The Association of Unmet Needs with Subsequent Retention in Care and HIV Suppression Among Hospitalized Patients with HIV Who Are Out of Care

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Abstract

Background:

Unmet needs among hospitalized patients with HIV may prevent engagement in HIV care leading to worse clinical outcomes. Our aim was to examine the role of unmet subsistence needs (e.g. housing, transportation, food) and medical needs (e.g. mental health, substance abuse treatment) as barriers for retention in HIV care and viral load suppression.

Methods:

We utilized data from the Mentor Approach for Promoting Patients' Self-Care intervention study, the enrolled hospitalized HIV-patients at a large publicly funded hospital between 2010 and 2013, who were out-of-care. We examined the effect of unmet needs on retention in HIV care (attended HIV appointments within 0–30 days and 30–180 days) and viral load suppression, six months after discharge.

Results:

417 participants were enrolled, 78% reported having ≥1 unmet need at baseline, most commonly dental care (55%), financial (43%), or housing needs (34%). Participants with unmet needs at baseline, compared to those with no needs, were more likely to be African American, have an existing HIV diagnosis and insured. An unmet need for transportation was associated with lower odds of retention in care (OR: 0.5; 95% CI:0.34–0.94, p=0.03), even after adjusting for other factors. Compared to participants with no need, those who reported ≥3 unmet subsistence needs were less likely to demonstrate viral load improvement (OR: 0.51; 95% CI:0.28–0.92; p=0.03) and to be retained in care (OR: 0.52; 95% CI:0.28–0.95; p=0.03).

Conclusion:

Broader access to programs that can assist in meeting subsistence needs among hospitalized patients could have significant individual and public health benefits.

Keywords: HIV, retention in care, supportive services, unmet needs, viral load suppression

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that, at the end of 2015, more than 1.1 million people aged 13 years and older were living with HIV in the US. Nearly 40,000 people became newly infected in 2016.[1] Although 85% of people with HIV are aware of their status, the proportion of people living with HIV (PLWH) who are retained in care in the U.S is estimated to be 48%, and only half of PLWH achieve viral suppression.[2,3] The U.S. ranks the lowest among high-income countries in the proportion of PLWH who are retained in care and in the percentage of individuals with undetectable viral load (VL).[4,5]

PLWH who are not retained in care are less likely to receive antiretroviral therapy (ART), and more likely to have higher HIV VL, lower CD4 cell counts, and higher morbidity and mortality compared to patients who are retained in care.[6] Studies demonstrate a correlation between the number of missed clinical appointments, as well as the total number of elapsed days between missed visits, and the occurrence rate of new AIDS-defining illnesses or death.[7–9] Hospitalization among PLWH can serve as another indicator of reduced access to care and failures in systems of HIV care on a population level. The highest rates of hospitalizations continue to be among African-Americans, females, and patients living in high-poverty neighborhoods.[10,11] While it is often an undesired outcome of poor retention in care, hospitalization also presents an opportunity for re-linkage to HIV care. Clinicians can identify hospitalized patients who are out-of-care, initiate or reinitiate ART, and facilitate follow up upon hospital discharge. A successful post-hospital transition into HIV care is associated with lower VL and lower mortality.[12]

Ancillary services are defined as comprehensive services that support retention in HIV medical care and assist with day-to-day living to improve the health outcomes of PLWH.[13,14] Studies have evaluated unmet needs for various services and explored the impact of providing medical services (mental health care, substance abuse treatment, case management) and subsistence services (food, transportation, housing assistance) on engagement in medical care and health outcomes. Findings from these studies suggest that patients who receive services tailored to their needs are more likely to enter care, maintain regular medical care, and have better health outcomes.[15–17] However, most of these studies have examined unmet needs for supportive services in patients with HIV infection at the community or clinic level. Only a few descriptive studies from very early in the HIV epidemic have explored the differences in healthcare, psychological, and financial needs across inpatient, outpatient, and long-term care settings.[18,19] Unmet needs among hospitalized patients with HIV may delay or prevent engagement in HIV care following discharge, potentially leading to worse clinical outcomes.

