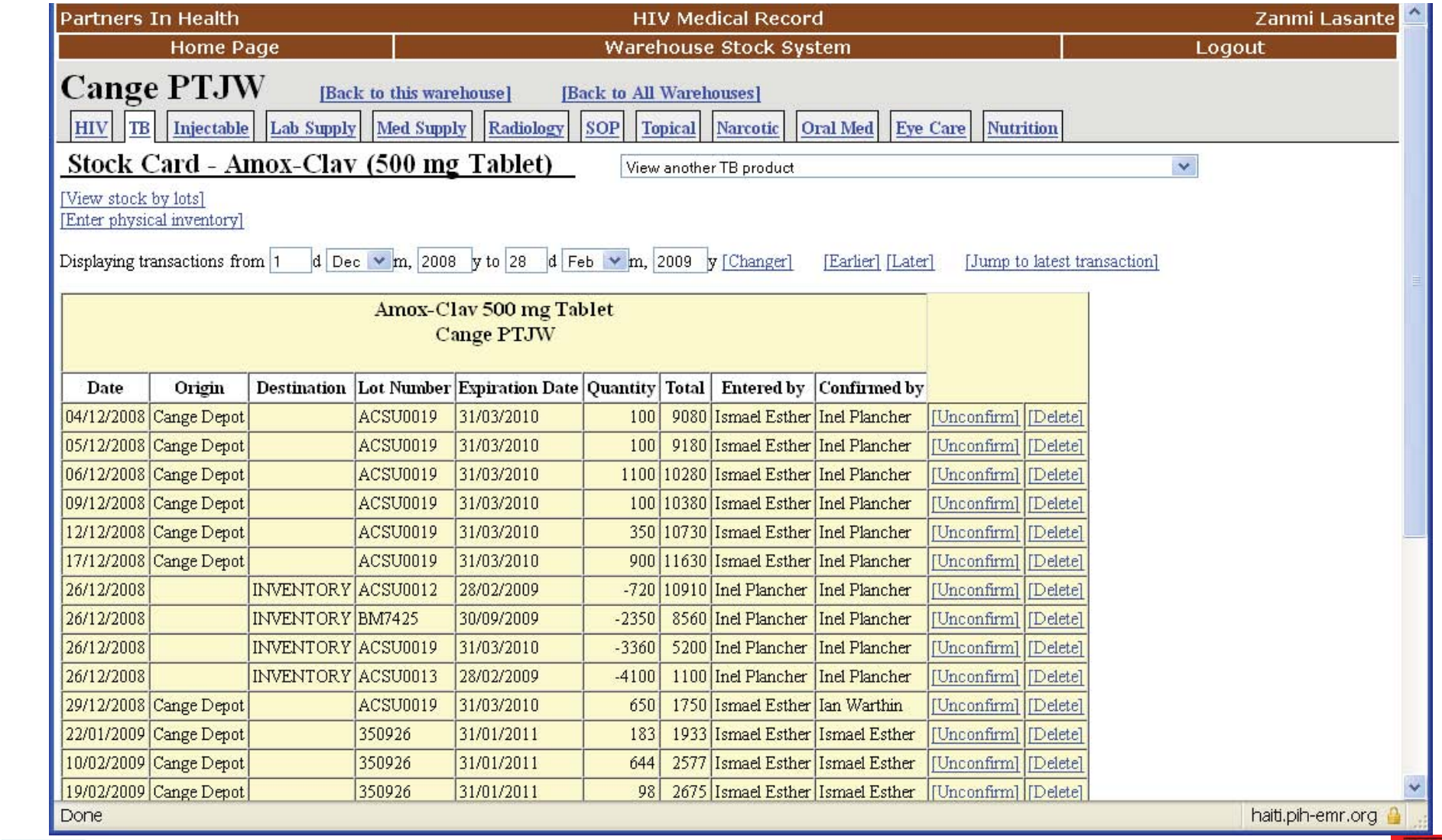
HIV treatment reminders, Kenya

- 538 patients randomized to weekly SMS reminder (n=273) or standard care (n=265).
- Adherence to ART was reported in 168 of 273 (61.5%) patients receiving the SMS intervention compared with 132 of 265 (48.8%) in the control group (relative risk [RR] for non-adherence 0·81, 95% CI 0·69-0·94; p=0·006).
- Suppressed viral loads were reported in 156 of 273 patients in the SMS group and 128 of 265 in the control group, (RR for virologic failure 0·84, 95% CI 0·71-0·99; p=0·04).

