Can resource poor HIV/TB programs afford not to embrace technology?

Smart investment in IT and mHealth

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Founding and Managing Director Right to Care

Rapidly expanding mobile networks and IT infrastructure provides an opportunity……

- South Africa has more cellphones than the total population
- 85% of indigent patients attending DoH clinics have cellphones

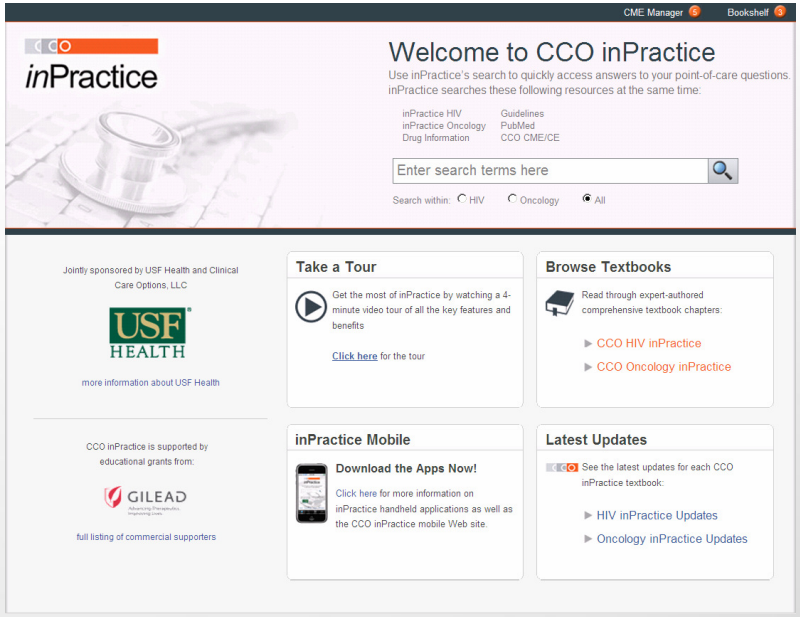
- Health care personnel shortages – require task-shifting and cost efficient systems
- Novel technologies address electricity and IT infrastructure constraints

Cellphones for adherence and LTFU – "Mambo? – How are you?"

- Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): *Richard T Lester Lancet:10.1016/S0140-6736(10)61997-6*
- Randomized trial SMS intervention
  - Weekly "Mambo?"; patient response "Sawa" (everything is fine) or "Shida" (I have a problem)
  - Outbound call
  - Kenya May 2007 to Oct 2008
  - SMS intervention (n=273) vs. standard of care (n=265)
- Adherence to ART was improved
  - 168 of 273 pts in SMS intervention arm vs.132 of 265 in the control arm (RR = 0·81; 95% CI = 0·69–0·94; p=0·006)
- The risk of virologic failure was lowered
  - (RR for virologic failure 0·84, 95% CI 0·71–0·99; p=0·04).

Opportunities to link rural, resource poor sites with available training systems and certification

- Conference and training programs available on-line
  - CROI, International AIDS Society – conference summaries
  - Educational software – CCO inPractice™ searchable,
    HIV e-textbook
- Key training requirements
  - Multidisciplinary, interactive,
  - Mentorship
  - Clinical problem solving
  - Dissemination of new guidelines
- Certification, monitoring use

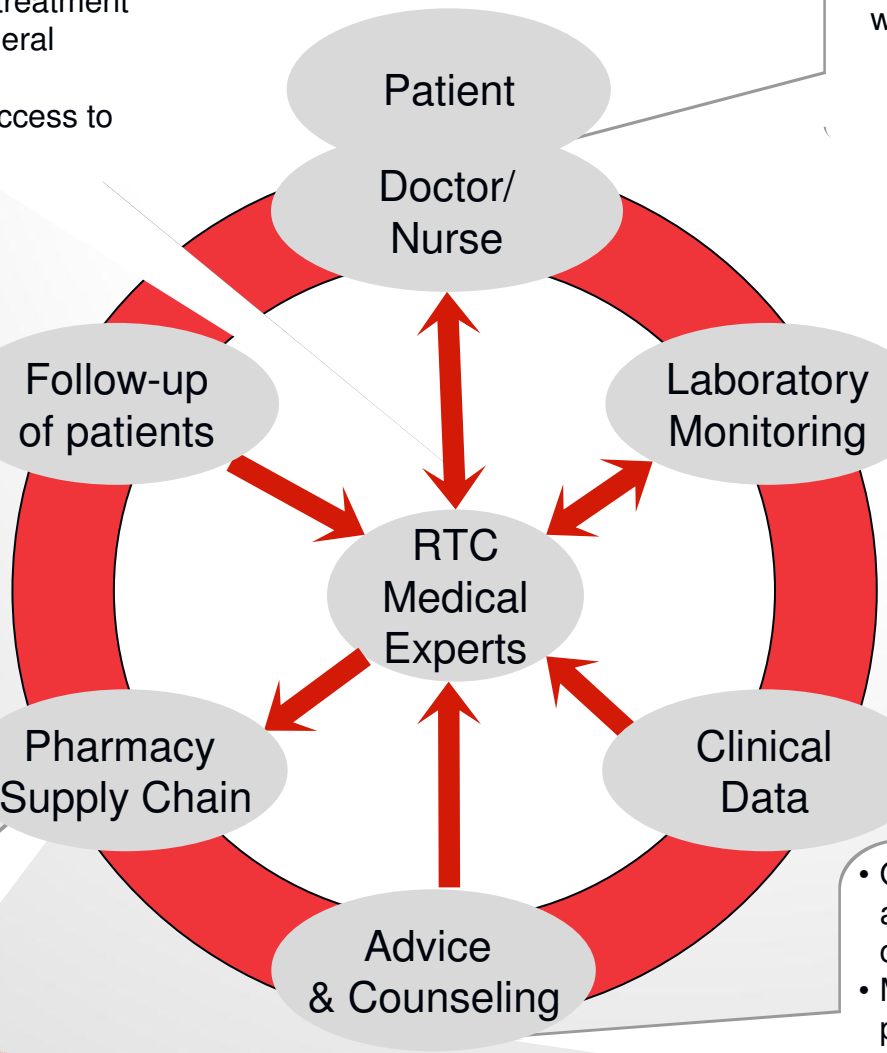


Ref: CCO HIV inPractice: http://inpractice.com

PEPFAR supports Right to Care in the following program areas ….

- Prevention:
  - Education, community mobilization, condom, HCT
  - Male Medical Circumcision
  - Prevention of MTCT
- Treatment, care and support:
  - Adult and Paediatric Wellness and ART programs
  - TB HIV Integration
  - Cervical Cancer screening and treatment
- Innovation
  - Development of IT systems to manage program and clinics
  - Development of new diagnostic algorithms
  - Use of data to improve treatment programs
- Health Systems Strengthening and Capacity Dev.

