Health Systems Research
- Case Studies in East Africa -

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Feb 25th, 2011

Regenstrief Medical Informatics

The **Source** for Medical Informatics

Course Title

Health information systems to improve quality of care in resource poor settings.

Definition: Resource Poor Settings

- Economies are divided according to Gross National Income (GNI) per capita.

- Groups are (for 2011):
  - Low income - $995 or less
  - Lower middle income - $996 - $3,945
  - Upper middle income -$3,946 - $12,195
  - High income - $12,196 or more.

- Country Classification Data | The World Bank

Low-income economies (40)

Afghanistan
Bangladesh
Benin
Burkina Faso
Burundi
Cambodia
Central African Republic
Chad
Comoros
Congo, Dem. Rep
Eritrea
Ethiopia
Gambia, The
Ghana
Guinea
Guinea-Bisau
Haiti
Kenya
Korea, Dem Rep.
Kyrgyz Republic
Lao PDR
Liberia
Madagascar
Malawi
Mali
Mauritania
Mozambique
Myanmar
Nepal
Niger
Rwanda
Sierra Leone
Solomon Islands
Somalia
Tajikistan
Tanzania
Togo
Uganda
Zambia
Zimbabwe

- Country Classification Data | The World Bank

Lower-middle-income economies (56)

Angola
Armenia
Belize
Bhutan
Bolivia
Cameroon
Cape Verde
China
Congo, Rep.
Côte d'Ivoire
Djibouti
Ecuador
Egypt, Arab Rep.
El Salvador
Georgia
Guatemala
Guyana
Honduras
Indonesia
India
Iraq
Jordan
Kiribati
Kosovo
Lesotho
Maldives
Marshall Islands
Micronesia, Fed. Sts.
Moldova
Mongolia
Morocco
Nicaragua
Nigeria
Pakistan
Papua New Guinea
Paraguay
Philippines
Samoa
São Tomé and Principe
Senegal
Sri Lanka
Sudan
Swaziland
Syrian Arab Republic
Thailand
Timor-Leste
Tonga
Tunisia
Turkmenistan
Tuvalu
Ukraine
Uzbekistan
Vanuatu
Vietnam
West Bank and Gaza
Yemen, Rep.

- Country Classification Data | The World Bank

Definition: Quality of Care

"The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."

- Institute of Medicine (IOM)

Elements of Quality Care

- Recognize patients at risk for diseases.
- Do appropriate evaluation.
- Make the appropriate diagnosis.
- Start the appropriate treatment.
- Schedule the appropriate follow-up.
- Stimulate the appropriate adherence to treatment.

- Feld, S: What is the Definition of Quality Medical Care.

Regenstrief Medical Informatics

Definition: Health IT

"The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making."

- Brailer & Thompson, 2004

Poor QoC in Resource-Poor Settings

- Patients at risk for diseases are not being recognized.
- Patients are not receiving the appropriate evaluation.
- Appropriate diagnoses are not being made.
- Patients are not being started on appropriate treatment.
- Patients not getting appropriate follow-up.

QoC and Resources

- Good quality of care requires financial and human resources.

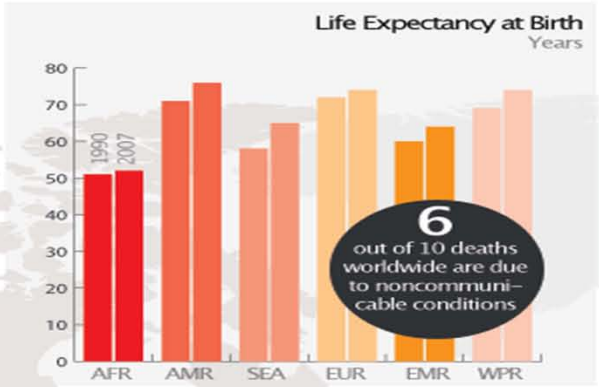
- Are the current resources being optimally used?

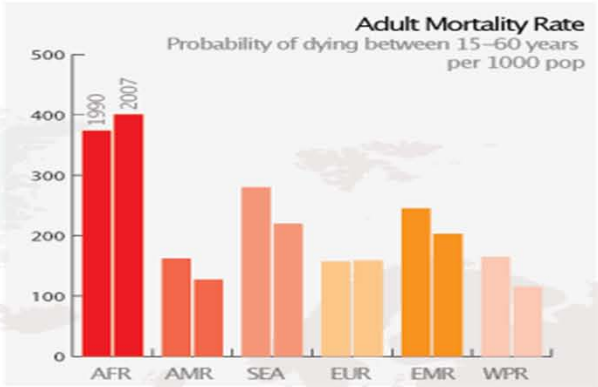
EHM Executive Healthcare

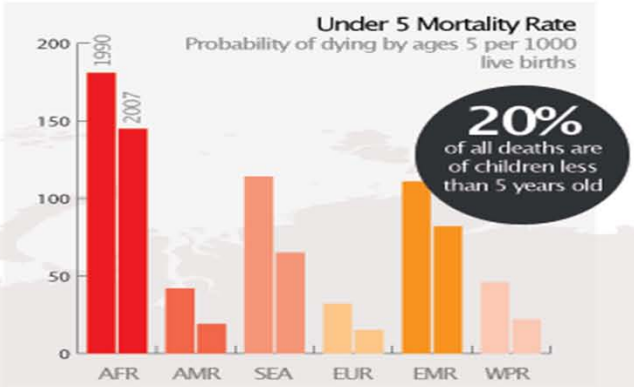
Global Health Indicators: Are We Better or Worse Off Now?

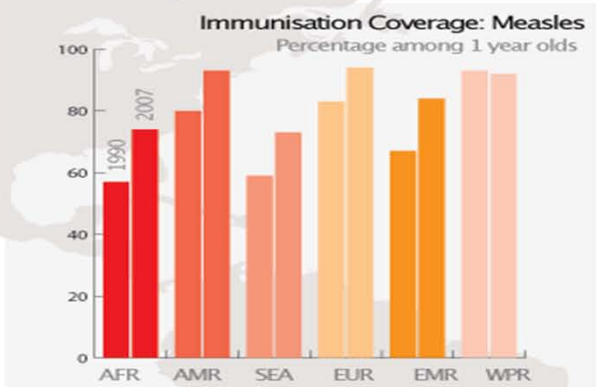
A recent WHO report reveals some encouraging signs of progress in world related health issues over the past 10–15 years. Despite this, we still have a long way to go...

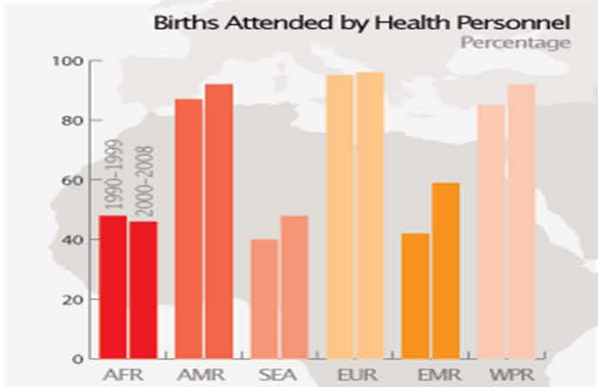
African Region
Americas
South East Asian Region
European Region
Eastern Mediterranean
Western Pacific

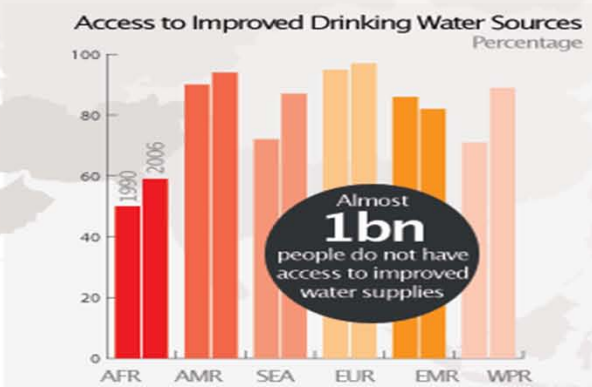


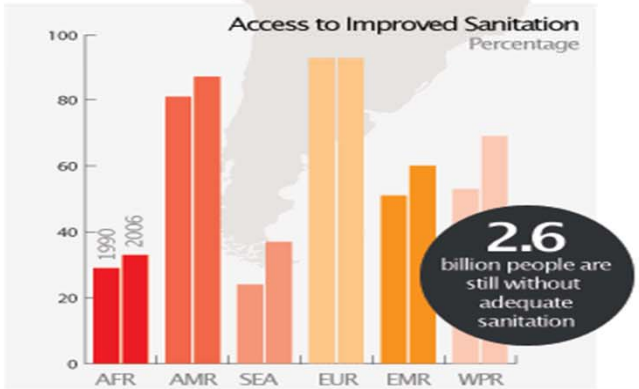


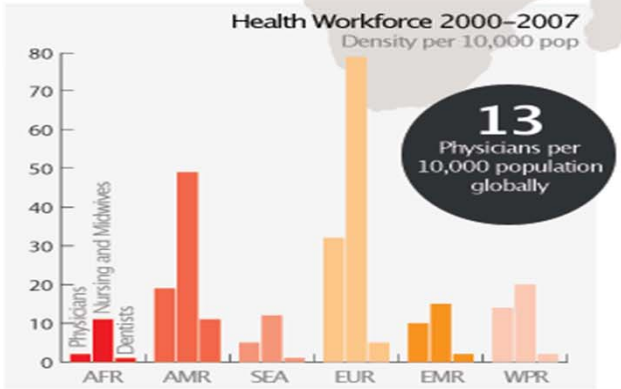


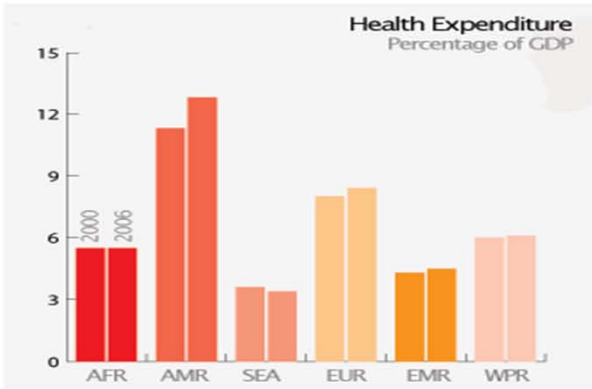












Source: World Health Organisation

Does HIT improve Quality of Care?