Lester RT et al. Lancet. 2010 Nov 27;376(9755):1838-45.

Pharmacy and supply chain

Pharmacy data



Partners In Health | HIV Medical Record | Zanmi Lasante

Home Page | Warehouse Stock System | Logout

Cange PTJW

[Back to this warehouse] [Back to All Warehouses]

HIV | TB | Injectable | Lab Supply | Med Supply | Radiology | SOP | Topical | Narcotic | Oral Med | Eye Care | Nutrition

Stock Card - Amox-Clav (500 mg Tablet)

View another TB product

[View stock by lots]
[Enter physical inventory]

Displaying transactions from 1 d Dec m, 2008 y to 28 d Feb m, 2009 y [Changer] [Earlier] [Later] [Jump to latest transaction]

Amox-Clav 500 mg Tablet
Cange PTJW

Date	Origin	Destination	Lot Number	Expiration Date	Quantity	Total	Entered by	Confirmed by		
04/12/2008	Cange Depot		ACSU0019	31/03/2010	100	9080	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
05/12/2008	Cange Depot		ACSU0019	31/03/2010	100	9180	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
06/12/2008	Cange Depot		ACSU0019	31/03/2010	1100	10280	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
09/12/2008	Cange Depot		ACSU0019	31/03/2010	100	10380	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
12/12/2008	Cange Depot		ACSU0019	31/03/2010	350	10730	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
17/12/2008	Cange Depot		ACSU0019	31/03/2010	900	11630	Ismael Esther	Inel Plancher	[Unconfirm]	[Delete]
26/12/2008		INVENTORY	ACSU0012	28/02/2009	-720	10910	Inel Plancher	Inel Plancher	[Unconfirm]	[Delete]
26/12/2008		INVENTORY	BM7425	30/09/2009	-2350	8560	Inel Plancher	Inel Plancher	[Unconfirm]	[Delete]
26/12/2008		INVENTORY	ACSU0019	31/03/2010	-3360	5200	Inel Plancher	Inel Plancher	[Unconfirm]	[Delete]
26/12/2008		INVENTORY	ACSU0013	28/02/2009	-4100	1100	Inel Plancher	Inel Plancher	[Unconfirm]	[Delete]
29/12/2008	Cange Depot		ACSU0019	31/03/2010	650	1750	Ismael Esther	Ian Warthin	[Unconfirm]	[Delete]
22/01/2009	Cange Depot		350926	31/01/2011	183	1933	Ismael Esther	Ismael Esther	[Unconfirm]	[Delete]
10/02/2009	Cange Depot		350926	31/01/2011	644	2577	Ismael Esther	Ismael Esther	[Unconfirm]	[Delete]
19/02/2009	Cange Depot		350926	31/01/2011	98	2675	Ismael Esther	Ismael Esther	[Unconfirm]	[Delete]

Done haiti.pih-emr.org

Pharmacy and Warehouse Stock Tracking

Reduction in product-days of stocked out medication (daily report – **a method of triangulation**)

System was set up in 2005 but scaled in 2006.

	Q1 2006	**Q4 2006**
Prod. Days stocked out	1569	634 *(P<0.001)*
Prod. Days	60,608	58,576
	2.6%	1.1%

Berger L, et al, Proc. AMIA SYMP. 2007:46-50

“Stop the Stock-outs”, Kenya

- Led by Health Action International, Oxfam and local civil society organizations
- “Stop the Stock-outs” used a system developed by Frontline SMS
- Patients to send text messages to a server if the drug they had been prescribed was stocked out at the clinic’s pharmacy
- Data is linked to mapping software

http://www.scidev.net/en/news/software-allows-public-to-map-medicine-shortages-.html

"Stop the Stock-outs"

- The group was able to map the levels of stockouts of essential medications in more than 100 clinics in Kenya
- **Stockouts rates of 50-60% were documented for essential medications**
- This data was publicized and led to the Kenya parliament voting for increased funding for drug supply
  - The system is also being used in Malawi, Zimbabwe and Uganda

Some lessons learned

The importance of local leadership

- Prioritizing the most important information requirements and focus on nailing them!
- Avoid “fishing expeditions” and “nice to haves”
- Explain what is possible and what isn’t and manage expectations
- Make sure you agree who is responsible for power, IT, data management and user supervision
- Formal informatics training needed for leaders