Implementation on a simple philosophy



- Link centralized treatment experts to peripheral treatment sites
- Includes direct access to specialist care

- RTC supports clinical sites in a wide variety of settings:
  - Public
  - Non-government
  - Private

- Public sector provision by NHLS
- Private sector multiple suppliers

- Clinical Data is collected
- Distant case management
- Hybrid model
- "Live"

- Onsite counseling advice through community counselors
- Medical and psychological support available via 24 hour call centre

- Capacity development of pharmacist
- Courier pharmacy for distant sites
- Buffer stock

- Transition to care
- Loss to treatment initiation
- Loss to follow-up

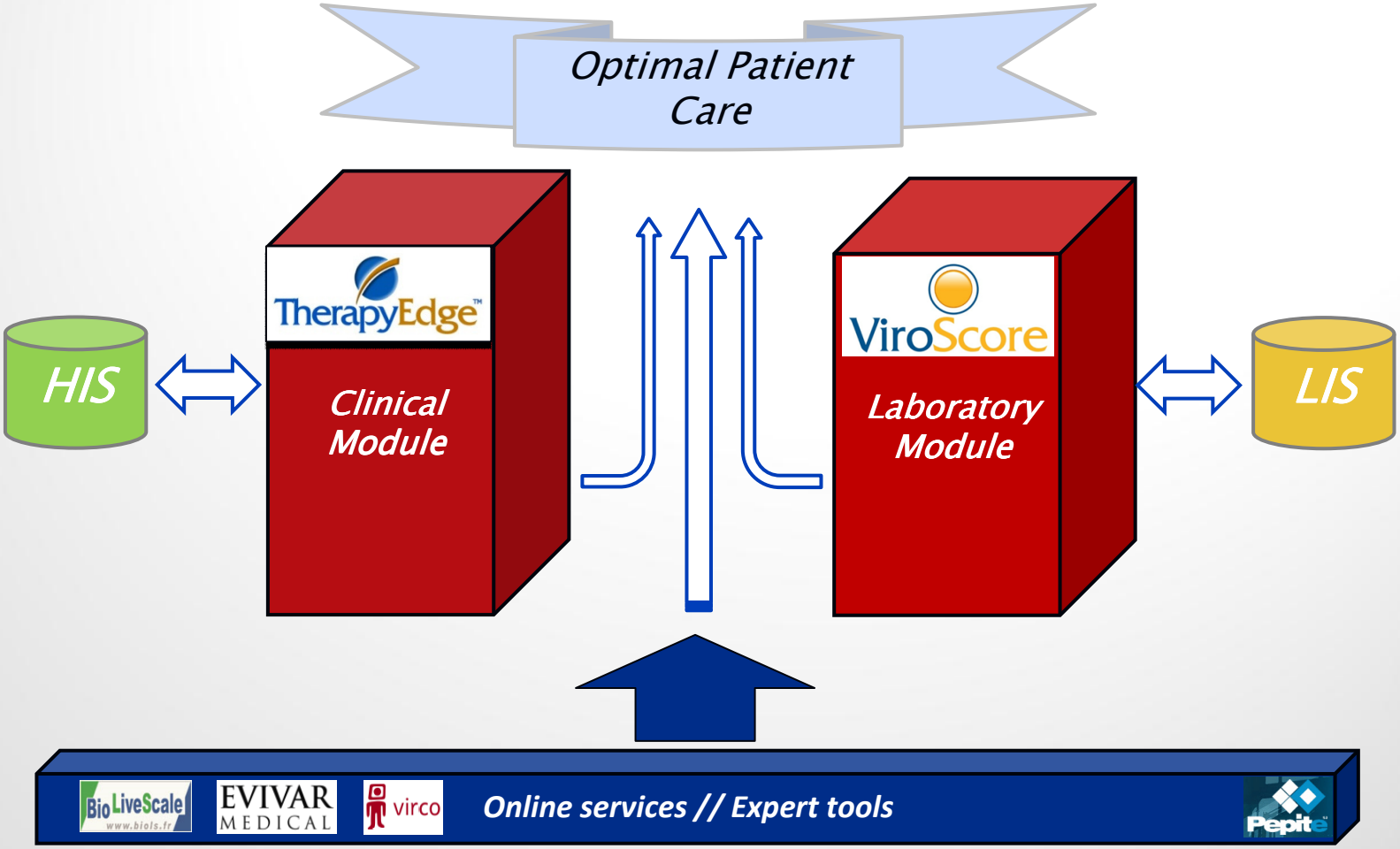
An integrated HIV/TB Management System

- Web linked relational database
- Data entry using a single screen (RapidCapture)
  - Real time interactive Electronic Medical Record (EMR)
  - Also suited to paper system with remote data capturing
- Medical decision support
  - Alert function *(e.g. drug interaction, scripting errors, Allergies, Dosing adjustments)*
  - Decision support, drug information and guidelines

    Decreases time spent by saturated specialists and leverages them to maximize volumes

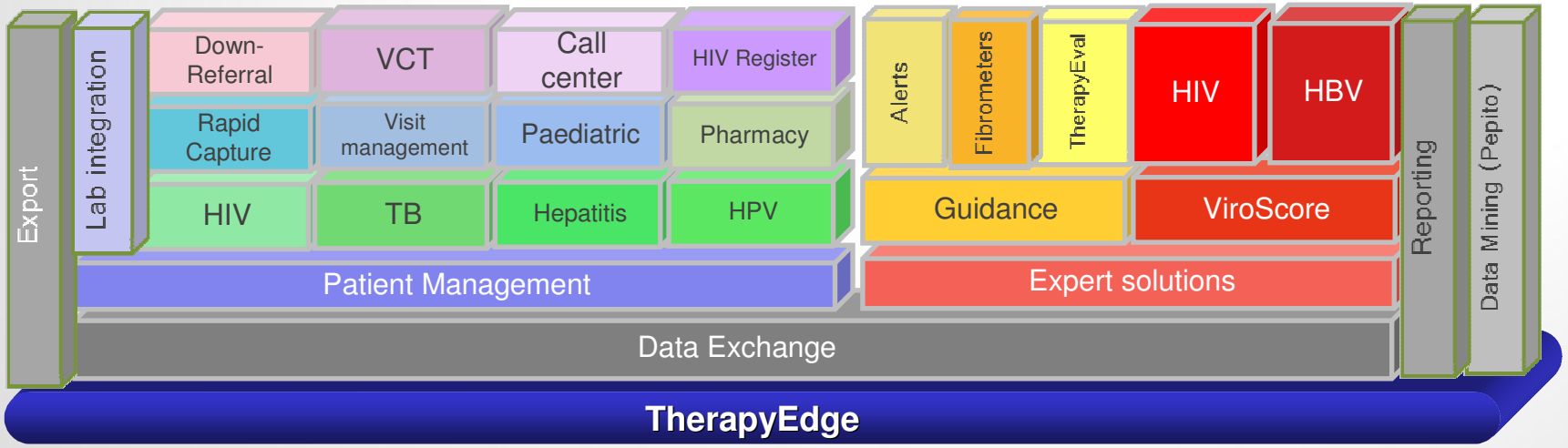
    Quality scripting, Evaluates therapy as part of ongoing education for clinicians
- Integrated with ICD10 classification of diseases and drug databases
- Down Referral, Paediatric Module, TB Module
  - Automated reporting (South African Government, PEPFAR)
- Export facility (Statistical, Economics and Epidemiologic Analysis)

Key features for implementation are – Interoperability and Integration



TherapyEdge™ main modules & solutions

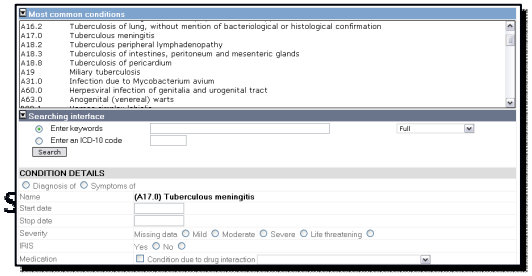
- Development undertaken supported by USAID/PEPFAR and RTC
- Development emphasis on clinical → administration