OPEN ACCESS Freely available online

PLoS MEDICINE

The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview

Ashly D. Black[1], Josip Car[1], Claudia Pagliari[2], Chantelle Anandan[2], Kathrin Cresswell[2], Tomislav Bokun[1], Brian McKinstry[2], Rob Procter[3], Azeem Majeed[4], Aziz Sheikh[2]*

PLoS Med. 2011 Jan 18;8(1):e1000387.

eHealth Impact Review

"We found that despite support from policymakers, there was relatively little empirical evidence to substantiate many of the claims made in relation to these technologies. Whether the success of those relatively few solutions identified to improve quality and safety would continue if these were deployed beyond the contexts in which they were originally developed, has yet to be established. Importantly, best practice guidelines in effective development and deployment strategies are lacking."

- Black et al: PLoS Med. 2011 Jan 18;8(1):e1000387.

eHealth Impact Review - Conclusion

- There is a large gap between the postulated and empirically demonstrated benefits of eHealth technologies. In addition, there is a lack of robust research on the risks of implementing these technologies and their cost-effectiveness has yet to be demonstrated, despite being frequently promoted by policymakers and ‘‘techno-enthusiasts’’ as if this was a given -

- Black et al: PLoS Med. 2011 Jan 18;8(1):e1000387.

HIT in resource-poor settings

- Evidence is even more scarce in resource poor countries?
- Could resource-poor countries benefit more from HIT interventions specifically because of they lack resources?
- We need to identify areas where HIT impacts quality of care (and where it does not).
- Impact on process and behavior ≠ Impact on outcomes.
- Need to evaluate the cost-effectiveness of interventions.

Potential Roles of Health IT

- Help in understanding how health systems work.
- Help in improving how health systems work.
- HIT as a direct care intervention.

Understanding how care system works

- What problem are we trying to solve?
- How will the implemented technology impact care processes, experience, and workload?
- Example: WHO and Ugandan MoH wanted to know how EHRs will impact time-use at two HIV clinics.

AIDS Care
Vol. 20, No. 6, July 2008, 677–682

Routledge
Taylor & Francis Group

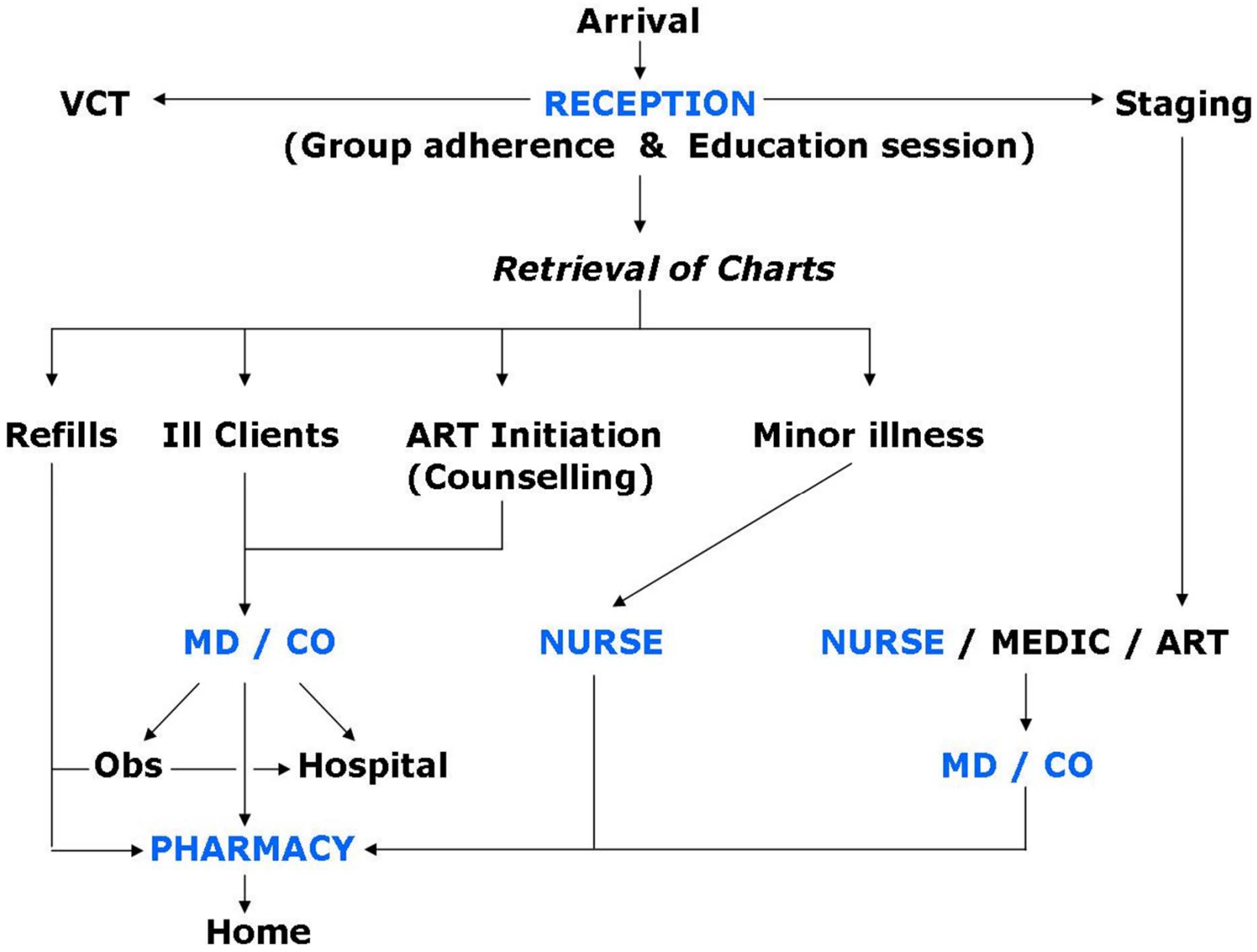
Patterns of care in two HIV continuity clinics in Uganda, Africa: a time-motion study

M.C. Were[a]*, J.M. Sutherland[b], M. Bwana[c], J. Ssali[d], N. Emenyonu[e], and W.M. Tierney[a]

Uganda:

Source: CIA World Factbook (public domain image)

- Population: ~ 33 million
- Life expectancy: M 52 / F 54
- Mortality rate, infant (per 1000 live births) – 84.5
- GNI per capita – US $ 460



Measuring Time Use

- Work Sampling
- Interviews
- Self-Administered Time Sheets
- Patient Flow Analysis Software (e.g. CDC PFA)
- Time & Motion

- Bratt JH et al. A comparison of four approaches for measuring clinician time use. Health Policy & Planning 1999; 14(4): 374-381
- Finkler SA et al. A comparison of Work-Sampling and Time-and-Motion Techniques for Studies in Health Services Research. HSR 1993; 28(5): 576-597

Subjects Observed

- Adult Patients (~ 80 returning pts, 20 new) for each phase of study
- All primary care providers
- Registration / Records Department Staff
- Pharmacy

Only staff working a full-shift were observed, each for 3 full workdays.

Patient and Provider Activities

- 4 days spent at each clinic identifying activities and developing categories.
- Programmed into HanDBase 3® software (DDH Software, Inc., Wellington, Florida) on PDAs
- Tested using trained observers.
- Refined accordingly.

Sample Physician Tasks

Activity	Analysis Group
Filing: Putting Documents in Record	Administrative
Talking: Patient / Family	Direct Patient Care
Exam: Pelvic Exam	Direct Patient Care
Reading: Patient Chart	Indirect Patient Care
Writing: On Encounter Form	Indirect Patient Care
Break: Taking Break	Personal
Looking / Waiting: For Patient	Waiting
Walking: Within Clinic	Miscellaneous

Sample Patient Activities

Activity	Analysis Group
Getting: Examined by Doctor	Time With Physician
Getting: Individual Counseling	Time With Other Provider
Getting: ART Medication	Time With Pharmacy
Looking for: Hospital Facility	Miscellaneous
Getting: Registered	Time With Registration
Waiting: For doctor	Waiting for Physician
Waiting: Laboratory	Waiting for Other Provider

HanDBase

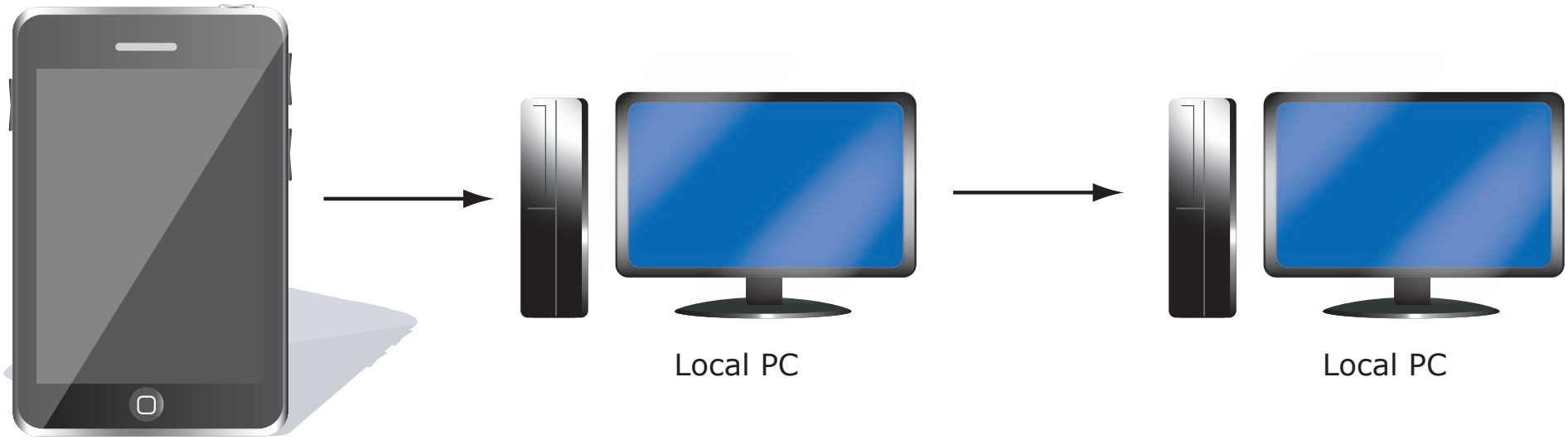
Data Collection

Microsoft Access

Data Aggregation

SAS

Data Analysis



Images by MIT OpenCourseWare.