The importance of individual patient records

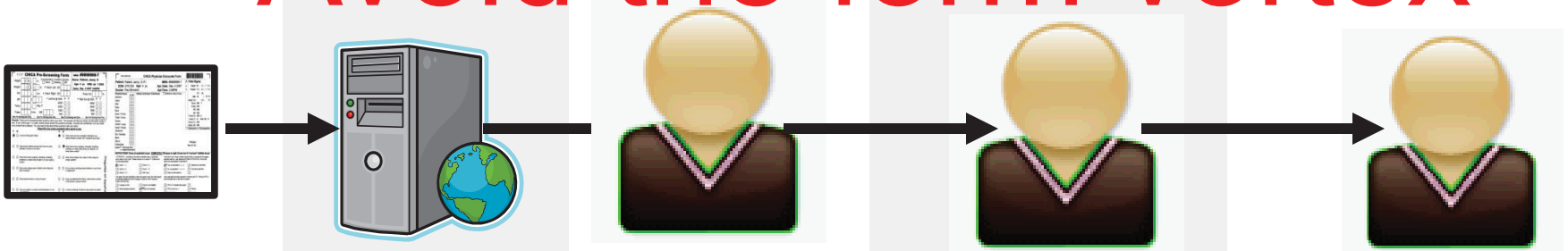
- The public health approach to clinical data management in developing countries has focused on aggregate data at national level
- Studies show that data quality is very poor if there are no tools for managing and analyzing the data locally[1]
- Local data use makes the system valuable for clinical care and staff

[1] Mate et al, PLoS One. 2009;4(5):e5483

Design systems with outputs as the primary focus

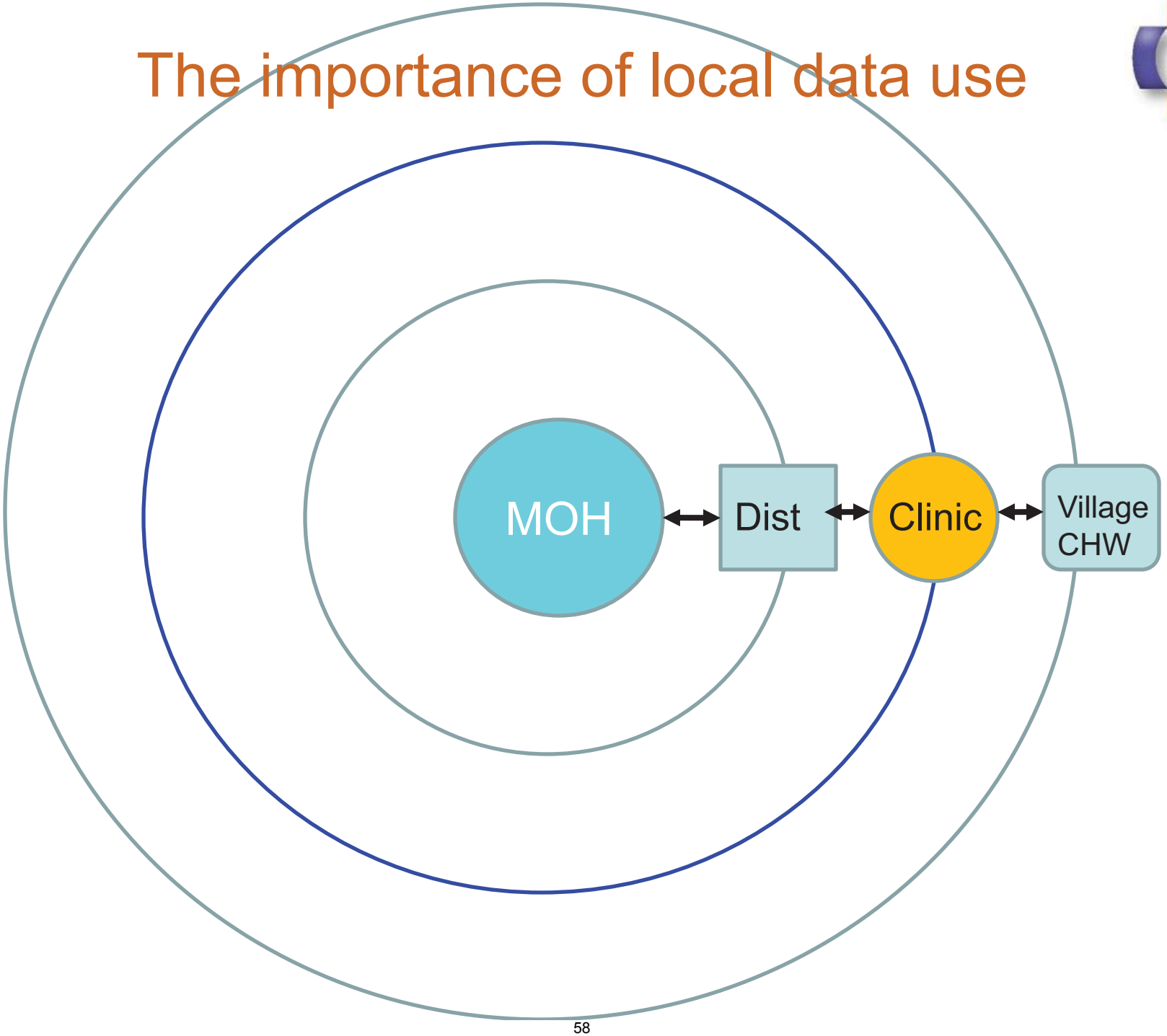
Forms | Infrastructure | Software | Data Collection & Quality | Analysis, Reports, Quality of Care?