Data System – Key features of TE-HIV

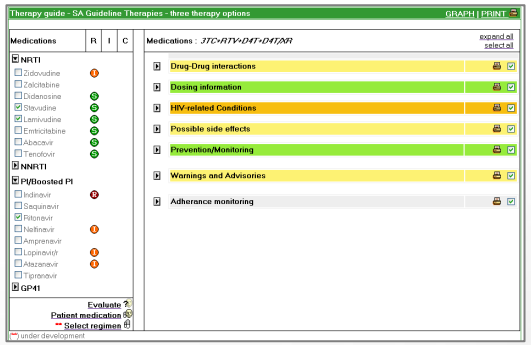
Complete patient chart

- Demographics
- Labs results
- Treatments
- Clinical conditions
- Visits
- …



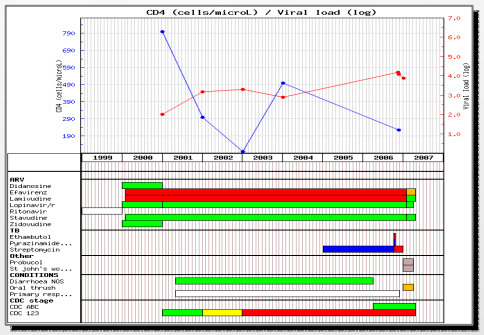
Decision support

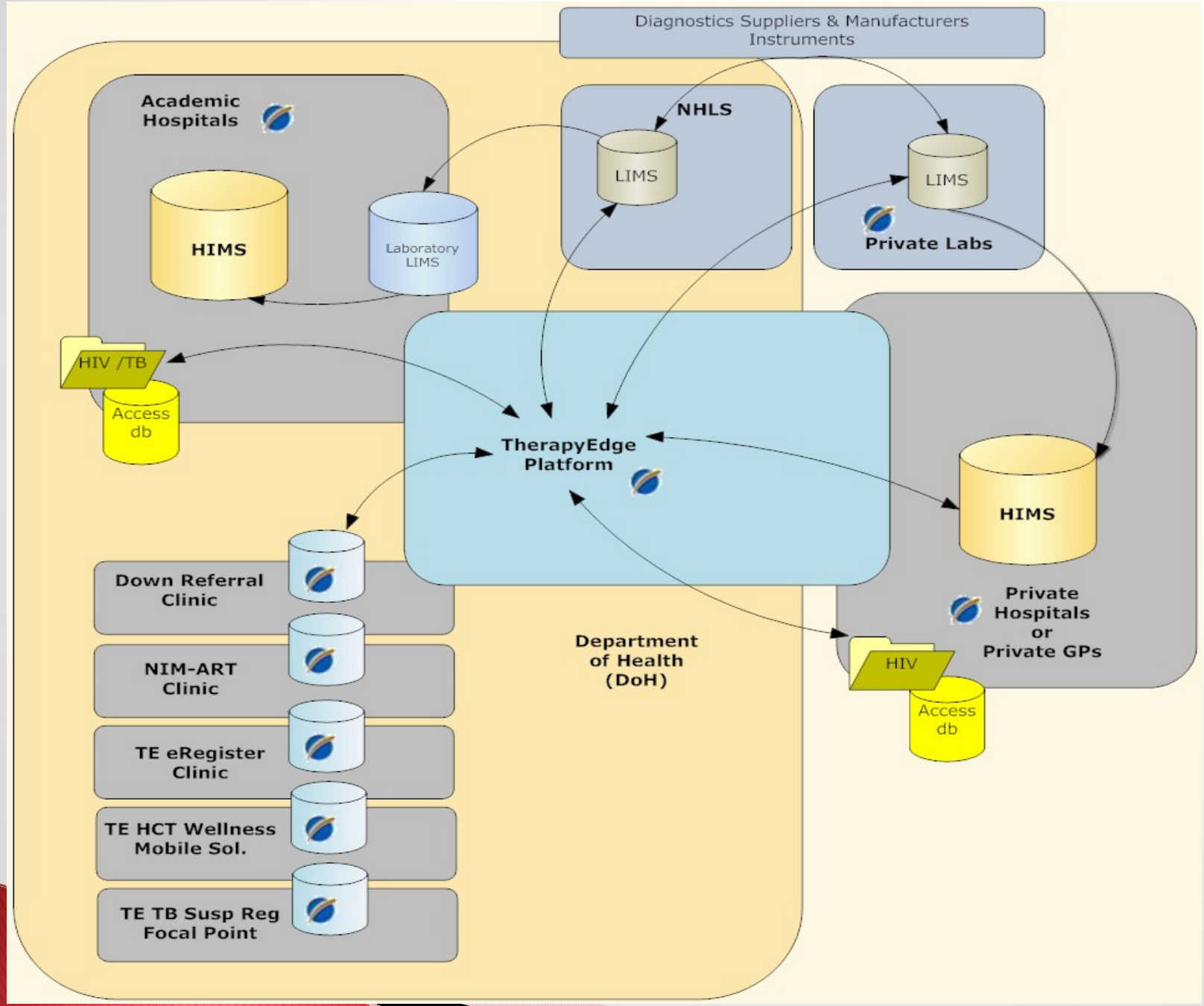
- Real time alert system
- Evaluate therapies through TherapyEval



