Patient retention in HIV care is related to point of diagnosis in western Kenya

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BACKGROUND

Home-based counseling and testing (HBCT) successfully diagnoses HIV earlier than provider-initiated (PITC) and voluntary counseling and testing (VCT) [1]. However, once enrolled in care following diagnosis, it is unknown whether patients entering care from HBCT have better retention compared with patients entering care from other testing modalities. Because of the challenges of capturing the cyclical process of retention and disengagement in care using traditional survival models, we present an updated analysis using state-space modeling.

OBJECTIVE

The objective of this study was to determine the impact of point of diagnosis (i.e., HIV testing program) on retention in HIV care among patients in western Kenya using data from AMPATH (Academic Model for Promoting Access to Healthcare). AMPATH, a partnership between Moi University, Moi Teaching and Referral Hospital and a consortium of North American institutions, has provided HIV treatment and care to over 160,000 individuals in western Kenya since 2001.

METHODS

- This retrospective analysis included all patients ≥13 years of age with data available on point of diagnosis who enrolled in care between January 2008 and September 2012.
- State-space models were used to assess the effect of point of diagnosis on the probability of transitioning between three states: engaged in care, disengaged from care and deceased (Figure 1). Multinomial regression models were fit to capture the effect of point of testing on specific state transitions while controlling for confounders. Time was partitioned into 6-month intervals and the state of each patient was determined within these intervals.
- Specifically the following models were fit to model the transition from engaged to remaining engaged in care, or death, with engaged to disengaged as the reference:
  - *Log{Pr(engaged at t)/Pr(disengaged at t)} = a0*time + (a1,a2,…,a8)' I(engaged at t-1)*{time + (testing + covariates)}*
  - *Log{Pr(deceased at t)/Pr(disengaged at t)}= b0*time+ (b1,b2,…,b9)'I(engaged at t-1)*{(testing and covariates)}*
- Similar models were fit to examine the probabilities of transitioning from disengaged to the other two states. Since death is an absorbing state: *Pr(deceased at t | deceased at t-1)* is always 1 and *Pr(being engaged or disengaged at t | deceased at t-1)* is always 0.

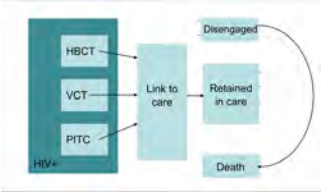


Figure 1. HIV care cascade, from testing to retention

RESULTS

Sample characteristics

The full sample included 48,947 individuals, of whom 67% were female, with median age of 36 years and median CD4 count at baseline of 350 cells/ml^3.

Table 1. Socio-demographic and clinical characteristics of 48,947 patients enrolled in care between 1/2008 and 9/2012.

	N (%)
Female	32,572 (33.5)
Median age, in years (IQR)	35 (28-43)
Point of diagnosis	
VCT/MVCT	16,206 (33.1)
HBCT	3,123 (6.34)
PITC/DTC	22,025 (45.0)
TB/Inpatient	1,643 (3.4)
Other	5,950 (12.2)
Married/living with partner	26,792 (54.7)
CD4 < 350cells/ml^3 at baseline	24,477 (50.0)
WHO stage III/IV at baseline	10,352 (21.1)

State space model

The trajectories of transition probabilities over the time intervals are presented in Figure 2. Results from the state space model indicated that overall (Table 2) the probability of remaining in care once engaged was high (p11=0.754), as was remaining out of care once disengaged (p22=0.811). The probability of transitioning out of care was 0.225, while the probability of coming back to care once disengaged was 0.185.

Table 2. Average transition probabilities from engaged, disengaged and death, between 2008-2012

	Engaged at time t	Disengaged at time t	Deceased at time t
Engaged at time t-1	0.754	0.225	0.021
Disengaged at time t-1	0.185	0.811	0.005

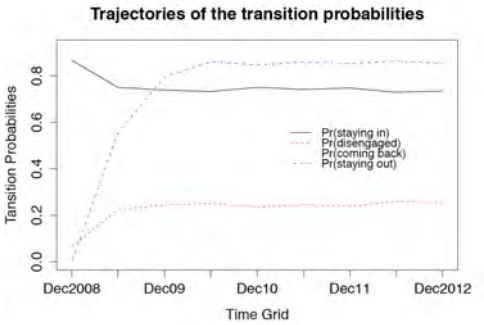


Figure 2. Trajectories of transition probabilities of staying in care, disengaging from care, coming back to care, and staying out of care from December 2008 to December 2012.

Impact of point of diagnosis

Among those engaged in care (Table 3), compared with those testing via VCT, those who tested via HBCT were more likely to stay engaged in care (relative risk (RR) = 1.38, 95% confidence interval: 1.29-1.47). Similarly among those disengaged from care, compared with those testing via VCT, those who tested via HBCT were more likely to reengage with care (RR = 1.53, 95% CI: 1.34, 1.75).

Those testing via PITC, compared with VCT, were less likely to stay engaged in care (RR = 0.95, 95% CI: 0.92, 0.98).

Table 3. Relative risk estimates of effect of covariates on state transition rates (relative to disengaged at time t) resulting from state-space model

State at t-1	Engaged (S1)			Disengaged (S2)		
State at t	Engaged (S1)	Diseng (S2)	Death (S3)	Engaged (S1)	Diseng. (S2)	Death (S3)
HBCT	1.38 (1.29, 1.47)	—	0.85 (0.65, 1.12)	1.53 (1.34, 1.75)	—	1.26 (0.66, 2.44)
PITC	0.95 (0.92, 0.98)	—	1.11 (0.99, 1.24)	0.97 (0.91, 1.04)	—	0.93 (0.69, 1.26)
TB/Inpatient	0.62 (0.57, 0.68)	—	1.04 (0.83, 1.30)	0.82 (0.71, 0.95)	—	1.78 (1.12, 2.85)
Other Testing	0.90 (0.86, 0.95)	—	0.91 (0.77, 1.07)	1.12 (1.03, 1.21)	—	1.39 (0.95, 2.03)
CD4 >= 350	1.24 (1.21, 1.28)	—	0.42 (0.38, 0.48)	1.45 (1.37, 1.53)	—	0.45 (0.34, 0.61)
Male	0.78 (0.76, 0.81)	—	1.57 (1.42, 1.74)	0.93 (0.88, 0.99)	—	1.25 (0.97, 1.63)
On ARV	1.66 (1.61, 1.72)	—	1.37 (1.22, 1.55)	6.25 (5.84, 6.68)	—	1.38 (1.27, 2.17)
Age >= 35	1.35 (1.30, 1.39)	—	1.35 (1.21, 1.55)	1.47 (0.39, 1.56)	—	1.38 (1.05, 1.81)

CONCLUSIONS

Among patients who linked to care following testing, those who tested via HBCT were more likely to remain engaged in care and to return to care if disengaged, compared with those who tested via VCT. Those testing via PITC were less likely to remain engaged in care. However, those enrolling in care represent a select group of all those testing via each program, and of all those who are living with HIV In a given region (see Figure 1). While we can characterize those testing via HBCT in this program [2], there is limited information regarding linkage to care following other types of HIV testing. Future work will examine the HIV cascade in full, from the point of testing through long-term engagement in HIV care using state space models. The results presented here suggest that additional follow-up may be warranted for patients entering care from VCT and PITC.

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References:
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