Avoid the form vortex

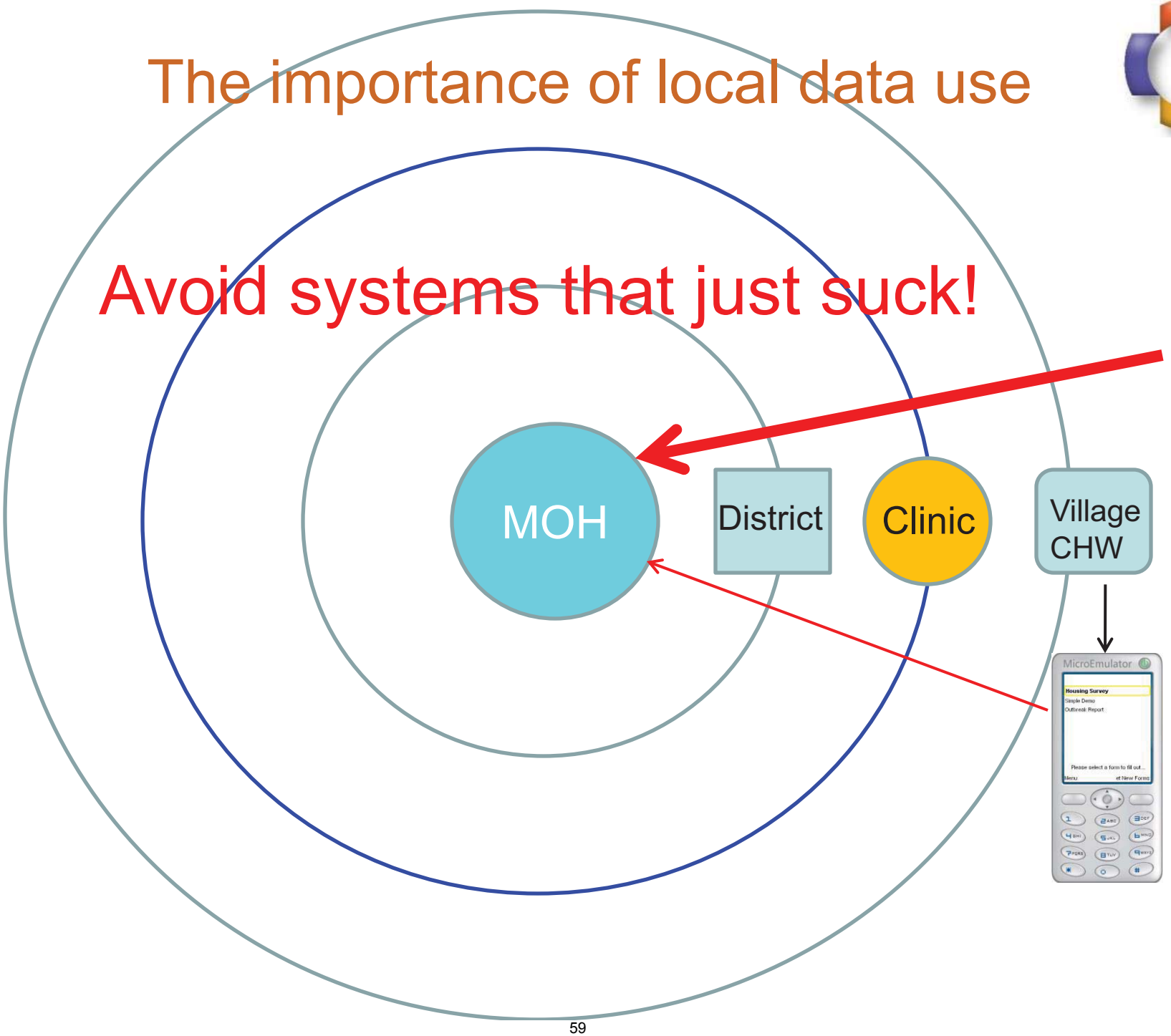


Forms, data Collection & Quality | Infrastructure | Software | Core Data set | Analysis, Reports, Quality of Care