We conducted a randomized controlled trial of a peer mentoring intervention among hospitalized PLWH who were not in care to evaluate the intervention's impact on retention in care and VL in the first six months after discharge in comparison to a time and attention control group. As previously presented, the intervention did not improve outcomes.[20] The aim of the current study is to examine the association of unmet subsistence and medical needs on retention in

HIV care and VL suppression after discharge across all participants in the parent study and to examine whether meeting those needs during follow up was associated with improved outcomes.

Methods

This study utilized data collected from the Mentor Approach for Promoting Patients' Self-Care (MAPPS) intervention study. The MAPPS study was a prospective, randomized, controlled trial to examine the effect of a peer mentoring program, targeting hospitalized patients with HIV who were either out of care or recently diagnosed, on retention in HIV care and VL six months after discharge. The mentor intervention included two in-person sessions with a trained peer mentor before discharge from the hospital and five phone calls over 10 weeks after discharge. Peer mentors served as role models for successfully managing HIV infection and for encouraging active self-management. They provided standard information about HIV, told their stories to motivate the participant, and helped participants assess barriers to care and identify clinic resources to overcome those barriers, all with a focus on improving retention in care. The control intervention was delivered by paid educators using the same schedule of sessions but was didactic and focused on safer sex and drug use for PLWH. The MAPPS intervention had no effect on retention in outpatient HIV care or VL compared to the control education intervention.[20]

Study population

Patients with HIV infection who were hospitalized at Ben Taub Hospital, the largest publicly-funded hospital in Houston, Texas, between August 2010 and August 2013 were recruited into the MAPPS study. On admission, hospitalized adult patients who planned on seeking follow up at Thomas Street Health Center (TSHC), a free-standing comprehensive clinic for persons with HIV, and were going to spend at least one more night in the hospital were randomized into the mentored arm or education control arm of the study. All participants completed an in-person survey as soon as feasible after enrollment before receiving any intervention in the hospital and at three months post-discharge. Participants had phlebotomy for VL and medical record review at six months.

All persons with a new diagnosis of HIV during that hospital stay were eligible for the MAPPS study. For patients with an existing HIV diagnosis, being in HIV care was defined as having at least three consecutive VL <400 copies/mL for at least the last six months and having completed HIV primary care visits in at least three of the last four quarter-years in the 12-months prior to hospitalization, based on evidence of clinic visit at TSHC or patient self-report of being in care at an outside clinic. All patients not meeting this definition of "in care" were considered "out of care" and were eligible for MAPPS. Details of the intervention, recruitment, and primary study results are available elsewhere.[20]–[22]

Data sources and study variables

Demographic variables (age, sex assigned at birth, race/ethnicity, HIV risk factors, health insurance) were collected by self-report at baseline. Laboratory results (CD4 cell count, HIV VL) at baseline and six months were collected from medical records or by study phlebotomy. Dates of

HIV primary care visits after discharge were collected by medical record review. Unmet needs were collected by self-report at baseline and three months. A list of 10 commonly unmet needs was constructed based on prior research and validated questionnaire items.[23] Study participants were asked whether each need was present within the past three months and, if the need was present, whether the need had been met or remained unmet.

Lack of basic life necessities may take precedence over health care, and the impact of those needs might be different from needs for healthcare services.[24,25] Thus, we divided the unmet needs into subsistence and medical needs. Subsistence needs included housing, transportation, food, and financial needs. Medical needs were defined as the need for mental health services, substance abuse treatment, information about medication side effects, help taking medications, case management, and dental care.[26,27]

Study outcomes

The two primary outcomes of interest for the MAPPS study and for this secondary analysis were VL improvement and retention in care at 6-month follow up. VL improvement was defined as achieving at least one $\log_{10}$ decrease in VL or having a VL < 400 c/mL. Retention in care was defined as attending at least one HIV primary care visit within 30 days of discharge and attending at least one HIV primary care visit between 31 and 180 days after discharge. During most of the enrollment period (2010 to 2012), the DHHS recommended ART initiation when the CD4 count fell below 500 cells/mm^3. The recommendation was changed in 2012 to include all patients regardless of CD4 count.[28] Participants with no indication for ART at the time of discharge according to the guidelines in place at that time only needed to meet the retention in care component of the definition. Of note, 94% of participants had an indication for ART at the time or enrollment. Participants with missing outcome data or who died before outcomes could be assessed were considered failures.