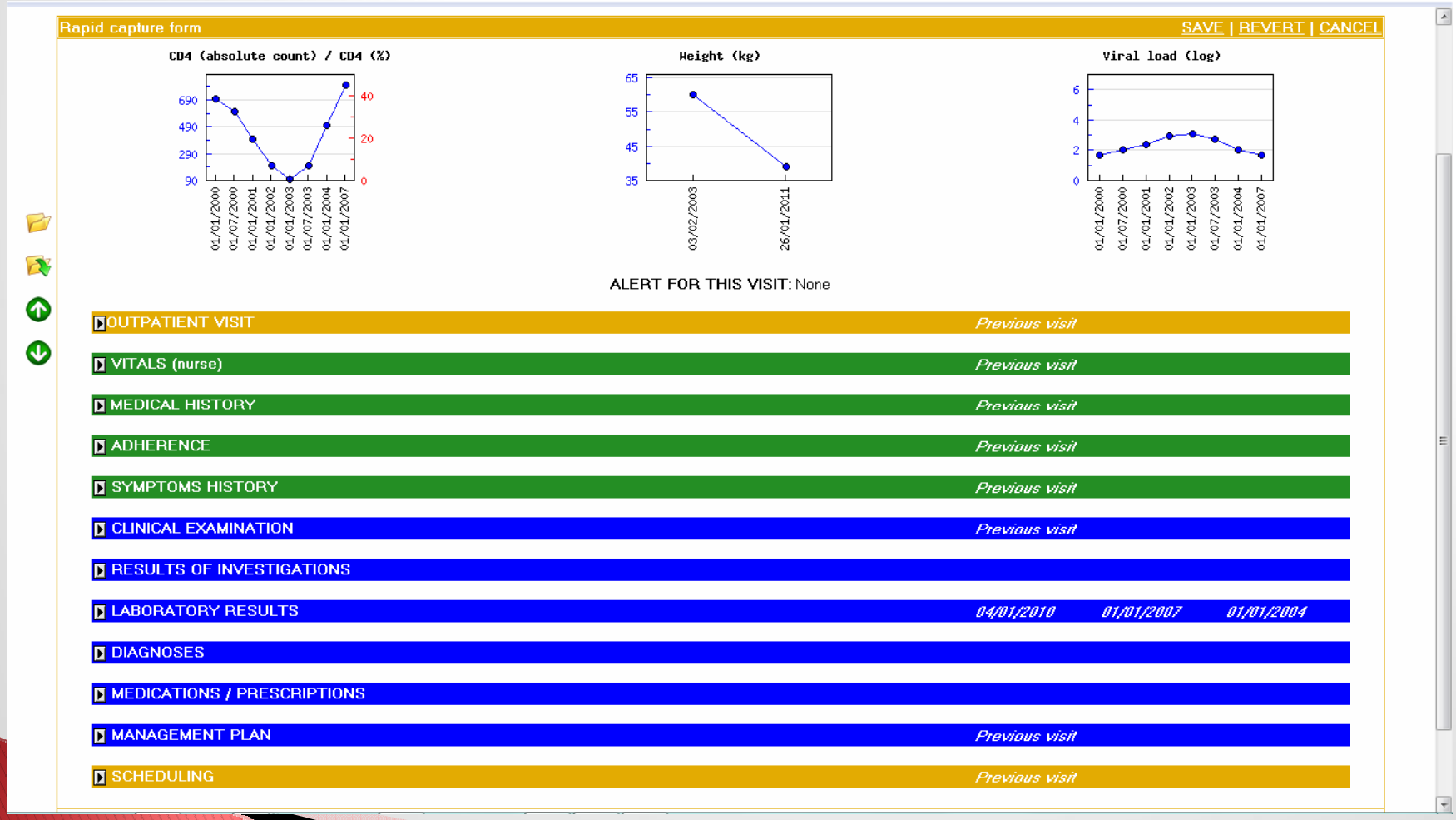
Data exchange / output

- Strong reporting (Pepfar…)
- Printouts / graphs
- Query builder
- HL7 / XML / CSV data exchange




Diagnostics Suppliers & Manufacturers Instruments
Academic Hospitals
HIMS
Laboratory LIMS
NHLS
LIMS
LIMS
Private Labs
HIV /TB
Access db
TherapyEdge Platform
HIMS
Private Hospitals or Private GPs
HIV
Access db
Down Referral Clinic
NIM-ART Clinic
TE eRegister Clinic
TE HCT Wellness Mobile Sol.
TE TB Susp Reg Focal Point
Department of Health (DoH)

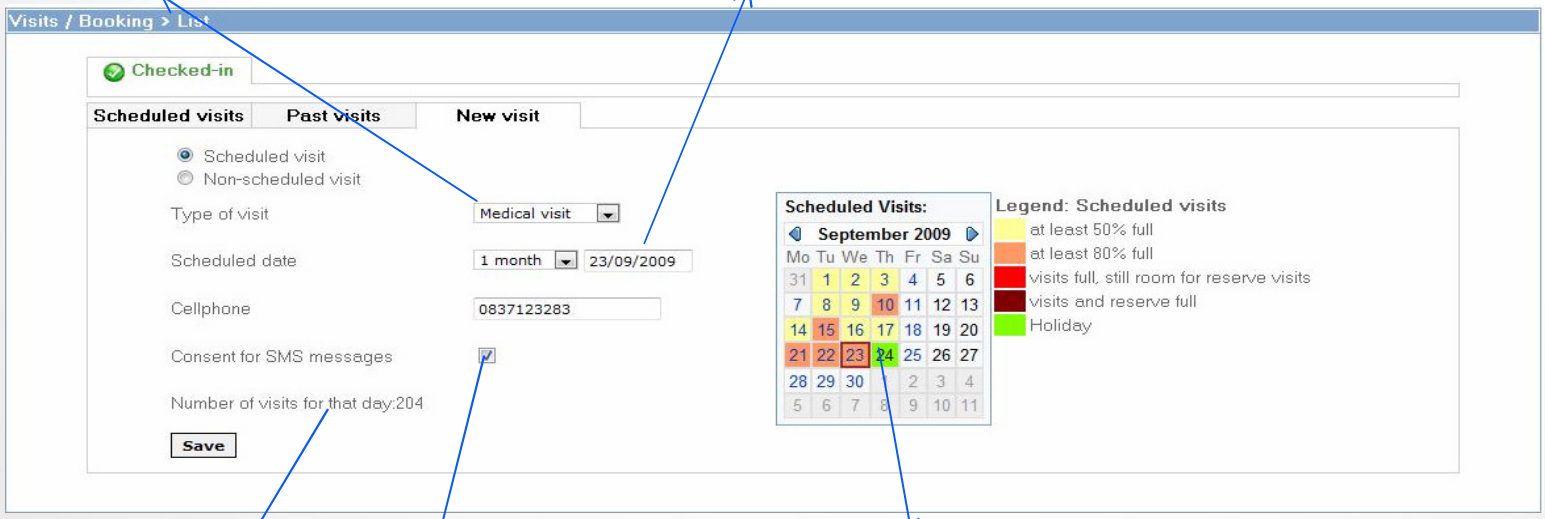
Rapid capture and “task-shifting”



Booking & SMS reminders – reduces LTFU

Different visits can be scheduled

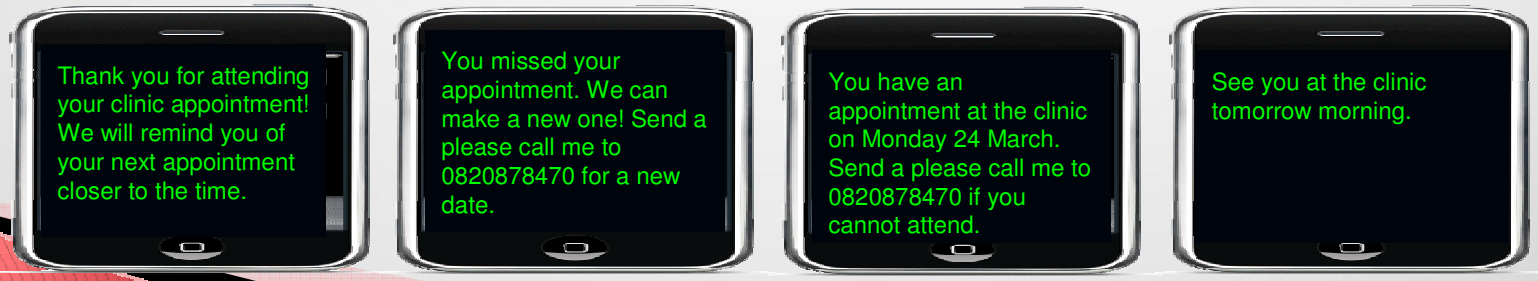
Suggested date given by medical staff



Consent for SMS

Colors to easily view availability in clinic

Number of booking for selected day



TherapyEdge: Reporting

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ROUTINE MONTHLY DATA INPUT FORM — Period: 01/01/2009 - 01/08/2009

Sub-Dis: 53-Training POOL — Completed by: — Sign:

Facility: — Verified by: — Sign:

No	DataElement	Source	Value	Comment
DORA - Laboratory				
1	Blood drawn for CD4 test	DORA	0	
2	CD4 test result turn around time of 6 days or less	DORA from blood book/register		
3	CD4 test result turn around time over 6 days	DORA from blood book/register		
DORA - ART assessment				
4	ART assessment first visit	DORA	3	
5	ART assessment follow up visit attended	DORA	4	
6	ART assessment patient - medically eligible	DORA	1	
7	Eligible ART assessment patient - known death male	DORA	0	
8	Eligible ART assessment patient - known death female	DORA	0	
9	Eligible ART assessment patient - known death HIV positive pregnant woman	DORA	0	
DORA - Registered ART patients				
10	Registered ART patient - ART start	DORA	2	
11	Registered ART patient - transferred in new	DORA	0	
12	Registered ART patient - total	DORA (Add data elements 10 and 11 for total)	2	