The importance of local data use



The importance of local data use



Defending the core data set

- The route to success is a core data set that supports the key outputs
- Then forms can be created to enter that data
- Maternal Concept Library is a collaboration to identify the essential data to reduce maternal deaths and work from this core.
- Changes to the core should require a formal process

Leave the data alone

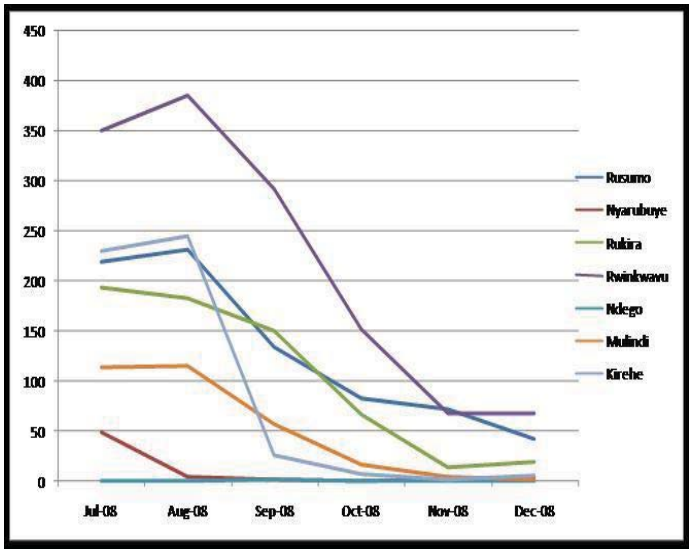
Image courtesy of Feral78 on Flickr.

Data management tools and training

- Data quality and completeness is a critical success factor
- Data quality tools needed to carry out regular checks
- Many organizations in Rwanda doing training but do not cooperate

PIH photo

Courtesy of Partners in Health. Used with permission.



One successful system beats 10 nearly there…

- Prioritize requests by what is feasible
- Get success with low hanging fruit live access to lab data, confirmed in evaluation studies
  - Access to TB lab data in Peru
  - Access to CD4 data in Rwanda
- *Don't have 10 things on the go before one has succeeded!*

Power supply, backups and protection

- Must invest in adequate power infrastructure especially with local server
- Low power devices make solar and backup systems more viable
- Laptop servers are a big win in many sites

Courtesy of Partners in Health. Used with permission.

PIH photo

Data backups

Haiti post earthquake

- I-Sante EMR system backs up data in Port au Prince and US, able to restore system in General Hospital from the backup system
- MSF – OpenMRS system for surgical care was lost with collapse of La Trinite hospital. Able to recreate the system within 1-2 weeks from backups.
- Data synchronization can address this issue as well as usability and data access

Courtesy of GHESKIO. Used with permission.