Data analysis

Proportions of patients who reported having none of the assessed needs, an unmet need, and an unmet need that was later met were calculated at baseline and at three months for each need. Univariate analyses were used to compare patients with no needs, met needs, and unmet needs at baseline to outcomes. Wald chi-square tests and accompanying p-values were used to assess statistical significance. Further analyses were conducted to examine whether having baseline reported needs met by three months was associated with VL improvement or retention in care at six months. Multivariable logistic regression models were developed to examine the association between unmet needs and outcomes, adjusting for demographics, clinical features, being in the mentored or in the education control arm, and health insurance status. Adjusted odds ratios and accompanying 95% confidence intervals were calculated. All data were analyzed using SAS (SAS Version 9.4, SAS Institute, Cary, North Carolina, USA).

The study protocol was approved by the Institutional Review Board for Baylor College of Medicine and Affiliated Hospitals. Participants provided written informed consent. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

Results

Demographics

A total of 417 participants were enrolled in the MAPPS study and included in the primary analysis. Among the 417 participants, 305 (73%) were male, and 112 (27%) were female. Most participants were African-Americans (n=278, 67%); 81 (19%) participants identified themselves as Hispanic, and 58 (14%) as non-Hispanic white. The two age groups with the greatest proportion of participants were 40–49 years (35%) and 30–39 years (27%). Forty-seven (11%) participants were newly diagnosed at the time of enrollment, 269 (65%) had a CD4 cell count < 200 cells/μL, and 197 (47%) had a VL > 100,000 c/mL (see Table 1). Most participants (94%) had an indication for ART, of whom 41% were taking ART in the four weeks before hospitalization. More than half of the participants (57%) did not report any drug use, and 61 (15%) reported only marijuana use in the last three months before hospitalization. Only 21% of the participants were employed, and 70% did not have public or private health insurance.

TABLE 1.

Presence of unmet needs at baseline by patient demographics and clinical factors. (n = 417)

Variables	All participants n = 417 (%)	Participants with no unmet need n = 92 (22%)	Participants with ≥ 1 unmet need n = 325 (78%)	P value
Age, y				0.14
< 30	52 (13%)	15 (16%)	37 (11%)	
30 – 39	114 (27%)	31 (34%)	83 (26%)	
40 – 49	146 (35%)	25 (27%)	121 (37%)	
≥ 50	105 (25%)	21 (23%)	84 (26%)	
Gender				0.07
Male	305 (73%)	74 (80%)	231 (71%)	
Female	112 (27%)	18 (20%)	94 (29%)	
Race/ethnicity				<0.01
White	58 (14%)	16 (17%)	42 (13%)	
Black	278 (67%)	43 (47%)	235 (72%)	
Hispanic	81 (19%)	33 (36%)	48 (15%)	
HIV-risk factors				0.12
IVDU	58 (14%)	9 (10%)	49 (15%)	
MSM	146 (35%)	40 (43%)	106 (33%)	
Other [a]	213 (51%)	43 (47%)	170 (52%)	
New HIV Diagnosis				<0.01
Yes	46 (11%)	22 (24%)	24 (7%)	
No	371 (89%)	70 (76%)	301 (93%)	
Baseline CD4				0.98
< 200	269 (65%)	59 (64%)	210 (65%)	
200 – 350	56 (13%)	13 (14%)	43 (13%)	
> 350	90 (22%)	20 (22%)	70 (22%)	
Baseline VL				0.55
< 400	85 (21%)	21 (23%)	64 (20%)	
≥ 400 or missing	327 (79%)	71 (77%)	256 (80%)	
Randomization				0.91
Mentored arm	202 (48%)	45 (49%)	157 (48%)	
Education control arm	215 (52%)	47 (51%)	168 (52%)	
Health insurance [b]				<0.01
Yes	123 (30%)	14 (16%)	109 (34%)	