- DORA Indicators
- PEPFAR Reporting
- Lost to Follow up/Missed appointments
- Scheduled patients
- Dispensing – Down referral
- Data verification
- Clinical verification
- Customized reports
- Full data export

Key attributes that contribute to success

- Simple user interface – enabling and improving patient doctor/nurse interaction
- Integration of laboratory results NHLS – leading to improved result retention
- Decision support according to in-country guidelines
- Linkage to training platforms – in service training
- Health Systems Strengthening
  e.g. Down Referral; TB/HIV integration
- Monitoring evaluation, budget, supply-chain management
- Platform enables mHealth integration

Right to care

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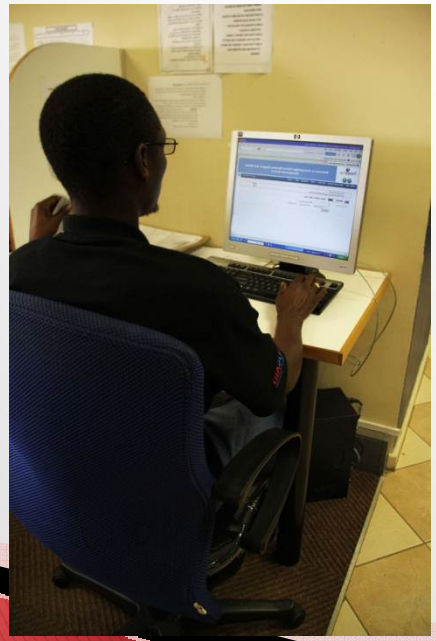
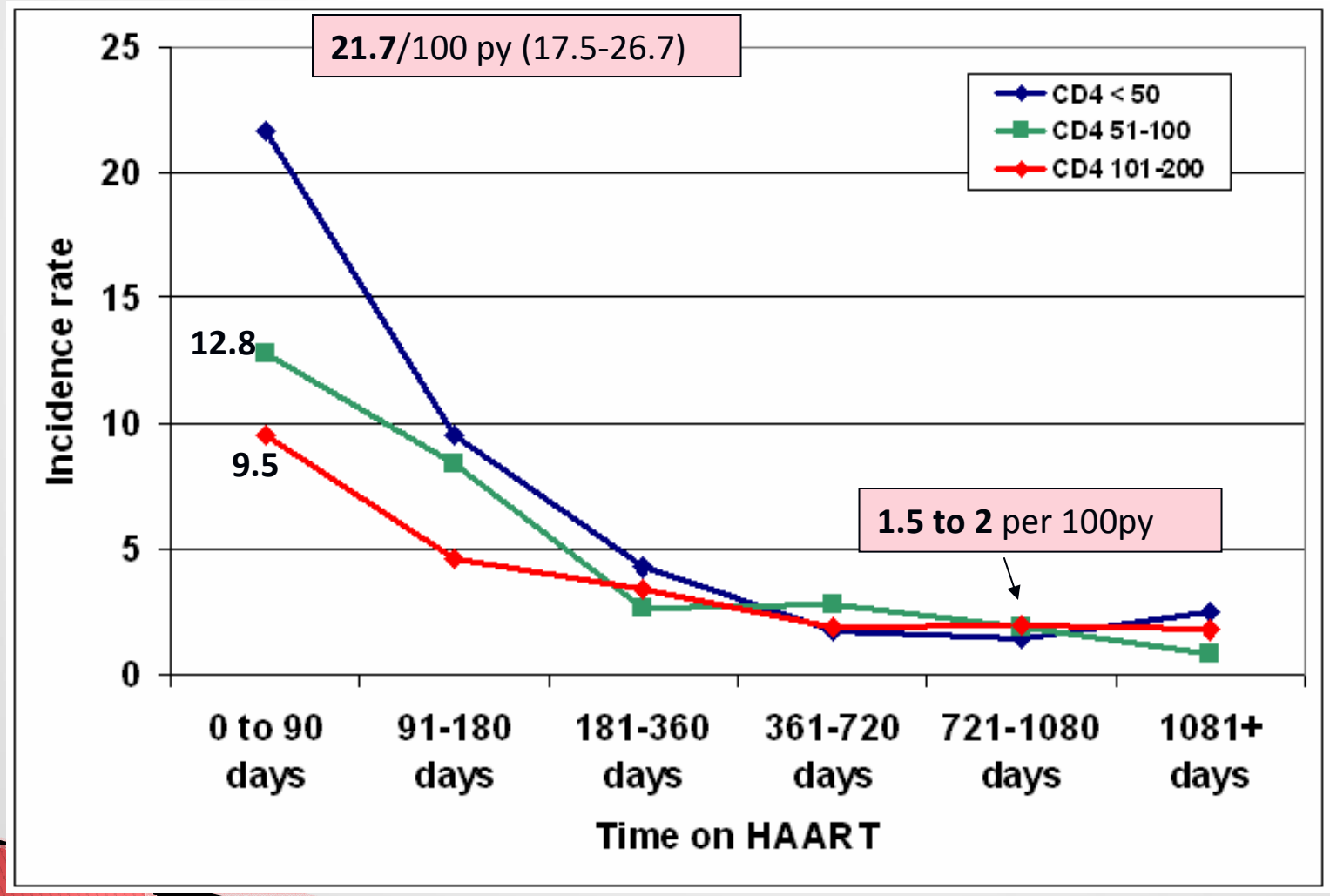
Themba Lethu Clinic
Johannesburg, South Africa
Comprehensive Care Management and Treatment Sites

