Electronic medical records and same day patient tracing improves clinic efficiency and adherence to appointments

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Introduction.....

- Global funding for ART reduced. Efficiency
 and cost-effectiveness critical
- High patient load with reduced clinic efficiency lead to long waiting times and reduced patient satisfaction and retention.
- Missed clinic appointments affect patient load and the ability to plan since the number of daily visits cannot be predicted.

.....most importantly....

 Missed appointment rates are the most significant predictor of treatment failure and loss to follow up, *coleman et al*

Increasing case load



Poor client satisfaction

 "I arrived here at 6am hoping that I would leave early enough to go to my workplace, but I have waited 4 hours now, and the cues just seem to get longer. I am going to have to find another clinic that has fewer patients" ROM patient.

The study

- Part of a 5-yr NIH grant to evaluate the efficiency and quality of models of ART delivery in Uganda.
- The three study sites differed in staffing model and locality.
- Two-phased study: 1) Baseline to identify barriers to patient flow. 2) Implementation of modifications to improve clinic efficiency
- April-June 2008, a baseline time and motion study identified poor clinic efficiency including long patient waiting times at the point of a manual records retrieval.

Phase 2-Modification

- Prior to October 2008 we maintained a manually updated patient register (missed appointments could only be ascertained after one month)
- If patients forgot their appointment cards the registry staff would have to manually search for the patient files leading to delays
- Implemented and evaluated the impact of Electronic medical records and same day patient tracing (EMR) as a strategy to reduce missed appointments and improve clinic efficiency.

The Modification-EMR and same day patient tracing

- At the end of each patient encounter real-time appointment status and next appointment visit dates are entered into an electronic medical records (EMR)
- EMR is used to generate a list of scheduled appointments for each clinic day and used for file retrieval prior to the clinic day.
- Patients are classified as on-schedule or early at registration and as missed appointment at the end of the clinic day.
- List of patients with missed appointments is generated for same-day patient tracing through a home visit.

Methods Study setting

- Reach Out Mbuya HIV/AIDs Initiative
- Nurse-led (ratio nurse: doctors 7:1
- Free comprehensive ART to the urban poor
- Home based care arm using PLWHA (43% of the staffing)
- Intensive monitoring of all Clients especially those on ARV & TB medication through the community (modified DOTS)









Typical source of Income for the women, many often have TB

Typical houses occupied by clients

Many are very ill by the time they finally access care



Study design

- Before and after design
- Baseline (pre-EMR) assessment was conducted between June and November 2008
- EMR implemented in October 2008
- Post implementation evaluation (post-EMR) was conducted between April and September 2009 (6/12 after the modification)

Study design

- Data on early, missed and on-schedule appointments and reasons for missed appointments pre-EMR were extracted from patient registers.
- Similar data for the post-EMR period were available electronically.
- A random sample of patients who missed appointments was analysed to ascertain reasons for missed appointments.
- Time and motion data were collected to evaluate waiting times to see and time spent with various provider types (clinic efficiency).

Statistical analysis

- Descriptive analysis was used to depict patient appointments, describe demographic characteristics, reasons for missed appointments, and waiting times.
- Mean number of missed, early and on-schedule visits was determined. The means between the two study periods was compared using the student's *t* test.
- Median waiting times post-EMR and pre-EMR were compared using the wilcoxon signed-rank test

Findings

Table 1. Clinic attendance before and after implementation of Electronic Medical records and patient tracing system

	Pre- EMR			Post-EMR				
Daily clinic attendance	Mean (S	SD) 95	% CI		Mean (SD)	95	% CI	P- value
Total attendance	68 (23)	66	71		70 (17)	68	72	>0.001
Total number of scheduled appointments	78 (27)	75	81		70 (17)	68	72	<0.001
On- schedule appointments	57 (21)	55	59		61(16)	59	63	<0.001
Missed appointments	21 (13)	19	22		8 (6)	7	9	<0.001
Early appointments	11 (8)	10	12		9 (5)	8	9	<0.001

Cl confidence interval *P* values derived from *student's t test*.