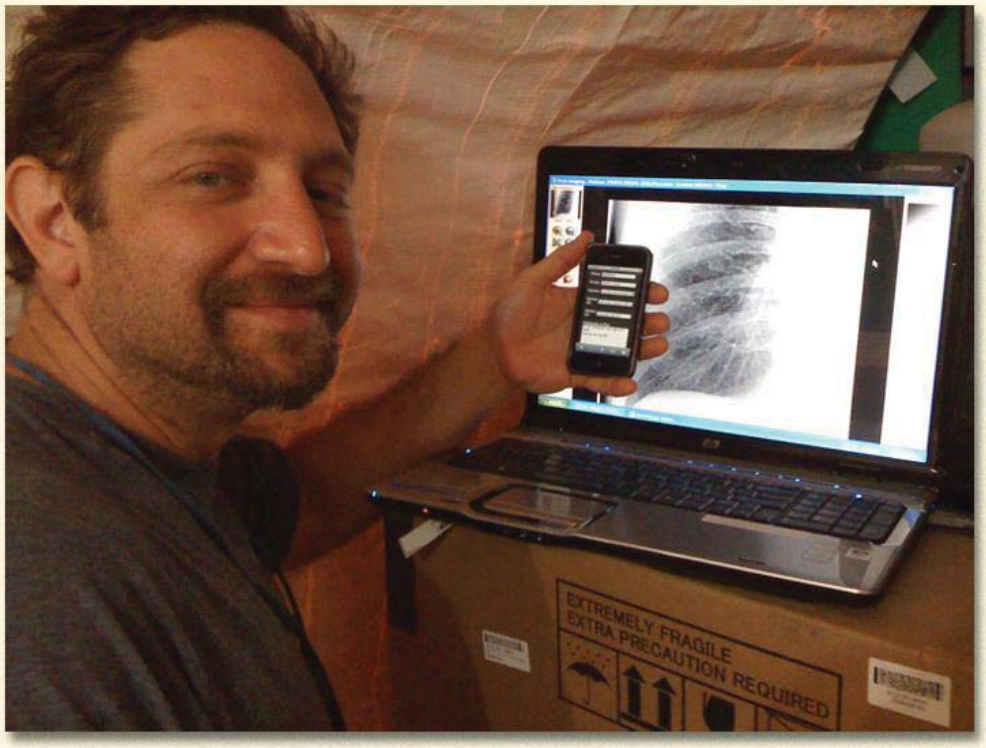
Photo GHESKIO

Confidentiality and data ownership

- Technical solutions exist to ensure security and encryption of medical data
- We encrypt data transfers with SSL
- Staff receive training in patient data and security management
- All logins and page views can be audited
- Lack of national policies and laws is a major concern in most developing countries including Haiti

Mobile devices for network and power independence

"277 Million Chinese people were accessing the Internet through mobile devices June 2010 up from 43 Million in December 2009!"
MIT Technology Review



Courtesy of Larry Nathanson. Used with permission.

Larry Nathanson, BIDMC Boston

Linked initiatives to address maternal mortality

- Big push to address maternal mortality in developing countries –finally!
- Initiatives in training, surgical facilities, blood banking, patient tracking and monitoring outcomes
- Collaboration between WHO, Gates, PIH, MVP, Dtree, AMPATH, IDRC, PEPFAR
- Pilot projects in Ghana, Bihar -India, soon Rwanda, Haiti and others

Maternal Concept Lab

- Identify the key requirements to improve maternal health and the information that is needed
- Agree to a small set of outputs: reports, summaries, etc.
- Agree the core data set that will allow you to create those outputs
- Share the data set and tools and designs with the larger collaboration
- Document all the details and evidence on a public site

Jonathan Payne, PIH and DTree

What has been invested in eHealth?

- Recent world bank study showed that over $480M has been awarded to ehealth projects by World Bank for *current projects*
- At least 3 other major development agencies also funding at high levels:
  - USAID
  - PEPFAR
  - GFATM
- Little if any evaluation has been carried out on those projects

Collaborators and Funders

- Partners In Health
- Regenstrief institute
- Medical Research Council, South Africa
- World Health Organization
- US Centers for Disease Control
- Brigham and Women hospital
- Harvard Medical School
- University of KwaZulu-Natal
- Millennium Villages Project
- International Development Research Centre, Ottawa
- Rockefeller Foundation
- Fogarty International Center, NIH
- Google Inc

Studies of mobile phone interventions

- Use of SMS reminders for pharmacists reduced stockout rates for malaria medications (Tanzania)
- Use of SMS in Kenya (Frontline SMS and Ushahidi) by patients led to measurement of drug stockout rates and better supply chain management

Evaluation of the District Health Information System (DHIS) in rural South Africa

- *Focus on PMTCT*
- *Outcomes:* assessed data quality, the utilisation for facility management, perceptions of work burden, and usefulness of the system to clinic staff.
- *Results.* **A high perceived work burden** associated with data collection and collation
- Some data collation tools were not used as intended.
- There was good understanding of the data collection and collation process **but little analysis, interpretation or utilisation of data**
- **Feedback to clinics occurred rarely**

A Garrib, et al , SAMJ , Vol. 98, No. 7, p 549-552

Challenges for information system deployments

- Reliability and support for equipment, power supplies and software
- Connectivity
- Training (IT, data entry, users, analysis)
- Data management and quality control
- Evaluation

Open standards

- The current history of the field is vertical systems customized to one purpose
- Little interoperability between systems
- and lab, pharmacy, national reporting tools and mobile devices
- Use of SNOMED-CT, ICD10, LOINC

HST.S14 Health Information Systems to Improve Quality of Care in Resource-Poor Settings
Spring 2012