Abbreviations: IVDU, intravenous drug use; MSM, men who have sex with men VL, viral load

[a]Other risk factors, no history of IVDU or MSM

[b]Health insurance include public and private health insurance

Prevalence of unmet needs

Approximately 78% (n=325) of participants reported having one or more unmet needs at baseline, including 143 (34%) who reported one or two unmet needs and 182 (44%) who reported three or more unmet needs. Participants reporting at least one unmet need at baseline were more likely to be African-American and less likely to be Hispanic, to have an existing HIV diagnosis as compared to having a new HIV diagnosis, and less likely to be uninsured as compared to having public or private health insurance (see Table 1). Of the 10 unmet needs surveyed, the most commonly reported unmet needs were dental care (55%) and financial needs (43%), followed by housing (34%) and transportation needs (29%).

Among participants who completed a baseline and 3-month survey (n=320; 84% of the 381 study participants known to be alive and not known to have moved out of the area), 145 (45%) reported a need for dental care that was unmet at either time point. Moreover, 133 (42%) reported financial needs and 103 (32%) reported housing needs that were unmet at either time point. In contrast, only 3% of participants reported a need for substance abuse treatment and 11% reported a need for mental health care services that were unmet at either time point.

Outcomes

Among all participants, 51% (n= 213) had VL improvement and 40% (n= 166) were retained in care at six months. In the mentor and control arms, 38 (19%) and 43 (20%) participants had missing VL at 6 months and were considered failures, respectively. In univariate analyses, there was a significant association between several individual unmet needs and VL improvement. VL improvement at six months was less common in participants who had unmet needs at baseline for housing, food, transportation, dental care, help taking medications, or case management. Retention in HIV care in follow-up was less common in participants with unmet needs for transportation or substance abuse treatment at baseline (see Table 2).

Table 2.

Association of baseline unmet needs with VL improvement and retention in care at 6 Months (n= 417)

Association of baseline unmet needs with VL improvement and retention in care at 6 Months (n= 417)

	VL Improvement [a] n=213 (51%)	*P* value	Retention in Care [b] n=166 (40%)	*P* value
Subsistence needs				
Housing		0.01		0.31
No need (n = 239)	133 (56%)		102 (43%)	
Met need (n = 37)	23 (62%)		15 (41%)	
Unmet need (n = 141)	57 (40%)		49 (35%)	
Food		0.05		0.44
No need (n = 210)	112 (53%)		87 (41%)	
Met need (n = 108)	61 (56%)		45 (42%)	
Unmet need (n = 99)	40 (40%)		34 (34%)	
Financial		0.14		0.56
No need (n = 175)	97 (55%)		75 (43%)	
Met need (n = 64)	35 (55%)		24 (38%)	
Unmet need (n = 178)	81 (46%)		67 (38%)	
Transportation		0.02		0.01
No need (n = 221)	124 (56%)		98 (44%)	
Met need (n = 73)	39 (53%)		33 (45%)	
Unmet need (n = 123)	50 (41%)		35 (28%)	
Medical needs				
Dental care		0.04		0.25
No need (n = 133)	68 (51%)		51 (38%)	
Met need (n = 56)	37 (66%)		28 (50%)	
Unmet need (n = 228)	108 (47%)		87 (38%)	
Information about medication side effects		0.21		0.93
No need (n = 328)	173 (53%)		132 (40%)	
Met need (n = 61)	30 (49 %)		23 (38%)	
Unmet need (n = 28)	10 (36%)		11 (39%)	
Help taking medications		0.04		0.95
No need (n = 353)	187 (53%)		140 (40%)	
Met need (n = 31)	16 (52%)		12 (39%)	
Unmet need (n = 33)	10 (30%)		14 (42%)	

Abbreviations: VL, viral load.