Table 2. Characteristics of sampled patients with missed appointments comparison of pre and post intervention

	Pre-EMR	Post-EMR	
Study variable	n=660	n=228	P values
Age in years- Mean (SD)	31 (12)	30 (12)	>0.001*
Gender n (%) Male Female	251 (38) 409 (62)	92 (40) 136 (60)	>0.001**
Marital status n (%) Married Single Divorced Widowed	<mark>391 (59)</mark> 103 (16) 104 (16) 62 (9)	152 (67) 29 (13) 25 (11) 22 (10)	>0.001**
Medication n (%)			
ART Pre- ART	428 (37) 412 (62)	90 (39) <mark>138 (60)</mark>	>0.001**
Duration in the Program Mean (SD)	4.5 (1.3)	4.5 (1.8)	>0.001*
Duration on ART - Mean (SD)	4.1 (0.9)	4.4 (1.2)	>0.001*

**P* values derived from *Students ttest*

***P* values derived from *chi*² test

Reason	Pre-EMR(n=660)	Post-EMR (n=228)	
	(n/%)	(n/%)	P values
Forgot	294 (44.5)	34 (15) (30% reduction)	<0.001
Wrong appointments date captured	188 (27.7)	10 (4.3) (24% reduction)	<0.001
Travelled for business or to the village	30 (4.5)	38 (16.6)	<0.001
Was at work	18 (2.7)	51 (22)	<0.001
Lost to follow up	72(10.9)	11(4.8)	<0.001
Transferred Bedridden/ admitted	28 (4.2)	0	<0.001
	4 (0.6)	36 (15.7) (15-fold increase)	<0.001
Gone for burial	3 (0.4)	11 (4.8)	<0.001
At school	3 (0.5)	9 (4)	<0.001
Died	25 (3.8)	7 (3.0)	>0.001
Had drugs	0	9 (3.9)	<0.001
*Others	0	12 (1)	-

*Includes: those who had no reason, had an accident or were attending to a sick relative **P-value derived from *Chi*²

Table 4. Patient waiting times before and after implementation of EMR and patienttracing by provider categories

Provider	Time	e waiting to see provide (minutes; IQR)	rs	Time spent with providers (minutes; IQR)			
FIOVIDEI	Pre-EMR (n=230)	Post-EMR (n=232)	P-value	Pre-EMR (n=230)	Post-EMR (n=232)	P-value	
Registry	18.00(0.0 65.0)	20.00(8.00 49.0)	<0.001	15.00(8.0 30.0)	19.00(10 30)	<0.001	
Pill counters	34.00(16.0 66.0)	21.00(11.0-38.0)	<0.001	14.00(4.0-25.0)	2.00(1.0-6.0)	<0.001	
Nurses	56.00(16.0 97.0)	38.00(18.0 62.0)	<0.001	18.50(10.0 30.0)	10.00(4.0-20)	<0.001	
Laboratory	15.00(8.5-67.5)	42.00(16.0-68.0)	<0.001	8.50(10.0-30.0)	23.00(8.0-35.0)	<0.001	
Pharmacy	45.00(6.0-121.0)	11.00(3.0-36.0)	<0.001	16.50(11.0-23.0)	21.00(14.032.0)	<0.001	
Counselor	26.00(3.0-49.0)	13.00(2 -22)	>0.001	35.00(25.0-80)	43.00(31-60)	>0.001	
	Total waiting times(minutes; IQR)						
	Pre-EMR (n=230)			Post-EMR (n=232		P -value	
Total time spent at clinic	274.00(209-346			206.00(159-250)	<0.001		
Waiting to see providers	291.00(228-353			94.00(58-131)	<0.001		

IQR, Interquartile range

* P- values derived from wilcoxon signed-rank test

Limitations

- Routine program data used in pre-EMR evaluation
- Patients reported as LTFU may have been dead
- Although Time and motion tools were anonymised there could have been reporter bias
- ROM serves a defined catchment area making patient tracing easy an costeffective

Conclusion/recommendations

- Improvement in records management through computerization and same day patient tracing significantly reduced missed appointments and improved clinic efficiency
- Prompt identification and tracing of patients who miss appointments could be an effective strategy to enhance medication adherence though adherence counseling and to minimize loss to follow up and mortality.
- ART scale-up efforts should include investments in record management systems, including EMR

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