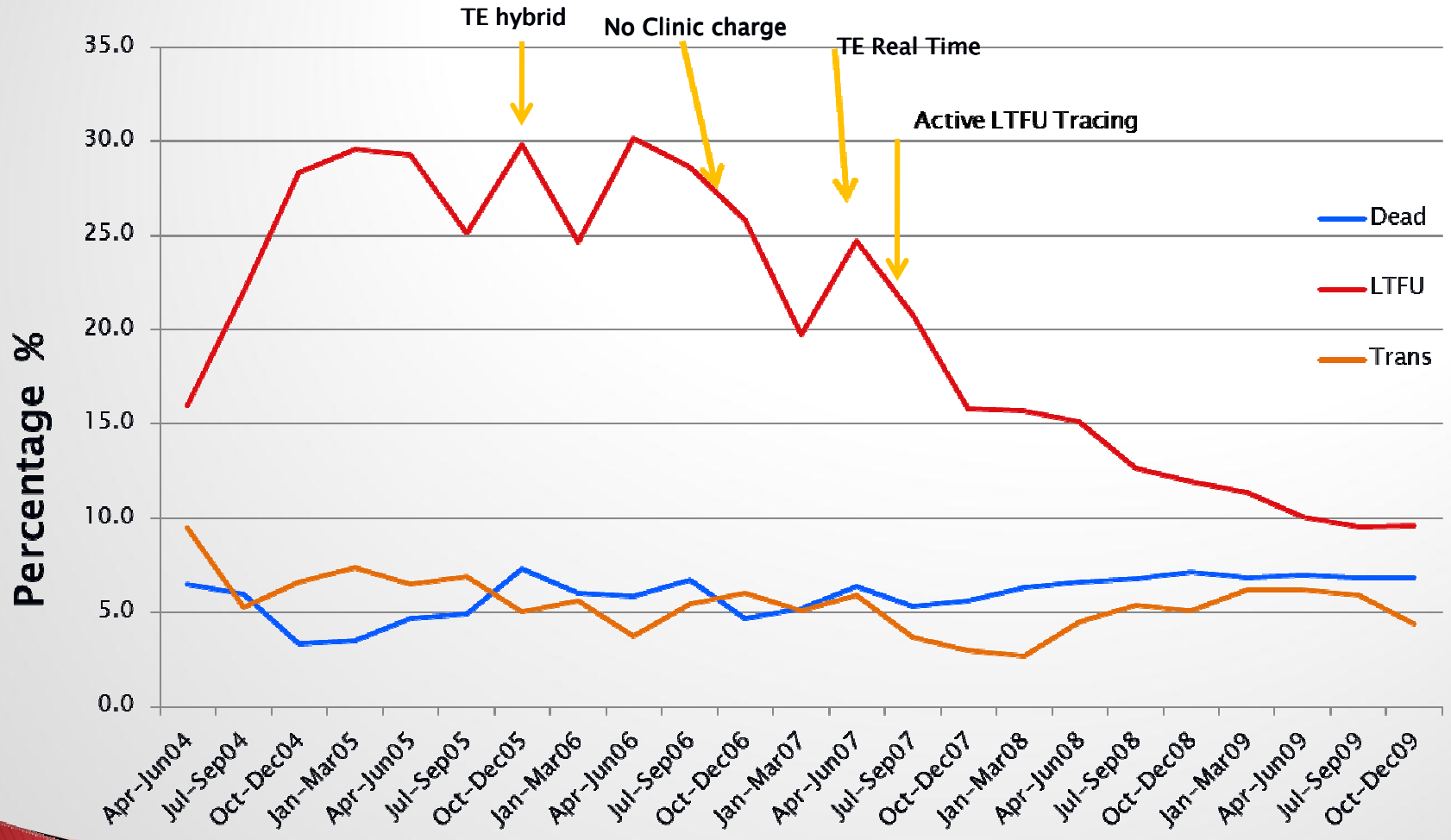


Incident TB by baseline CD4+ count (Poisson regression model)



A van Rie, I Sanne et al Int. TB and Lung Dis. Paris 2008

Patient retention within six months of ARV initiation



Ref: Evans D., Nagar S., et al., unpublished

Disease management system leads to significant health care personnel efficiency

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CATEGORY	FTE recommended per 500 patients	FTE required 11,000 patients	Actual FTE at Themba Lethu 11,500 ART pts
MEDICAL OFFICER	1	22	10
PROFESSIONAL NURSE	2	44	10
PHARMACISTS	1	22	4+6 assistants
DIETICIANS	1	22	1
SOCIAL WORKERS	0.5	11	1
LAY COUNSELLORS	5	110	22
ADMIN. CLEKS	1	22	9
DATA CAPTURERS	1	22	8
TOTAL	12.5	275	71
FTE Proportion			25.8%

Reduction in personnel

Particularly in critical categories: doctor, nurse and pharmacist

Right to care

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NHLS Integration

Integration success: matched NHLS results

			TOTAL	%
TRANSFER				
	FILES	Number of files received (one patient per file)	**148,039**	
	VOLUME	Amount of data received in Bytes	**290,437,107**	
MAPPING				
	SENT	Number of patients identified based on the algorithms below	**99,165**	**66,99%**
	TE ID		**22,053**	**22,24%**
	SAMPLE ID		**54,554**	**55,01%**
	NHLS / FILE ID		**13,844**	**13,96%**
	DEMOGRAPHICS		**8,714**	**8,79%**
	FILTERED	Number of patients who were not identified	**48,874**	**33,01%**
RESULTS				
	SAMPLES	Number of samples imported	**644,468**	
	LABS		**0**	
	MAPPED	Number of labs imported	**544,969**	**84,56%**
	NOT MAPPED	Number of labs not imported	**99,499**	**15,44%**
VALUES	**This section is in BETA (data need to be cleaned)**			
	NORMAL	Number of labs with normal value	**260,673**	**47,55%**
	HIGH	Number of labs with higher than normal value	**72,787**	**13,28%**
	LOW	Number of labs with lower than normal value	**89,941**	**16,41%**
	NO RANGE	Number of labs with no range specified	**124,773**	**22,76%**

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Down Referral
Nurse Monitored ART in practice

Preparing systems for NIMART

Nurse versus doctor management of HIV-infected patients receiving antiretroviral therapy (CIPRA-SA): a randomised non-inferiority trial.

Sanne I et al Lancet. 2010 Sep 25;376(9746):1054

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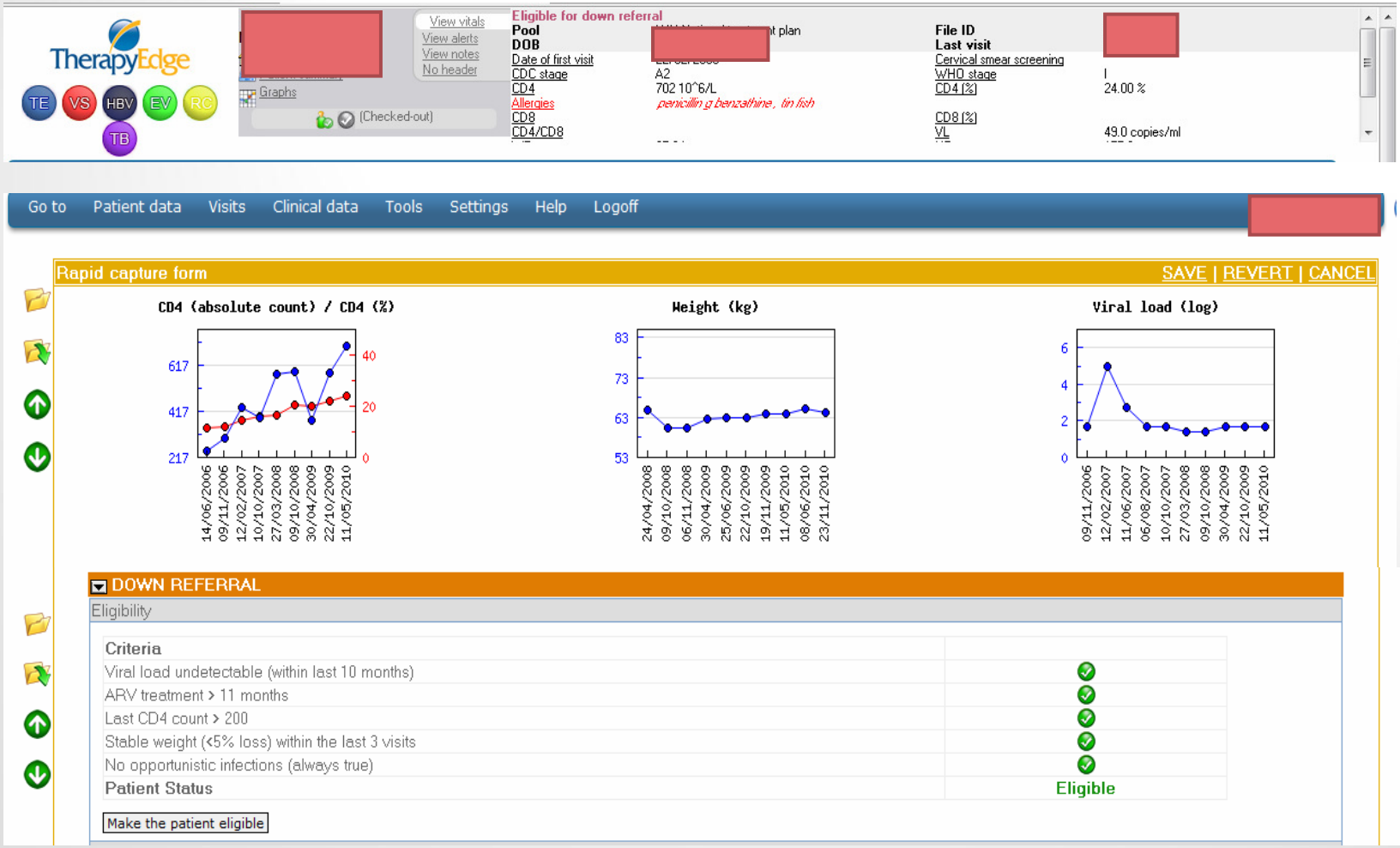


