HIV+ PATIENTS RECEIVING ARVS THROUGH HOME DELIVERY: DOES IT MATTER? A CAUSAL ANALYSIS

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Introduction

Differentiated service delivery (DSD) models, which consider individual patient preferences of especially vulnerable subpopulations, are key to meeting the UNAIDS 90-90-90 goals for 2020 and beyond. Courier delivery of chronic medication to a patient's home (home-refill) is an attractive and scalable intervention to improve antiretroviral therapy (ART) adherence; data, however, is limited to real-world settings with electronic health record (EHR).

Methods

- Retrospective analysis of ART naïve HIV+ adults from Aid for AIDS (AFA) cohort, a private HIV health management scheme in South Africa who
- Initiated 1st line NNRTI based ART between January 2002 and July 2013.
- Primary endpoint: all-cause mortality
- Secondary endpoints: CD4 and viral load (VL) response, loss to follow-up (LTFU), and switching to home-refill.
- Statistical analyses: descriptive, baseline (propensity-score) model, & time-updated marginal structural models (MSM).
- Patients were divided into groups: Home-refill (monthly delivery by courier) & Self-refill (monthly collection at a local pharmacy); some patients elected to switch from self-refill to home-refill during Rx.

Results

40,939 patients, contributed >100,000 years of follow-up. Most common 1st line regimen - efavirenz + lamivudine + zidovudine, then efavirenz + emtricitabine + tenofovir. At 24 months, the home refill group had improved median CD4+ T- cell counts (451 vs. 387, respectively, p < 0.01) and likelihood of virologic suppression (81% vs 71%, p<0.001) vs self-refill.

Previously [1], we have shown home-refill (figure 1) had improved CD4 gain, VL suppression, & survival (adjusted hazard ratio for survival of 0.90 [95% CI: 0.84-0.96] (Table 1).

In this analysis, we established a marginal structure model (MSM) addressing time-varying aspects and causality, and found Home-refill was associated with even higher benefit (adjusted hazard ratio = 0.66 [95% CI: 0.55-0.78]). LTFU and switching to home-refill from self-refill were positively associated with lower CD4 and higher VL on self-refill, explaining the stronger association.

Acknowledgements

Hospitalisation rates & costs of CD4 and VL monitoring also higher in the home-refill group – suggesting better health-seeking behaviour – see table 2.

Discussion

We demonstrate:
- Significant survival benefit for home-refill over self-refill in a causal analysis, considering the potential selection for home-refill (by healthier patients) from the outset and selecting home-refill if outcomes were poor on self-refill, (see the cost & utilization data).

Our findings support home-refill (courier) within the DSD models to facilitate the UNAIDS 90-90-90 targets in resource-poor and -rich settings, and could be extended in public-health settings to other medical conditions - e.g., noncommunicable disease. Further research is particularly needed on the potential impact of home-refill in those with known transportation barriers – e.g., unemployed, postpartum woman, & adolescents.