Pre-Implementation Results: PCPs

- Over 140 hours of PCP observation

	Masaka	Mbarara
Mean hrs in Clinic	5.5 ± 1.3 (range 2.5–7.5 h)	4.9 ± 0.95 (range 3.8–6.5 h)
Clinic Start Time	8:56 am - 10:57 am	8:15 am - 9:53 am
Clinic End Time	12:32 pm - 5:21 pm	12:27 pm - 3:35 pm
Pts seen / Day	26 ± 8 (range 16 – 48)	29 ± 7 (range 19 – 41)
Mean pts / hour	3 – 8 patients	4 – 7 patients

Activities of PCPs (% of workday)

	Masaka Providers				Mbarara Physicians
	NP	CO	MD	NP+CO+MD	
Indirect Patient Care	31.3	27.1	32.4	31.2	33.9
Direct Patient Care	26.2	33.3	27.4	28.2	25.1
Personal	20.9	15.7	17.9	18.1	16.0
Administrative	8.2	17.8	16.8	15.0	6.5
Waiting	7.0	1.4	3.0	3.6	1.4
Miscellaneous	6.5	4.8	2.6	3.8	17.0

Minutes per patient-encounter spent by PCPs

	Minutes per Pt Encounter (SD)		p-Value
	Masaka	Mbarara	
Indirect Patient Care	3.83 (2.84)	3.41 (2.41)	0.04
Direct Patient Care	3.41 (3.09)	2.51 (1.96)	<0.0001

Image by MIT OpenCourseWare.

- **Indirect Patient Care**: Reading or Writing on patient's chart or encounter form, prescribing medications, discussing patient's care on phone or with other providers.
- **Direct Patient Care**: Talking to or counseling patient(s), and examining or doing a procedure on patient.

Results for Established Patients

- Over 420 hours of patient observation

	Masaka	Mbarara
Daily Patient Census	119 ± 34 (range 71 – 197)	107 ± 45 (range 62 – 172)
Mean Visit Length	77 ± 38 minutes	196 ± 84 minutes

Inefficient Systems of Care:

	Mean (median) minutes per visit	
Patient Activity	**Masaka**	**Mbarara**
Waiting	51 (43)	122 (123)
Time with other staff	11 (5.0)	43 (27)
Time with clinicians	7.5 (6.3)	8.2 (6.1)
Miscellaneous	5.8 (3.5)	23 (16)
Time with pharmacy	2.6 (1.9)	1.7 (1.4)

Discussion

- PCPs spent a limited amount of time in clinic
- While in clinic 40% of time not spent on tasks related to patient visits
- Some Suggestions:
  - Alleviate other responsibilities outside the clinic.
  - Re-assign tasks so that time is spent on tasks PCPs are uniquely qualified.
  - Re-engineer work processes. Example: Encounter Forms vs. Free Text Notes.

Discussion

- Large part of clinic visit spent by patients Waiting.
  - Time & Motion Data gives you information on possible bottlenecks.

- Large variability:
  - In start- and end-times and clinic length for providers
  - In daily patient census.

Discussion

- Need better queue management in this multiple stage system
- Take advantage of the waiting time – e.g. to educate and counsel patients
- "Assign responsibility to patient flow problem" – Eugene Litvak
- Manage patient daily census better
- Large variability:
  - In start- and end-times and clinic length for providers
  - In daily patient census - ? Scheduling system.

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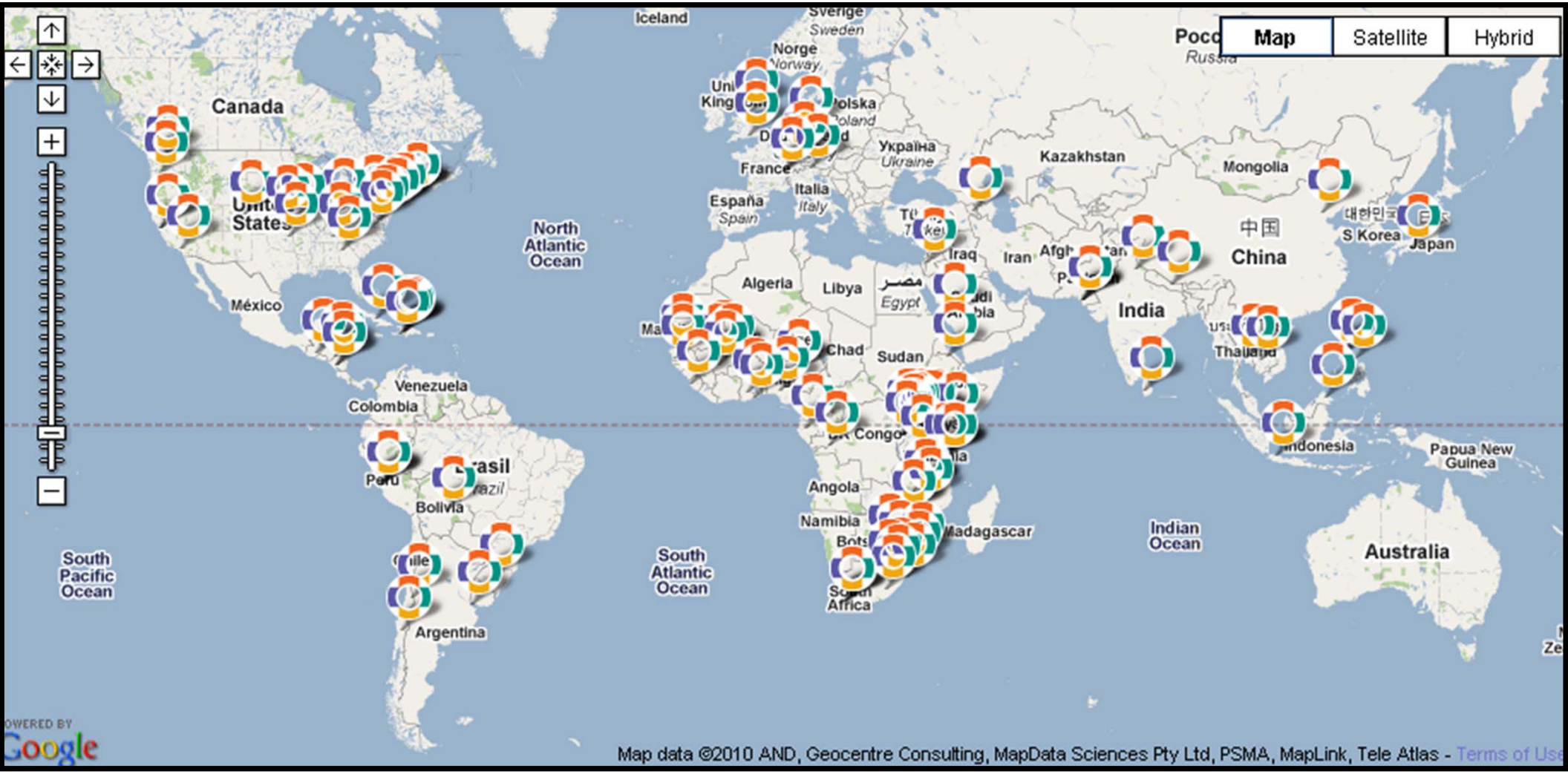
Impact of EHRs on Time Use

Courtesy of OpenMRS. Used with permission.

OpenMRS Implementations



Overlay courtesy of OpenMRS. Used with permission.

EHRs with Clinical Summaries

MBARARA REGIONAL REFFERAL HOSPITAL / MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ISS Clinic Patient Summary Sheet

Jane Doe *File Number:* **2222-22-2222**

F **33 (15/06/1975)** *ART Number:* **FTF**

last seen by *(30/04/2008)*

Diagnosis at last visit:
WHO STAGE 3
TB Status: NO SIGNS
painful sensory Neuropathy
Allergies:

Toxicities:
PERIPHERAL NEUROPATHY

Non Art Medications at last visit:
amoxyl

Current ART Regimen
COMBIVIR
NEVIRAPINE
Previous ART Regimen(s)
TRIOMUNE 30

VITAL SIGNS

	Date	Weight	Temp	BP	K Score
Enrollment	*18/10/2007*	46	36	84/66	60
ART Start	*31/10/2007*	46	37	80/60	90
3rd Last visit	*13/03/2008*	50	35	90/60	90
2nd Last visit	*10/04/2008*	53	36	120/80	95
Last visit	*30/04/2008*	53	35	113/76	90

LAB HISTORY

CD4	*Date*	HB	*Date*	Viral load	*Date*
227.0	*18/10/2007*	10	*23/10/2007*		

ALERT! REPEAT CD4

Results of Mbarara Time-Motion Study: Providers*

Measure	Before Summaries	After Summaries	Before–After Difference
Number of physicians	3	3	0
Number of clinic hrs/day	6.5	6.4	–0.1
Number of patients/day	41	44	3
Direct patient care (%)	25.7	34.6	8.9
Indirect patient care (%)	35.6	33.2	–2.4
Administration (%)	6.0	8.8	2.8
Personal (%)	14.5	13.3	–1.2
Miscellaneous (%)	16.7	6.6	–10.1
Waiting (%)	1.4	3.4	2.0

* Time is measured in percent of a provider's workday. No between group differences were statistically significant (p-value <0.05)

Minutes (mean) spent by providers per patient encounter

Activity	Before Summaries N = 237	After Summaries N=395	P-Value
Direct patient care[a]	2.3	2.9	< 0.001
Indirect patient care[b]	3.2	2.9	0.7

[a] **Direct Patient Care**: Tasks include talking to or counseling patient(s), and examining or doing a procedure on patient.