Data from down referral demonstrate excellent outcomes – Viral suppression rates 96.2% and immune competence 99.6%

- Down Referred from Themba Lethu Clinic to Crosby Clinic a primary health care clinic (n=1648) between Jan 2008 – Feb 2010
- > 1 year follow-up at down referral; > 2 years on treatment

Results

- Proportion VL undetectable – 96.2%
- Proportion CD4+ count category

<100	0.4%
100 – 299	12.1%
300 – 499	43.0%
>500	44.5%

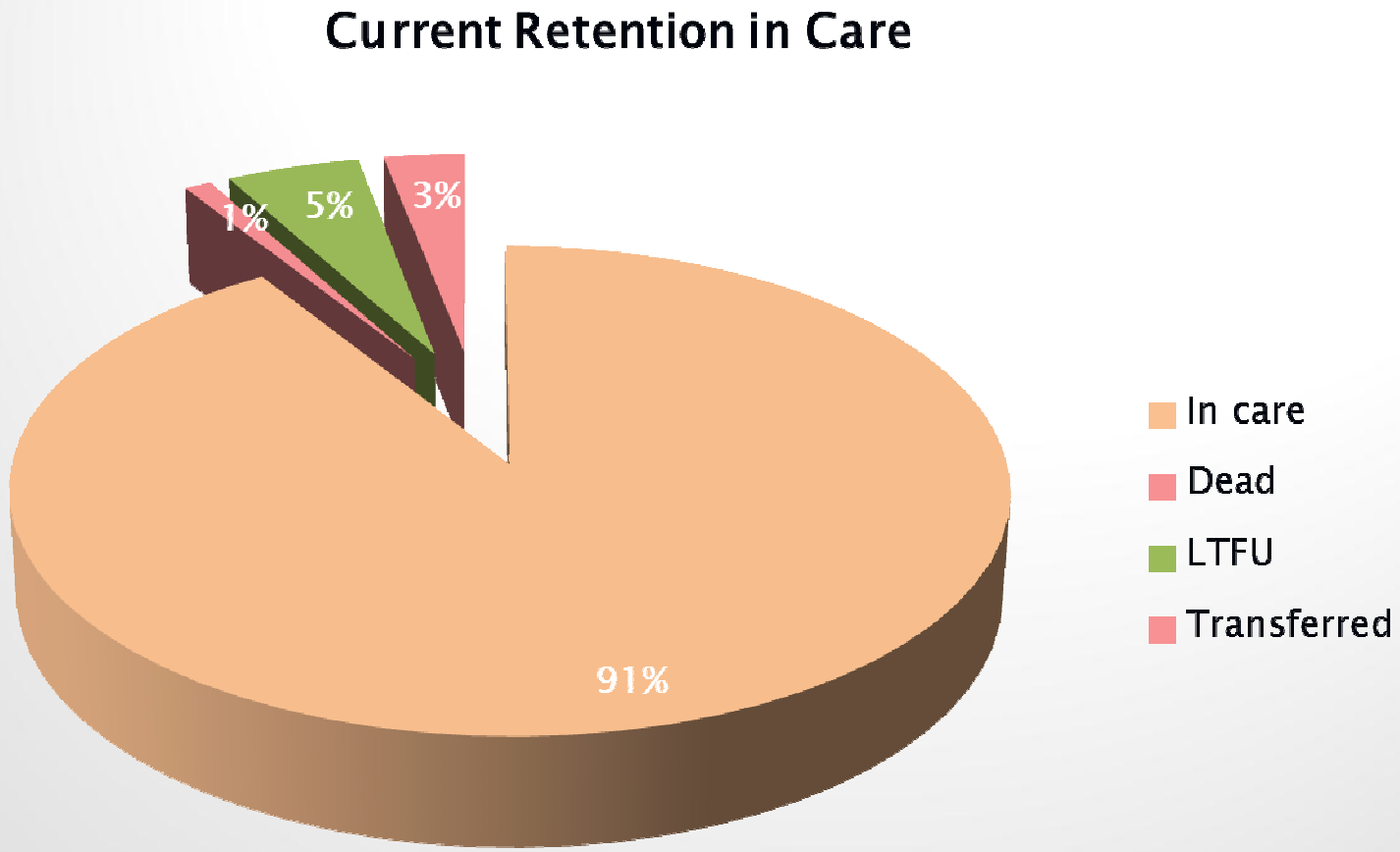
Reason for Up-Referral (n=274)

Reason for up referral	Total n		%	% of down referrals
Defaulters	113			6.48%
Traced and back in care		73	65%	4.19%
Lost to follow up		40	35%	2.29%
Transferred out	23			0.11%
Side effects of ARVs	62			3.5%
Lipodystrophy		41	66%	2.3%
Hyperlactataemia		16	26%	2.1%
Peripheral neuropathy		5	8%	0.28%
Pregnancies	30			1.7%
Virologic failure	17			0.97%
Miscellaneous	29			1.6%
TOTAL Up referred	274			15.72%

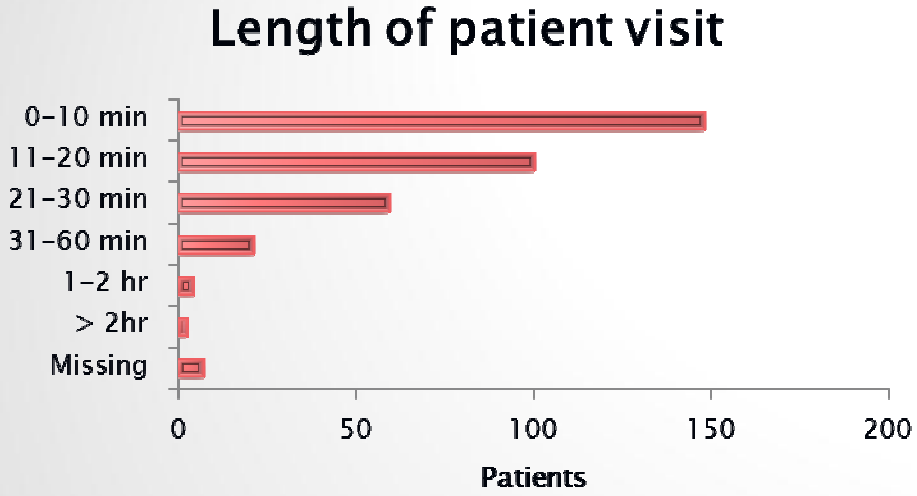
With a good management system Primary Health Care nurses can deliver good care to follow up patients