[a]VL improvement was defined as achieving at least one log10 decrease in VL or having a VL < 400 c/mL Missing VL = failure.

[b]Retention in care is defined as completing at least 1 primary care visit between 1 and 30 days after hospital discharge and at least 1 subsequent primary care visit between 31 and 180 days after discharge.

In multivariable analyses, we examined the association between unmet needs at baseline and outcomes, adjusting for age, sex, race, HIV risk factor, initial CD4 cell count and VL, being in the mentored or in the education control arm, new HIV diagnosis, and health insurance status. Having a dental care need at baseline that was met compared to having no need was significantly associated with higher odds of VL improvements at 6-month follow up (OR: 2.2; 95% CI: 1.04–4.50, p=0.03). In similar analyses, an unmet need for transportation at baseline compared to no need was significantly associated with lower odds of retention in care (OR: 0.5; 95% CI: 0.34–0.94, p=0.03). In addition, a met need for dental care compared to no need was significantly associated with higher odds for retention in care (OR: 2.06; 95% CI: 1.05–4.07, p=0.04).

Among the 320 participants with both baseline and 3-month surveys, participants who reported having an unmet need at baseline or at three months, compared to those who had needs that were met at both time points or who had no needs at both time points were significantly less likely to achieve viral suppression at six months for the following needs: housing (53%, 68% and 73%, respectively, p=0.01), food (52%, 65% and 70%, respectively, p=0.01), transportation (47%, 68% and 70%, respectively, p<0.01), dental care (58%, 84% and 57%, respectively, p<0.01), information about side effects (41%, 64% and 64%, respectively, p=0.04), help taking medications (31%, 65% and 66%, respectively, p<0.01), and case management (52%, 72% and 61%, respectively, p=0.02). Participants who reported having an unmet need at baseline or at three months, compared to those who had needs that were met at both time points or no needs at both time points were significantly less likely to be retained in care for the following needs: transportation (35%, 55% and 53%, respectively, p<0.01) and substance abuse treatment (29%, 27% and 50%, respectively, p=0.02; see Table 3).

Table 3.

Association of status of unmet needs at baseline and 3 months with VL improvement and retention in care at 6 months among participants with a baseline and 3-month survey (n=320).

	VL Improvement	P Value	Retention in Care	P Value
Subsistence needs				
Housing		0.01		0.11
No need at both time points (n = 142)	96 (68%)		74 (52%)	
Met need at both timepoints (n = 30)	22 (73%)		16 (53%)	
Unmet need at either timepoint (n = 148)	78 (53%)		60 (41%)	
Food		0.01		0.36
No need at both time points (n = 105)	74 (70%)		55 (51%)	
Met need at both timepoints (n = 83)	54 (65%)		38 (46%)	
Unmet need at either timepoint (n = 132)	68 (52%)		57 (43%)	
Financial		0.05		0.46
No need at both time points (n = 69)	50 (72%)		36 (52%)	
Met need at both timepoints (n = 52)	34 (65%)		26 (50%)	
Unmet need at either timepoint (n = 199)	112 (56%)		88 (44%)	
Transportation		<0.01		<0.01
No need at both time points (n =124)	87 (70%)		66 (53%)	
Met need at both timepoints (n = 78)	53 (68%)		43 (55%)	
Unmet need at either timepoint (n = 118)	56 (47%)		41 (35%)	
Medical needs				
Dental care		<0.01		0.34
No need at both time points (n = 53)	30 (57%)		20 (38%)	
Met need at both timepoints (n = 43)	36 (84%)		21 (49%)	
Unmet need at either timepoint (n = 224)	130 (58%)		109 (49%)	
Information about medication side effects		0.04		0.40
No need at both time points (n = 179)	114 (64%)		78 (44%)	
Met need at both timepoints (n = 107)	68 (64%)		54 (51%)	
Unmet need (n = 34)	14 (41%)		18 (53%)	
Help taking medications		<0.01		0.47
No need at both time points (n = 226)	149 (66%)		109 (48%)	
Met need at both timepoints (n = 52)	34 (65%)		25 (48%)	
Unmet need at either timepoint (n = 42)	13 (31%)		16 (38%)	

Abbreviations: CI, confidence interval; OR, odds ratio; VL, viral load.