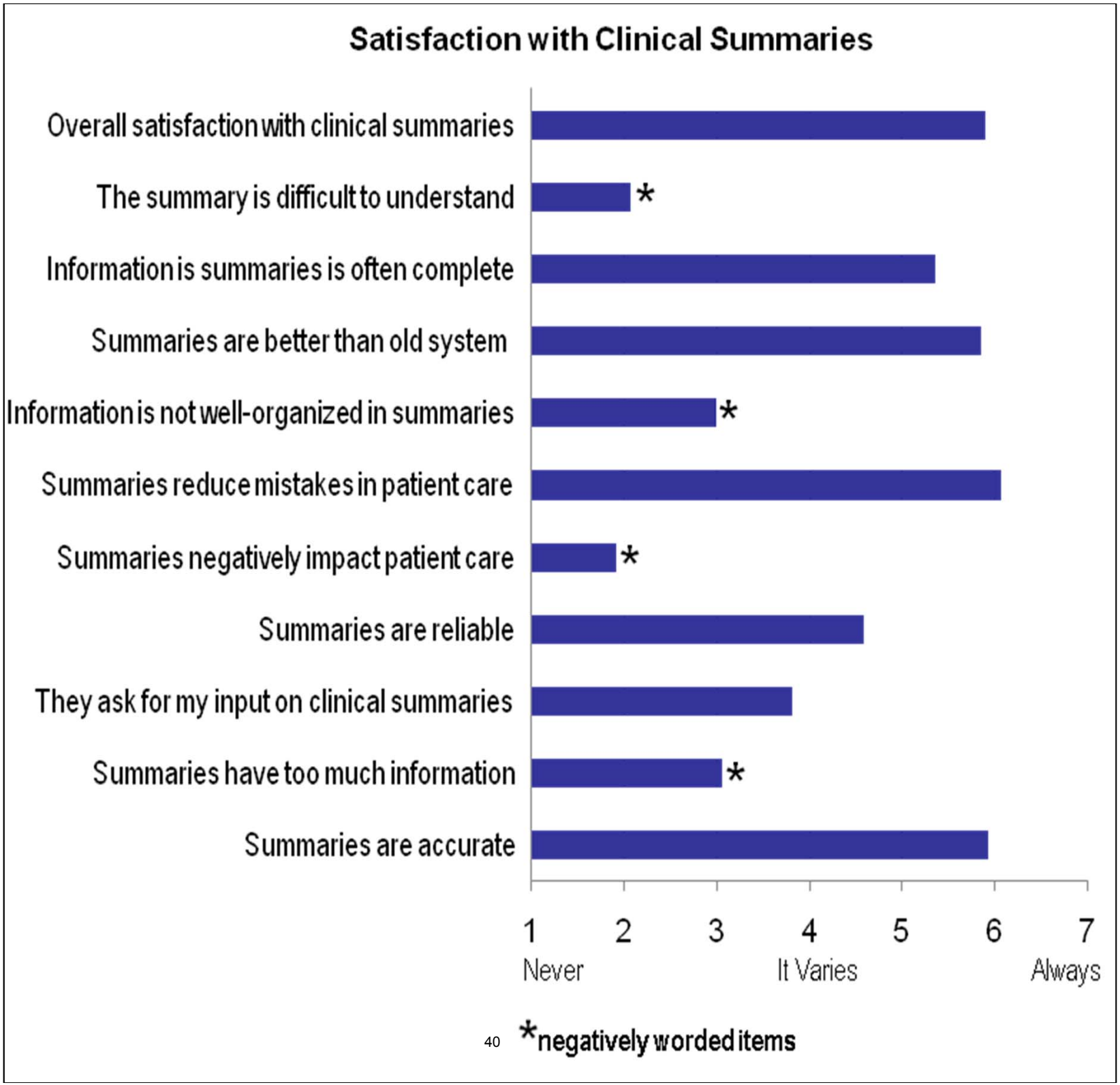
[b] **Indirect Patient Care**: Tasks include reading clinical summary or patient's chart, writing on encounter form or chart, prescribing medications, discussing patient's care on phone or with other providers.

Were MC, Shen C, *Bwana M, Emenyonu N, Musinguzi N, Nkuyahaga F, Kembabazi A,* ***Tierney WM.*** *Int J Med Inform. 2010;79(2):90-6.*

Table 6: Results of Mbarara Time-Motion Study: Patients*

Measure	Before N = 88	After N = 94	Difference
Time in registration	1.2	1.0	–0.2
Time with clinicians	7.7	6.4	–0.7
Time with other staff	42.3	61.3	+19.0
Time with pharmacy	1.7	11.6	+9.9
Miscellaneous activities	22.9	17.9	–5.0
Waiting	121.9	88.0	–33.9
Waiting for registration	0.3	0.0	–0.3
Waiting for clinicians	45.1	44.5	–0.6
Waiting for other staff	52.4	28.9	– 23.5
Waiting for pharmacy	24.1	14.6	–9.5
Total visit time	197.7	186.2	–11.5

* Time in mins / visit. observed. p-value <0.05 indicated by shading.


Satisfaction with Clinical Summaries
Overall satisfaction with clinical summaries
The summary is difficult to understand *
Information is summaries is often complete
Summaries are better than old system
Information is not well-organized in summaries *
Summaries reduce mistakes in patient care
Summaries negatively impact patient care *
Summaries are reliable
They ask for my input on clinical summaries
Summaries have too much information *
Summaries are accurate
1 2 3 4 5 6 7
Never
It Varies
Always
*negatively worded items

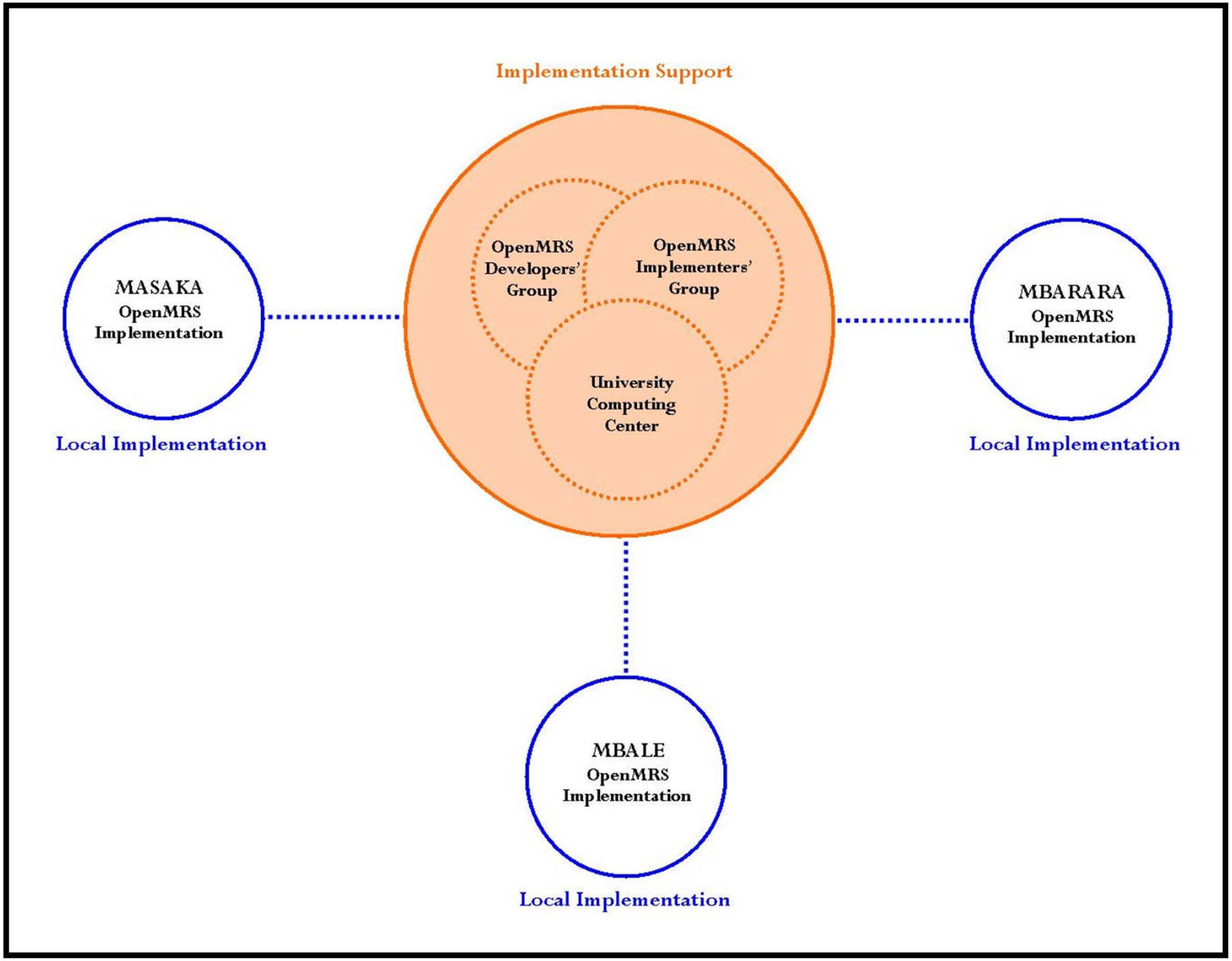
Considerations:

- What implementation models work well to reduce human-resource constraints and cost burden?

- What is the effect of the EHRs on how clinics function?

- Can we assess the impact of these systems on patient care?