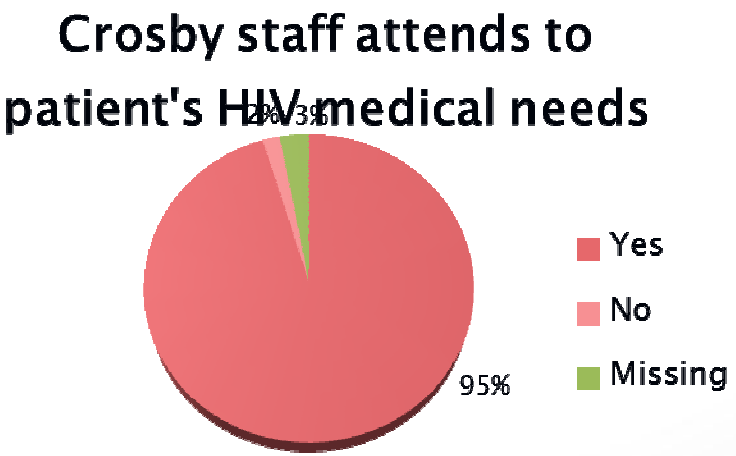
Ref: Jaffray I., et al. Poster 269 SA AIDS conference 2009

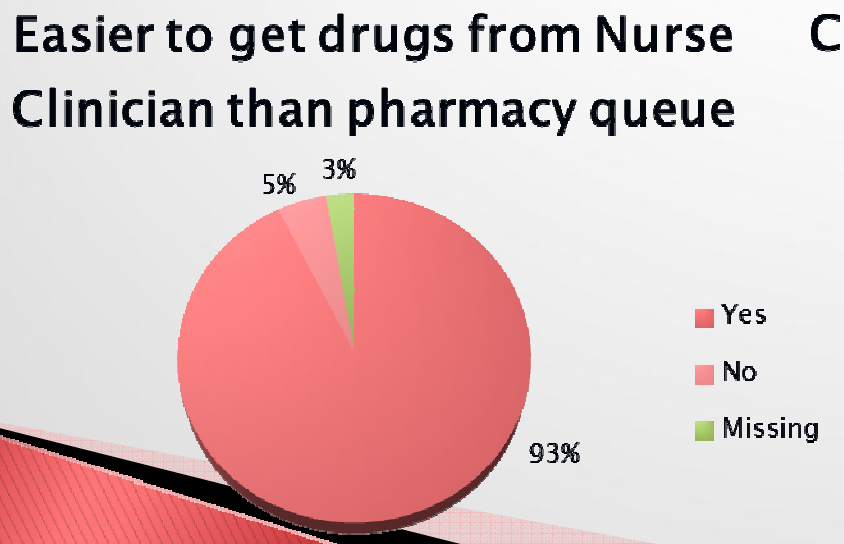
Down referral retention in care 91%,

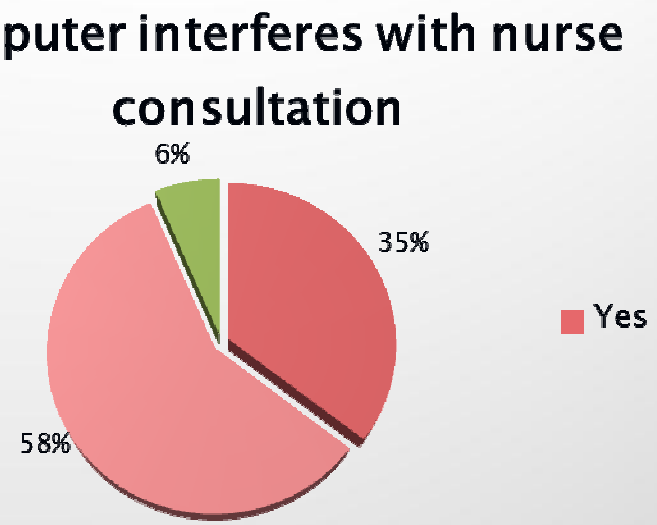


Patient satisfaction survey – high level satisfaction time, medical exam









Cost and outcomes of "task-shifting"

Background

- Task shifting from higher- to lower-level healthcare facilities and staff is required to increase capacity and reduce costs
- South African treatment providers have piloted down-referral (DR) of stable adult antiretroviral treatment (ART) patients from hospital-based clinics to primary health clinics (PHC)

Methods

- Matched cohort study – down-referred px compared to a matched sample of px eligible for down-referral at the same site but not down-referred
- 1: 3 matching (540 down referred : 1,620 not down referred) on age, gender, CD4 count, time on ART, and regimen using propensity scores
- Outcomes – based on vital status, presence in the clinic, VL, and CD4 count 12 months after down referral eligibility: in care and responding; in care, not responding; and no longer in care (died/ LTFU)
- Costs – Included all drugs, labs, outpatient visits, infrastructure, and other fixed costs

Costing study using a matched case-control study method (2:1)

	Down referred	Maintained at TI
Outcomes 12 months after study enrolment (%)		
N	540	1620
In care and responding	95.0	89.1
In care but not responding	2.8	4.2
No longer in care	2.2	6.7
Average cost/ outcome (USD)		
In care and responding	504	553
In care but not responding	499	594
No longer in care	181	329
All	498	540

Findings

- A DR strategy may increase treatment capacity and conserve resources without compromising patient outcomes
- Cost saving appears modest, but if up to 25% of SA's current ART population (1,000,000) is eligible for down referral using these criteria, we might expect to save more than $12 million annually

L. Long – CROI 2011

Expanded use and access to this PEPFAR supported IT and mHealth development

Programs in resource poor settings

- PharmAccess
  - Observational cohort study on HIV treatment and drug resistance in several African countries
- TREAT-Asia
  - HIV treatment and drug resistance in several asian countries
- Thailand – TCELS and CDC
- Botswana – BOMAID
  - Public Private Partnership to shift 20,000 stable patients to the private sector
    - Laboratory interface, central courier pharmacy, direct access to data system in the doctors rooms

Europe

- TherapyEdge is installed in 20 major University hospitals for the management of HIV and viral hepatitis
- Interface with:
  - LIMS (laboratory)
  - HIS (hospital information system)
  - Some laboratory automates (HL7 trace)
- Reporting and National Guidelines
- HIV/Viral hepatitis drug resistance interpretation
- San Cecilio Hospital (Granada, Spain) and CHU Sart Tilman (Liège, Belgium) are using the full set of TherapyEdge platform capacities

The use of IT systems is highly acceptable to health care provider……

- >80% found TE easier to...
  - ✓ Review ART progress and history
- >70% found TE easier to...
  - ✓ Find specific clinical information
  - ✓ Produce a patient summary
- >60% found TE easier to...
  - ✓ Enter clinical notes
  - ✓ Track changes in lab results
- >50% found TE easier to...
  - ✓ Review diagnoses
  - ✓ Write a prescription
  - ✓ Review patient problems

Survey of users of live TE

Patient quotes…..

"My file is never lost"
"My doctor can show me on the computer how well I am doing"

Acknowledgements

- PEPFAR
- Department of Health
- USAID
- NIH

Thank You

Right to care

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