Evaluating the Effects of Housing Status on Viral Suppression and Retention to Care among HIV-Infected Patients

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BACKGROUND

- Literature suggests that unstable housing is associated with lower adherence to antiretroviral therapy [1, 2] thus resulting in worse HIV-health outcomes, such as higher HIV-1 viral loads (VL) [3] and lower CD4 counts [2].
- Few studies have been designed specifically to examine the effect of housing status on CD4 counts, HIV-1 VL, and retention to care.
- This study used surveillance data from the The Miriam Hospital (TMH) Immunology Center Database to examine the relationship between housing and HIV-health outcomes among patients entering into care at TMH Immunology Center from Jan. 1, 2011 – Dec. 31, 2015.

OBJECTIVES

I. Compare baseline demographic characteristics of patients who did and did not report unstable housing at baseline.
II. Examine relationship between unstable housing and (1) CD4 count at entry; (2) end of year HIV-1 VL; and (3) retention to care.
III. Compare differences in HIV-1 VL and retention to care for patients who experienced a change from unstable to stable housing.

METHODS

Primary Independent Variable: Housing status is defined as unstable if sleeping in emergency shelters, other facilities for homeless persons, or places not meant for human habitation.

Outcome Variables

- *Retention to Care:* ≥ 1 HIV medical care visits each 6 month period of the calendar year, with a minimum of 60 days between the visits.
- *End of Year Viral Suppression:* HIV-1 VL results categorized as suppressed (≤ 200 copies/mL) or unsuppressed (>200 copies/mL).
- *CD4 Count at Entry:* A CD4 count < 200 cells/mm^3 is considered a diagnosis of AIDS.

Statistical Analysis: Chi-square and Wilcoxon rank sum tests used in comparing baseline demographics in objective I. For objective II, adjusted adjusted risk ratios (ARR) were calculated using a multivariate logistical regression model to account for the confounding effects of age, gender, race, drug use, and psychiatric illnesses. Objective III employed a McNemar test.

RESULTS

		HIV-1 VL > 200 copies/mL								
		2013			2014			2015		
		Yes	No	%VU	Yes	No	%VU	Yes	No	%VU
Unstable Housing	Yes	14	27	34.1	17	32	34.7	15	33	31.3
	No	18	222	7.50	21	309	6.36	29	394	6.86
	ARR	3.92 (2.11 – 7.25)			5.07 (2.91 – 8.86)			4.18 (2.50 – 7.00)		
	p -value	< 0.001			< 0.001			< 0.001		

Table 1: Viral suppression at end of year vs. housing status at beginning of year. VL = Viral Load. %VU = Percent Virally Unsuppressed (>200 copies/mL). ARR = Adjusted Risk Ratio.

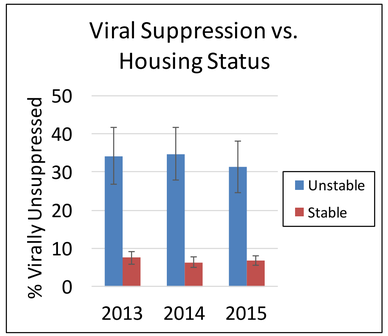

Figure 1: Viral suppression vs. housing status by year. Error bar = standard error of mean

		Patients Not Retained at TMH Immunology Center								
		2013			2014			2015		
		Yes	No	%NR	Yes	No	%NR	Yes	No	%NR
Unstable Housing	Yes	14	31	31.1	22	34	39.3	20	32	38.5
	No	26	220	10.6	36	306	10.5	60	386	13.5
	ARR	3.05 (1.68 – 5.55)			4.16 (2.67 – 6.47)			2.60 (1.72 – 3.93)		
	p - value	< 0.001			< 0.001			< 0.001		

Table 2: Retention to care vs. housing status at beginning of year. %NR = Percent Not Retained. ARR = Adjusted Risk Ratio.

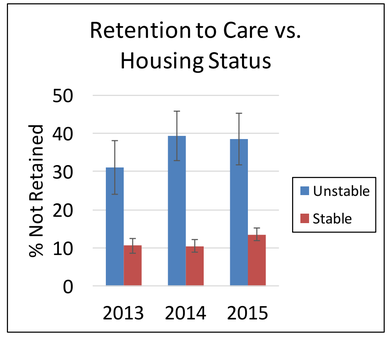

Figure 2: Retention to care vs housing status by year. Error bar = standard error of mean

		Virally Suppressed Following Stable Housing	
		Yes	No
Virally Suppressed Prior to Stable Housing Change	Yes	44	7
	No	19	7
	OR	2.71 (1.09 – 7.64)	
	p – value	0.031	

Table 3: Viral suppression after transitioning from unstable to stable housing. OR = Odds Ratio

		Retentive Following Stable Housing	
		Yes	No
Retained Prior to Stable Housing Change	Yes	47	8
	No	21	6
	OR	2.63 (1.12 – 6.85)	
	p – value	0.026	

Table 4: Retention to care after transitioning from unstable to stable housing. OR = Odds Ratio

RESULTS

I. Unstably housed patients were more likely to be female (OR: 2.28, 95% CI: 1.35 – 3.82), black (OR: 2.13, 95% CI: 1.35 -3.38), and have current psychiatric illnesses (OR: 1.679, 95% CI: 1.057 – 2.66). Age was found to be marginally significant ($p = 0.0557$) with unstably housed patients having a median age of 37 years vs. 43 years for stably housed patients. No relationship between drug use and housing.
II. 28% of unstably housed patients had a CD4 < 200 at entry vs. 19% of stably housed individuals ($p = 0.001$, ARR = 1.72, 95% CI: 1.26 - 2.35). Unstably housed patients had a higher risk than stably housed patients to be unsuppressed at the end of the year and have lower retention to care (Tables 1 & 2). No relationship between housing and viral suppression or retention to care found in 2011 or 2012.
III. The transition from unstable to stable housing was associated with higher odds of viral suppression and retention to care (Tables 3 & 4).

CONCLUSIONS

The study demonstrated two central findings:

1. Unstable housing was associated with increased risk of: (1) low CD4 counts at entry; (2) unsuppressed end of year HIV-1 VL; and (3) lower retention to care. These findings persisted after adjusting for potential confounding demographic variables.
2. The transition from unstable to stable housing was associated with higher odds of HIV-1 VL suppression and retention to care.

We presented these findings to the RI Dept. of Health in Oct. 2016 and plan to use these results to assist them in their future low-income housing grant applications.

REFERENCES

1. Denning, P. and E. DiNenno, Communities in Crisis: Is There a Generalized HIV Epidemic in Impoverished Urban Areas of the United States?
2. Moss, A.R., et al., Adherence to highly active antiretroviral therapy in the homeless population in San Francisco: a prospective study. Clin Infect Dis, 2004. **39**(8): p. 1190-8.
3. Kidder, D.P., et al., Health status, health care use, medication use, and medication adherence among homeless and housed people living with HIV/AIDS. Am J Public Health, 2007. **97**(12): p. 2238-45.

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