Implementation Model



- Were MC, Emenyonu N, Achieng M, Shen C, Ssali J, Masaba JP, Tierney WM. "Evaluating a scalable model for implementing electronic health records in resource-

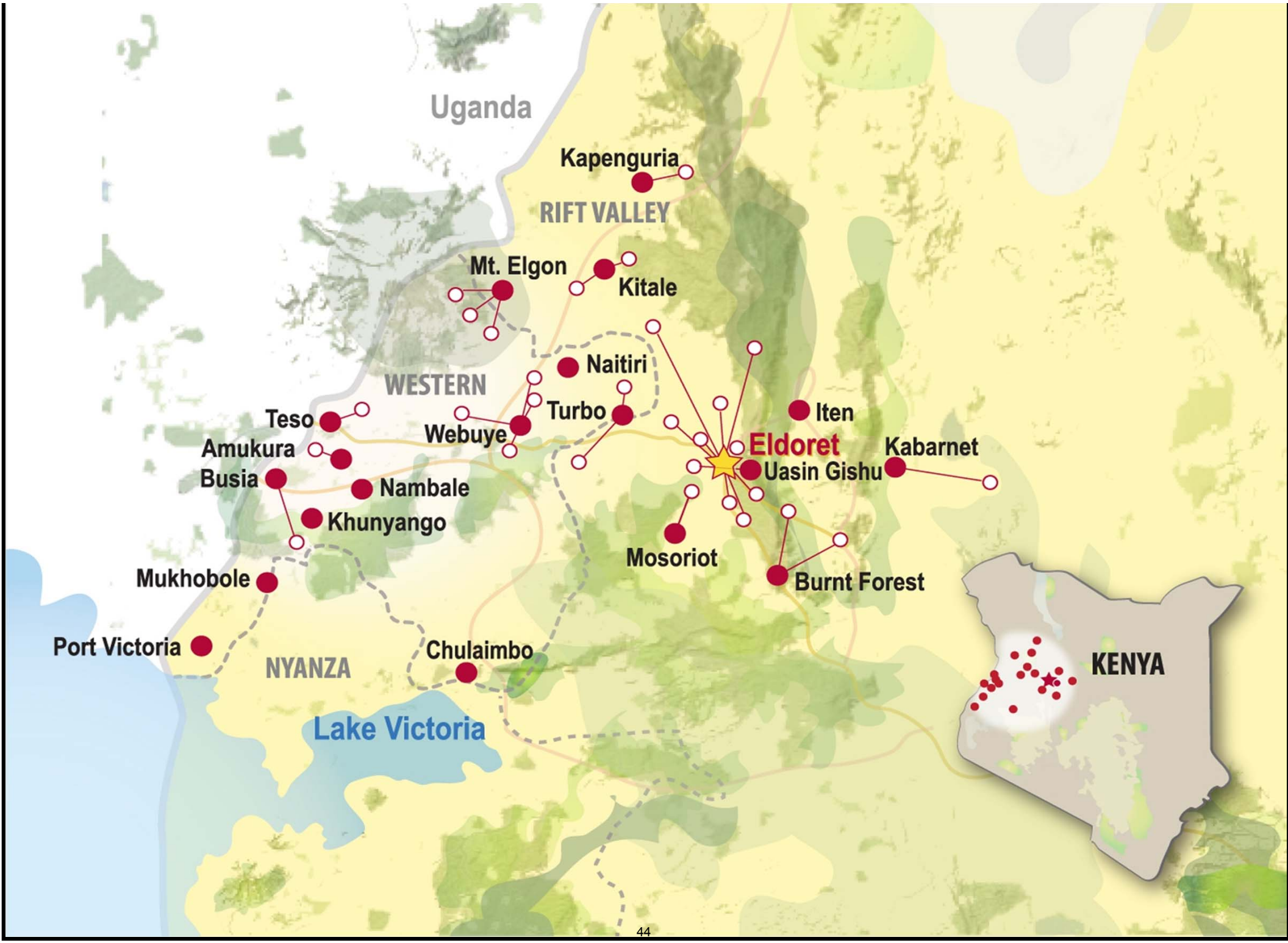
Clinical Decision Support:

Hypothesis:

EHRs-based reminders to clinicians can improve quality of care, compliance with guidelines, and patient safety in developing countries.

Element of QoC:

Do appropriate evaluation for patients.



Courtesy of USAID/AMPATH. Used with permission.

Adrian Gardner

Webuye AMPATH Clinic

AMPATH: Adult Return Visit Short Form **Date:**

1. Name: JOHN DOE | **AMPATH ID:** 123MT-2 | **Previous ID:**

2. Location: MTRH Module: ☒1 ☐2 ☐3 ☐4
Health Centre:
☐Mosoriot ☐Turbo ☐Burnt Forest
☐Amukura ☐Naitiri ☐Chulaimbo
☐Webuye ☐Kitale ☐Kapenguria
☐Teso ☐Other:

3. Category: ☐Pilot
☒MTRH Staff ☐MTCT Staff
☐NASCOP ☐Research
☐Self Pay ☐Other:
☐Awaiting Assignment

4. Member of Discordant Couple?
☐Yes
☒No
☐Unknown

☒Scheduled Visit ☐Unscheduled Visit

5. Female Patients:

5a. Is the patient pregnant? ☐ Yes ____Weeks
☒No (Go to 5b)

If yes: On ARV-directed pMTCT ☐Yes ☐No

5b. Has she delivered since her last visit? ☐Yes Date_____ ☐ No (Go to 6)
How was the mother treated? ☐Total pMTCT ☐NVP ☐Untreated ☐On ARV Therapy ☐Unknown
Infant received NVP? ☐Yes ☐No
Feeding Method? ☐Breast ☐Predominate Breast ☐Formula ☐Mixed feeding ☐Weaned
Baby enrolled in Peds HIV Clinic? ☐Yes ☐No

6. Does the patient have any interval complaints? ☒Yes ☐No
Comments: HEMOPTYSIS x 3 DAYS

7. Current Medications:

ARVs: ☒Yes ☐No Is this the patient's Primary Regimen? ☒Yes ☐No
☐Combivir ☒Triomune-30 ☐Triomune-40
☐3TC ☐d4T-30 ☐d4T-40 ☐AZT ☐ABC ☐DDI 125 ☐DDI 200 ☐TDF
☐EFV ☐NVP ☐NFV ☐Kaletra (Lopinavir/Ritonavir)

PCP Prophylaxis: ☒None ☐Septrin ☐Dapsone

TB Prophylaxis: ☐None ☒INH

TB Treatment: ☒None ☐Rifater (Rifampicin/Pyrazinamide/INH) ☐Rifafour ☐Ethambutol
☐Streptomycin ☐Ethizide (Ethambutol/INH) Start Date of TB treatment:_____

Cryptococcus Tx: ☒None ☐Diflucan

Other Drugs:

8. Adherence:

During the last month has the patient missed any medications? ☐Yes ☒No
☐ARVS ☐ PCP Prophylaxis ☐ TB Prophylaxis ☐Anti-TB Medication
Drugs Missed: Reason(s):

During the last seven days how many of his/her pills did the patient take?
☐ARVS: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐ PCP Prophylaxis: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐ TB Prophylaxis: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐Anti-TB Medication: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
Reason(s) for missing pills in the last 7 days:

9. Physical Exam:

BP 120/80 P 70 Temp 37 Wt 60 Height 172cm SaO_2 99%
General: ☐Jaundice ☐Pale ☒Adenopathy **Mucocutaneous:** ☐Thrush ☐Kaposi ☐Rash
Comments:

Courtesy of USAID/AMPATH. Used with permission.

AMPATH: Adult Return Visit Short Form — Date:

1. Name: JOHN DOE | AMPATH ID: 123MT-2 | Previous ID:

2. Location: MTRH Module: ☒1 ☐2 ☐3 ☐4
Health Centre:
☐Mosoriot ☐Turbo ☐Burnt Forest
☐Amukura ☐Naitiri ☐Chulaimbo
☐Webuye ☐Kitale ☐Kapenguria
☐Teso ☐Other:

3. Category: ☐Pilot ☒MTRH Staff ☐MTCT Staff ☐NASCOP ☐Research ☐Self Pay ☐Other: ☐Awaiting Assignment

4. Member of Discordant Couple? ☐Yes ☒No ☐Unknown

☒Scheduled Visit ☐Unscheduled Visit

5. Female Patients:

5a. Is the patient pregnant? ☐ Yes ____Weeks ☒No (Go to 5b) | If yes: On ARV-directed pMTCT ☐Yes ☐No

5b. Has she delivered since her last visit? ☐Yes Date_____ ☐ No (Go to 6)
How was the mother treated? ☐Total pMTCT ☐NVP ☐Untreated ☐On ARV Therapy ☐Unknown
Infant received NVP? ☐Yes ☐No
Feeding Method? ☐Breast ☐Predominate Breast ☐Formula ☐Mixed feeding ☐Weaned
Baby enrolled in Peds HIV Clinic? ☐Yes ☐No

6. Does the patient have any interval complaints? ☒Yes ☐No
Comments: HEMOPTYSIS x 3 DAYS

7. Current Medications:

ARVs: ☒Yes ☐No Is this the patient's Primary Regimen? ☒Yes ☐No
☐Combivir ☒Triomune-30 ☐Triomune-40
☐3TC ☐d4T-30 ☐d4T-40 ☐AZT ☐ABC ☐DDI 125 ☐DDI 200 ☐TDF
☐EFV ☐NVP ☐NFV ☐Kaletra (Lopinavir/Ritonavir)

PCP Prophylaxis: ☒None ☐Septrin ☐Dapsone

TB Prophylaxis: ☐None ☒INH

TB Treatment: ☒None ☐Rifater (Rifampicin/Pyrazinamide/INH) ☐Rifafour ☐Ethambutol ☐Streptomycin ☐Ethizide (Ethambutol/INH) Start Date of TB treatment:_____

Cryptococcus Tx: ☒None ☐Diflucan

Other Drugs:

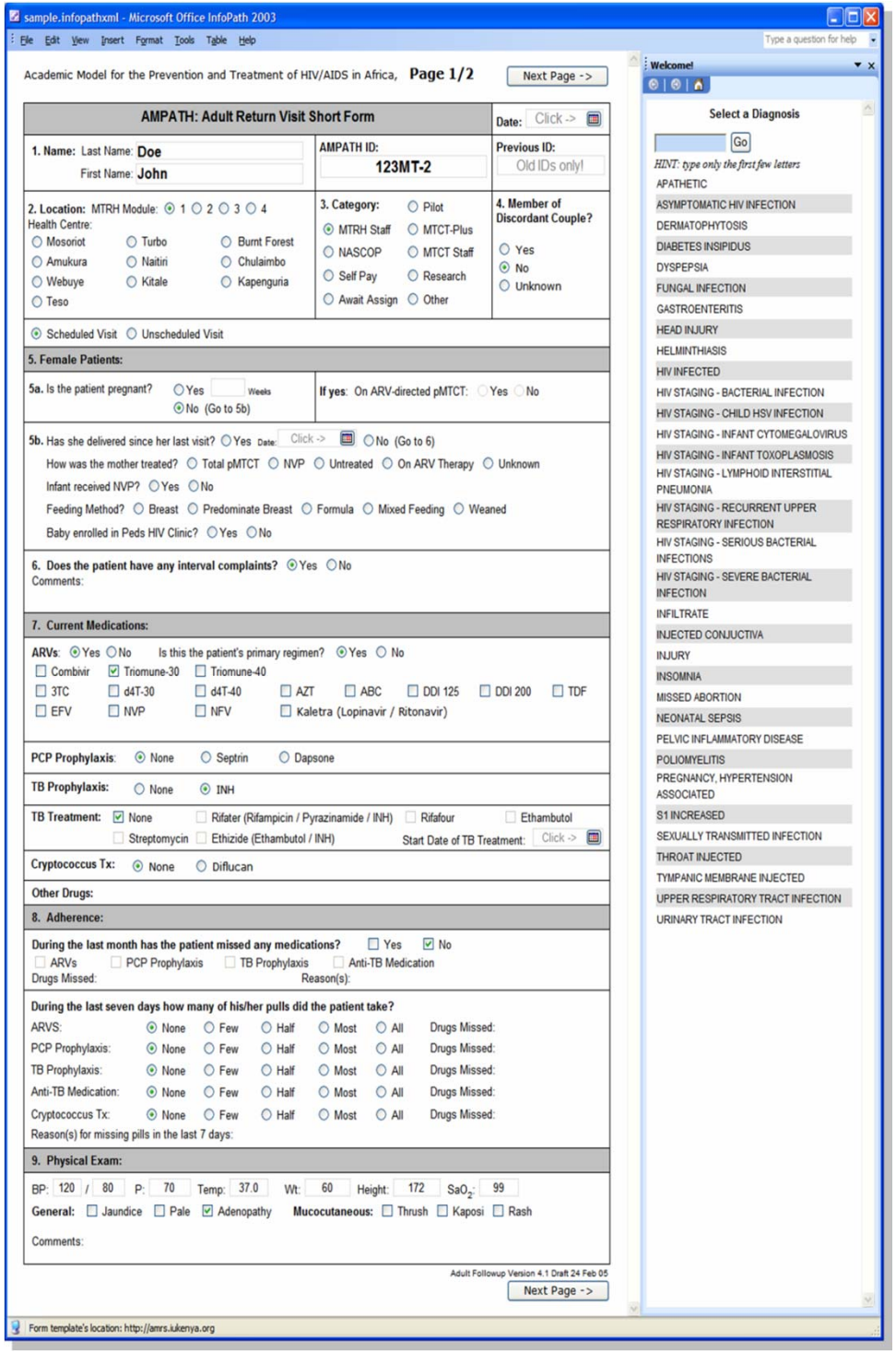
8. Adherence:

During the last month has the patient missed any medications? ☐Yes ☒No
☐ARVS ☐ PCP Prophylaxis ☐ TB Prophylaxis ☐Anti-TB Medication
Drugs Missed: Reason(s):

During the last seven days how many of his/her pills did the patient take?
☐ARVS: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐ PCP Prophylaxis: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐ TB Prophylaxis: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
☐Anti-TB Medication: ☒None ☐Few ☐Half ☐Most ☐All Drug(s) missed_____
Reason(s) for missing pills in the last 7 days:

9. Physical Exam:

BP 120/80 P 70 Temp 37 Wt 60 Height 172 cm SaO_2 99%
General: ☐Jaundice ☐Pale ☒Adenopathy **Mucocutaneous**: ☐Thrush ☐Kaposi ☐Rash
Comments:



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AMPATH Medical Record System Clinical Summary

Jane Doe **11111-1**

42 year-old female

First Encounter on 04-Oct-2004
WHO STAGE II
Perfect HIV Rx Adherence (past year): yes

Problem List:

1. CONJUNCTIVITIS, ALLERGIC *(17-Dec-2007)*
2. BRONCHITIS *(21-Aug-2007)*
3. PHARYNGITIS *(21-Aug-2007)*
4. PERIPHERAL NEUROPATHY *(04-Dec-2006)*
5. RESPIRATORY TRACT INFECTION, UPPER *(04-Dec-2006)*
6. COUGH *(11-Sep-2006)*
7. VAGINITIS *(14-Jul-2006)*
8. TONSILLITIS *(20-Apr-2006)*

Recent ARVs and OI Meds:

1. NEVIRAPINE
2. LAMIVUDINE
3. d4T-30

Flowsheet:

WEIGHT (KG)	HGB	CD4	VIRAL LOAD	SGPT
47.0 *24-Aug-2004*	12.9 *05-Aug-2004*	277.0 *05-Aug-2004*		119.8 *17-Feb-2005*
47.0 *21-Aug-2007*	13.9 *11-Sep-2006*	271.0 (25.0%) *16-Mar-2006*		35.1 *11-Sep-2006*
46.0 *22-Oct-2007*	15.0 *03-Jan-2007*	575.0 (31.0%) *14-Jul-2006*		62.5 *02-Jan-2007*

Chest X-ray: (check chart as needed for results prior to 14-Feb-2006)
:

Please order CD4 count now (last CD4 ordered over 12 months ago)

Last seen 18-Feb-2008 at MTRH Module 2
Printed on 2008-02-21 at 12:30:39

11111-1

Why CDSS can fail in this setting:

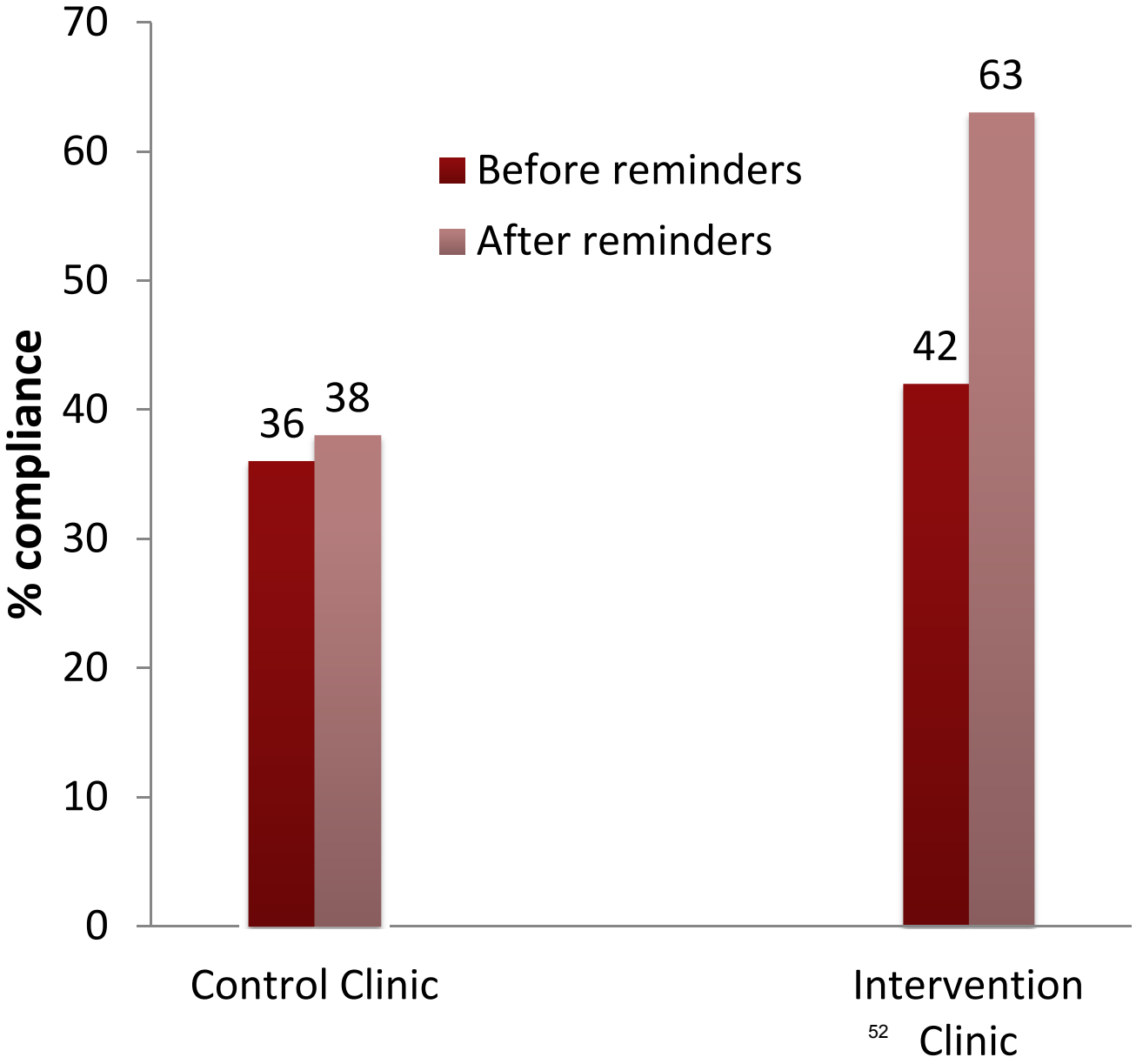
- Unreliable generation of summaries & reminders
  - Poor infrastructure: power, printers, viruses.
  - nurses too busy to print summaries.
- Inaccurate reminders
  - Lab results in paper but not in EHRs.
  - Errors on encounter forms, and with data-entry.
  - Delayed data entry.
- Providers ignoring accurate reminders
  - Rote practice patterns or unaware of approved guidelines.

- Noormohammad SF, Mamlin BW, Biondich PG, McKown B, Kimaiyo SN, Were MC. IJMI 2010;79(3):204-10.

Clinical Summaries with Reminders

- Clinical summaries with reminders available to >50,000 AMPATH patients (21 sites) at the time of visit.
- Include Adult HIV, Pediatric HIV, and Antenatal Care summaries.
- > 30 Adult and Pediatric reminders currently implemented.
- Work supported by Abbott Fund.

Impact of computer-generated care suggestions on compliance with CD4 testing algorithms



Were MC, Shen C, Tierney WM, Mamlin JJ, Biondich PG, Li X, Kimaiyo S, and Mamlin BW. JAMIA 2011.

Elements of Quality Care

- Recognize patients at risk for diseases.
- Do appropriate evaluation.
- Make the appropriate diagnosis.
- Start the appropriate treatment.
- Schedule the appropriate follow-up.
- Stimulate the appropriate adherence to treatment.