Variables		Multivariate with p-score		Multivariate	
		Hazard ratio (95% CI)	p-value	Hazard ratio (95% CI)	p-value
Antiretroviral dispensing	home-refill	0.88 (0.82 to 0.95)	<0.001	0.9 (0.84 to 0.96)	0.003
	self-refill	referent		referent	
Baseline NNRTI	efavirenz	1.13 (1.03 to 1.23)	0.012	1.14 (1.04 to 1.25)	0.006
	nevirapine	referent		referent	
Baseline NRTI	tenofovir	referent		referent	
	other	1.95 (1.26 to 3)	0.003	1.91 (1.24 to 2.94)	0.003
	zidovudine	1 (0.85 to 1.19)	0.957	0.87 (0.78 to 0.96)	0.008
	stavudine	1.09 (0.94 to 1.26)	0.255	0.99 (0.88 to 1.1)	0.813
Sex	female	referent		referent	
	male	1.04 (0.92 to 1.17)	0.562	1.15 (1.08 to 1.23)	<0.001
Age on starting antiretroviral therapy (years)	<25	0.81 (0.63 to 1.06)	0.121	0.74 (0.58 to 0.94)	0.014
	25-49	referent		referent	
	>50	1.5 (1.35 to 1.66)	<0.001	1.58 (1.45 to 1.73)	<0.001
Baseline viral load (copies/ml)	<100,000	0.71 (0.43 to 1.18)	<0.001	0.73 (0.44 to 1.21)	0.217
	100,000-999,999	referent		referent	
	>1,000,000	1.78 (1.15 to 2.76)	0.19	1.85 (1.2 to 2.85)	0.005
Basline CD4 category (cells/µL)	0-49	4.04 (3.53 to 4.62)	0.009	4.38 (3.92 to 4.89)	<0.001
	50-199	1.96 (1.75 to 2.2)	<0.001	referent	
	200-349	referent		2.02 (1.81 to 2.26)	<0.001
	>350	1.11 (0.87 to 1.42)	0.415	1.09 (0.85 to 1.39)	0.494
Year of starting antiretroviral therapy	2002-2003	2.4 (2.13 to 2.71)	<0.001	2.25 (2.03 to 2.49)	<0.001
	2004-2005	1.53 (1.38 to 1.71)	<0.001	1.55 (1.39 to 1.73)	<0.001
	2006-2007	1.16 (1.06 to 1.28)	0.002	1.19 (1.09 to 1.31)	<0.001
	2008+	referent		referent	
Body Mass index (kg/m2)	<18	1.52 (1.3 to 1.78)	<0.001	1.56 (1.33 to 1.83)	<0.001
	18-24	referent		referent	
	25-34	0.82 (0.72 to 0.93)	0.007	0.8 (0.7 to 0.91)	0.003
	35+	0.7 (0.53 to 0.92)	0.013	0.67 (0.51 to 0.88)	0.006

Table 1: Cox regression table comparing multivariate analyses with or without propensity score

	Home-refill	Self-refill
Patients	14 620	19 202
Patient years	31 983	40 257
Time on ART (mean)	2.19	2.10
Hospital days/100 years	229	218
VL claims /year	1.260	1.009
ARV claims /year	11.03	7.69
Average cost USD/year	159	131
Average hospital costs USD/year	54	48

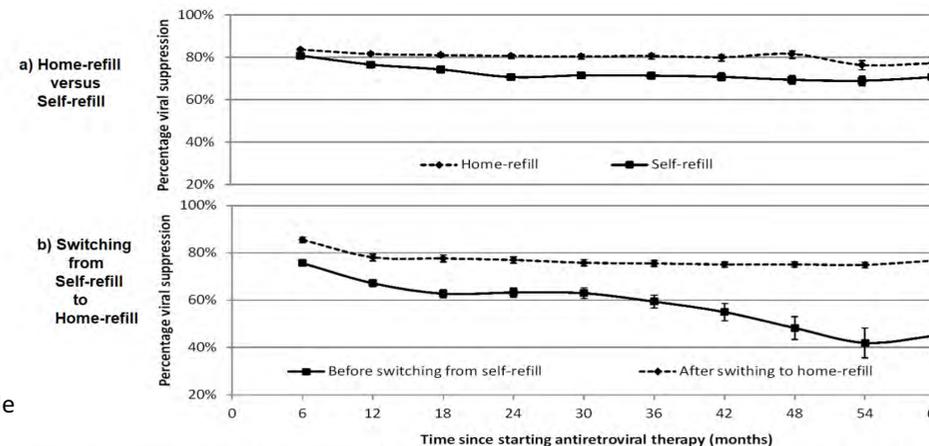Table 2: Comparing home-refill and self-refill cost and utilization data

Figure 1: Comparing HIV viral load response (% suppression) from baseline to 60 months on antiretroviral therapy with 95% confidence ranges for home-refill by courier with (a) self-refill and (b) switching from self-refill to home-refill by courier