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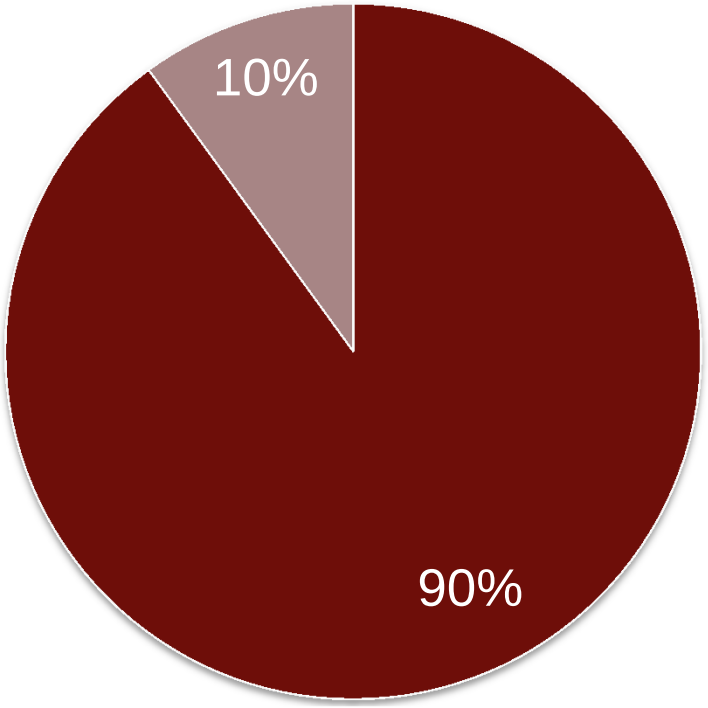


Only 12% of men and 10% of women in sub-Saharan Africa know their HIV-status.

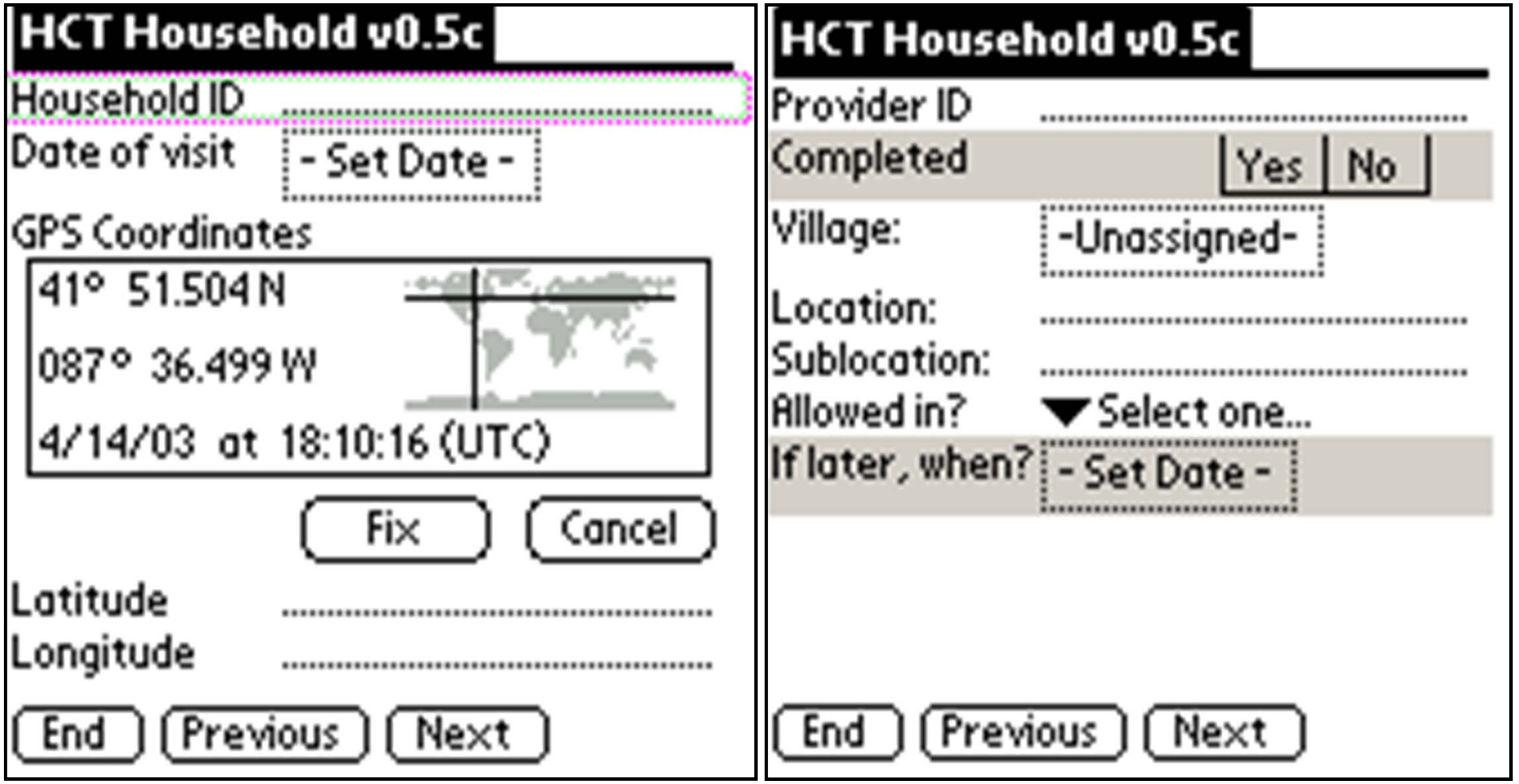
- USAID-AMPATH's home visit program:
  - Visit all 2 million individuals in catchment area.
  - Collect basic health information.
  - Offer focused care services.
- Typically, records collected during such visits could have been paper-based.
- Hypothesis:

  We can completely leapfrog paper-based records, and create electronic health records (EHRs) for each home-based clinical visit.

- Goals of Home Visits:
  - Identify HIV-positive pts unaware of their status.
  - Offer care services to identify patients as needed.
  - Identify pregnant women not receiving antenatal care.
  - Identify orphaned and vulnerable children.
  - Identify children without appropriate immunizations.
  - Identify individuals at risk for TB.
  - Provide rapid HIV testing.
  - Sputum testing for TB.
  - Provide de-worming medications.
  - Provide bed nets to families.

- Developing Handheld Program:
  - Engaged stakeholders.
  - Identified data elements to be collected.
  - Understood workflow and testing algorithms.

Household Information



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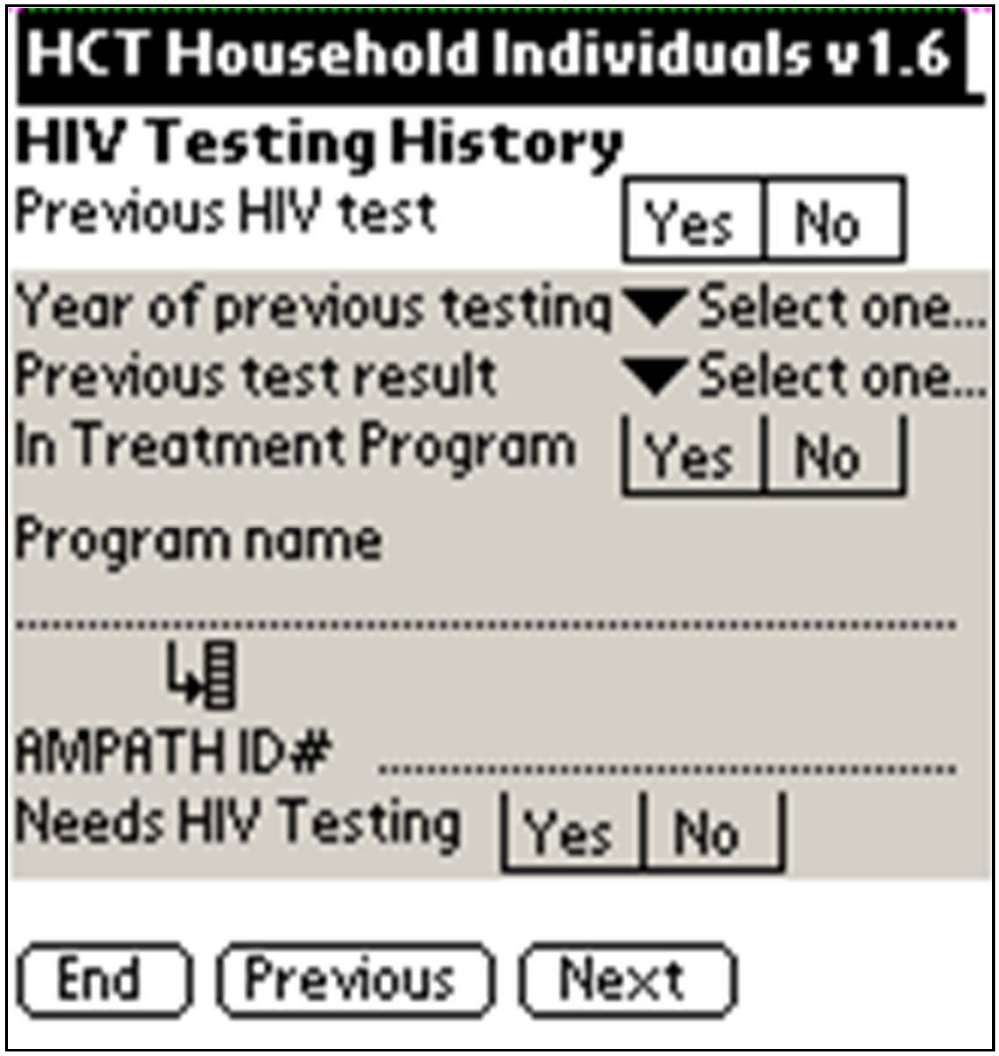
HIV Module



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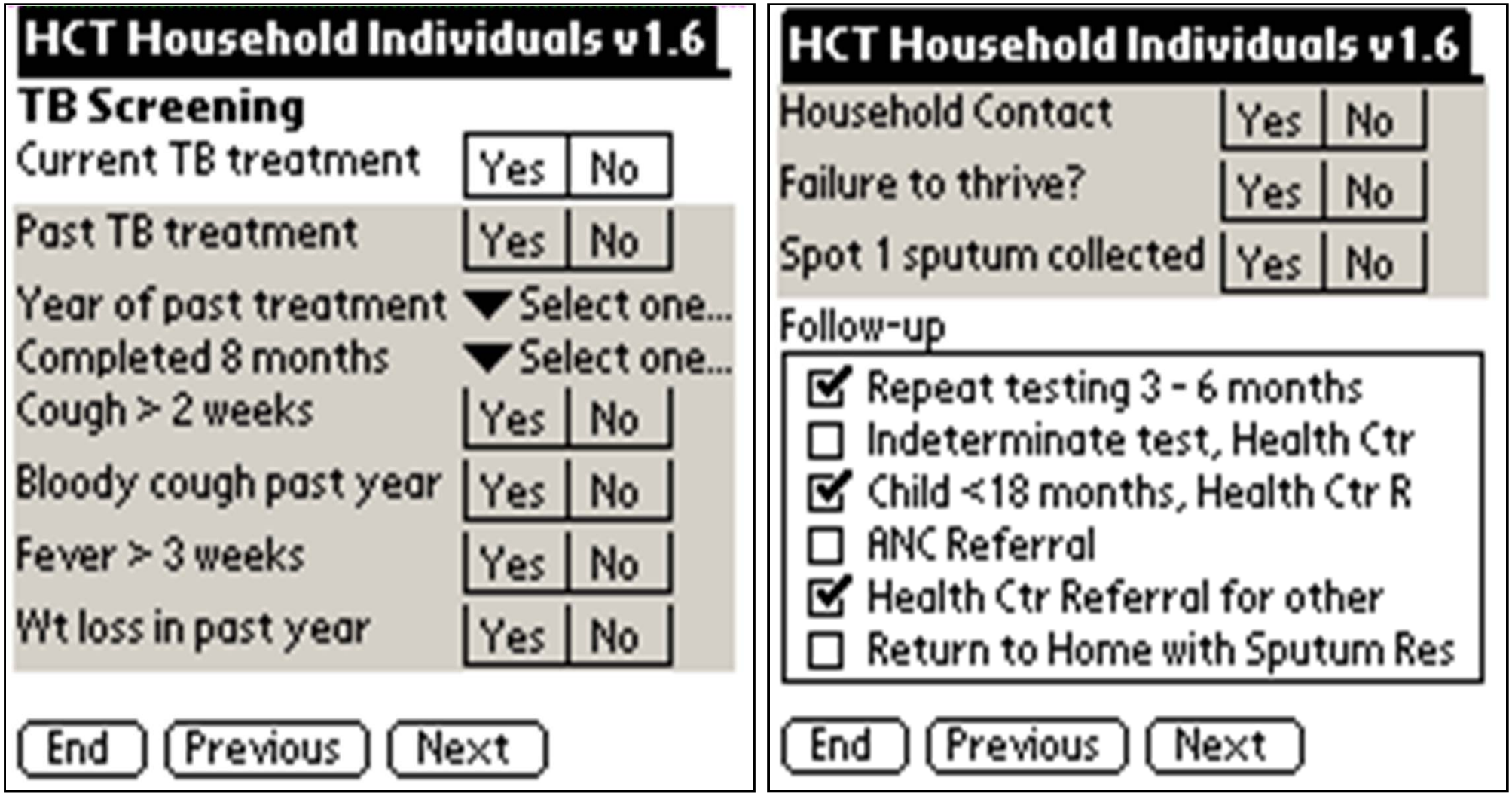
TB Module



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Palm T|X and Garmin e-trex Devices

Photo showing connected devices removed due to copyright restrictions.

Community Mobilization

Courtesy of USAID/AMPATH. Used with permission.

HCT Counselors

Courtesy of USAID/AMPATH. Used with permission.

Door-To-Door HCT

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HCT Counseling

_DSC6317.JPG

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HCT Testing

_DSC6333.JPG

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HCT Testing

_DSC6344.JPG

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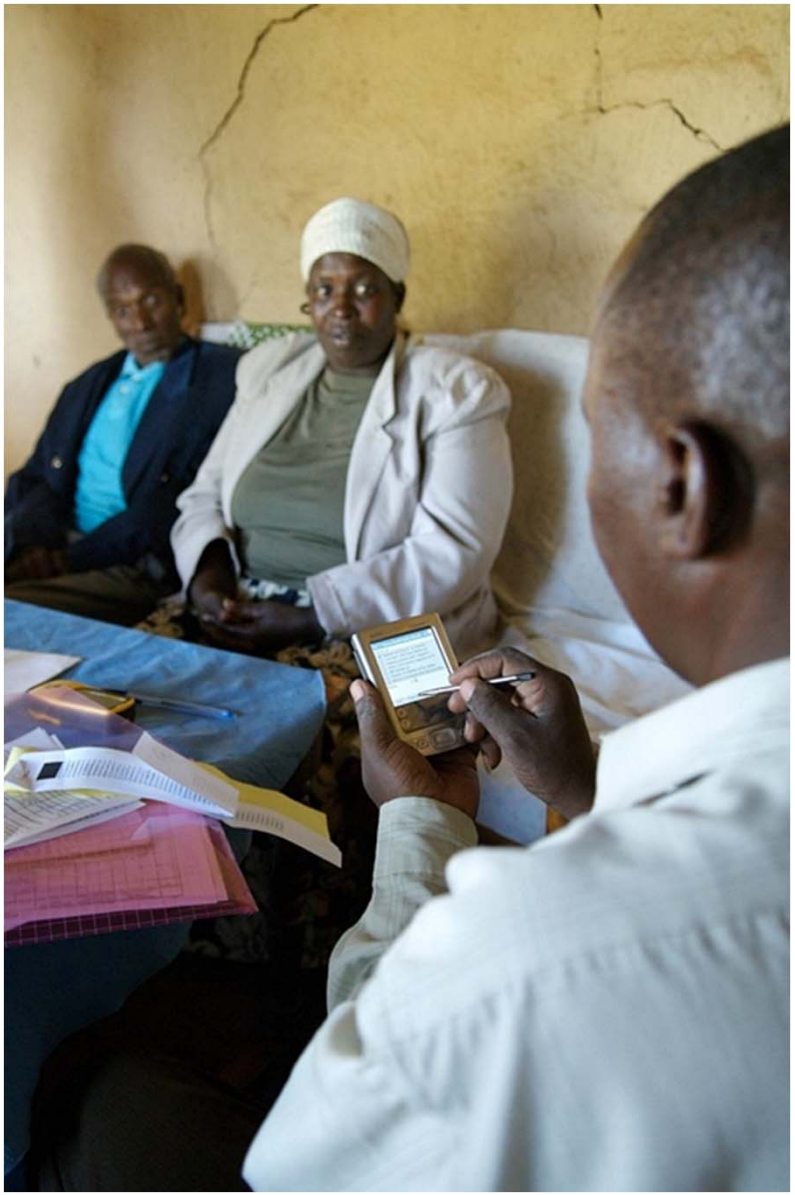
HCT and Handheld Technology



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Results:

- Jul-Oct 2008:
  - 93 CHWs visited 14,648 households.
  - 40,111 people (55% female, 26% < 13 years old) had electronic records created.
  - 403 of 899 (45%) pregnant women identified were not receiving antenatal care.
  - 1,131 HIV+ pts identified. 693 (61.3%) were new diagnoses.
  - 376 individuals had been exposed to or had symptoms suggestive of tuberculosis – sputum samples collected.

Cost of Technology:

- 2 million tested in 3 yrs (2,565 / day in 780 workdays).
- 320 sets of PDA/GPS devices @ $573 per set.

Item	Cost
320 GPS/PDA/Cable Devices/Pendragon Licenses	$183,360
18 PCs @ $1,500 each	$27,000
Programming time 1-month	$1,500
IT person (50% FTE) for 3 yrs	$22,000
Data Assistants (2 FTEs) for 3 years	$45,000
Data Manager (50% FTE) for 3 years	$22,000
Training on technology for counselors & HCT staff	$1,000
TOTAL	**$301,860**

Cost of Technology:

- With PDA/GPS - $301,860 for 2 million people.
  $0.15 per individual seen or per record created by CHW.

Compare to:

- Manual data entry:
  Current pay is $17 / day to enter ~ 80 encounter forms.
  $0.21 per encounter form entered.

Improving Technology

+

+

- Built Open-Source HCT software (ODK).
- Use single device with GPS, bar-coding, and camera.
- HCT data stored in an instance of OpenMRS.
- Providing ‘Universal’ IDs during HCT.

Nothing is Easy

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Bringing Care to Individuals

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Improving Access & Awareness

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Five-Stage Framework for Evaluation of HIT Projects

(1) Problem definition.

(2) Bench testing in the laboratory.

(3) Early field trials under the direct control of the original investigator.

(4) Field testing in new or unfamiliar settings.

(5) Definitive study of the system's efficacy during routine operational use.

- Stead WW, Haynes RB, Fuller S, et al. Designing medical informatics research and library--resource projects to increase what is learned. J Am Med Inform Assoc 1994;1(1):28-33

Thank you.

Country	Australia	Canada	Germany	New Zealand	Britain	United States
Overall ranking (2007)	3.5	5	2	3.5	1	6
Quality of care	4	6	2.5	2.5	1	5
Access	3	5	1	2	4	6
Efficiency	4	5	3	2	1	6
Equity	2	5	4	3	1	6
Healthy lives	1	3	2	4.5	4.5	6
Health expenditures per capita (2004)	$2,876*	$3,165	$3,005*	$2,083	$2,546	$6,102

**2003 data; Source: The commonwealth fund*

Image by MIT OpenCourseWare. Source: The Commonwealth Fund. * 2003 data.

Masaka Clinic

- Funded by Uganda National AIDS control Program
- 5,100 HIV +ve patients
- Care by MDs, Nurse Practitioners and Clinical Officers (CO).
- Hand-written free-text paper records
- No patient scheduling system

Mbarara Clinic

- Funded by Uganda National AIDS control Program
- 11,000 HIV +ve patients
- Care by MDs only.
- Structured paper-based encounter forms with coded answers used
- No patient scheduling system

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