When categorized into subsistence needs and medical needs, the number of unmet needs at baseline varied by demographic and clinical factors. Hispanic participants were least likely to report both subsistence and medical unmet needs compared to non-Hispanic white and African-American participants. Participants with an existing HIV diagnosis were more likely to report higher numbers of unmet subsistence needs and unmet medical needs than persons

with a new diagnosis. Females, participants whose route of infection was IV drug use, and insured were more likely to report a higher number of unmet medical needs than males, persons with sexual route of HIV infection, and persons without health insurance (see Table 4).

Table 4.

The number of unmet subsistence and medical needs at baseline by participant demographic and clinical factors (n=417)

Table 4.

The number of unmet subsistence and medical needs at baseline by participant demographic and clinical factors (n=417)

Variables	Unmet Subsistence Needs [a]				Unmet Medical Needs [b]			
	0 n (%)	1–2 n (%)	≥ 3 n (%)	*P* value	0 n (%)	1–2 n (%)	≥ 3 n (%)	*P value*
Age, y				0.39				0.05
< 30	20 (38%)	23 (44%)	9 (17%)		21 (40%)	28 (54%)	3 (6%)	
30 – 39	43 (38%)	50 (44%)	21 (18%)		48 (42%)	53 (46%)	13 (11%)	
40 – 49	51 (35%)	56 (38%)	39 (27%)		37 (25%)	83 (57%)	26 (18%)	
≥ 50	45 (43%)	44 (42%)	16 (15%)		38 (36%)	51 (49%)	16 (15%)	
Gender				0.21				0.01
Male	124 (41%)	122 (40%)	59 (19%)		118 (39%)	151 (50%)	36 (12%)	
Female	35 (31%)	51 (46%)	26 (23%)		26 (23%)	64 (57%)	22 (20%)	
Race/ethnicity				<0.01				<0.01
White	26 (45%)	20 (34%)	12 (21%)		21 (36%)	26 (45%)	11 (19%)	
Black	88 (32%)	126 (45%)	64 (23%)		81 (29%)	155 (56%)	42 (15%)	
Hispanic	45 (56%)	27 (33%)	9 (11%)		42 (52%)	34 (42%)	5 (6%)	
HIV-risk factors				0.47				0.03
IVDU	18 (31%)	26 (45%)	14 (24%)		15 (26%)	32 (55%)	11 (19%)	
MSM	62 (42%)	60 (41%)	24 (16%)		64 (44%)	69 (47%)	13 (9%)	
Other [c]	79 (37%)	81 (41%)	47 (22%)		65 (31%)	114 (54%)	34 (16%)	
New HIV Diagnosis				<0.01				<0.01
Yes	28	13	5 (11%)		29	17	0	

Abbreviations: IVDU, intravenous drug use; MSM, men who have sex with men VL, viral load.

[a]Subsistence need is defined as housing, food, financial, or transportation needs.

[b]Medical need is defined as dental care, information about medication side effects, help taking medications, case management, substance abuse treatment, or mental health.

[c]Other risk factors, no history of IVDU or MSM

[d]Health insurance include public and private health insurance

In multivariable analyses, we examined the relationship between the number of unmet subsistence and medical needs at baseline and outcomes, adjusted for age, sex, race, HIV risk factor, initial CD4 cell count and VL, being in the mentored or in the education control arm, new HIV diagnosis, and health insurance status. Participants who reported three or more unmet subsistence needs were significantly less likely than patients who reported no unmet needs to demonstrate VL improvement (OR: 0.51; 95% CI: 0.28 – 0.92; p=0.03) and to be retained in care (OR: 0.52; 95% CI: 0.28–0.91; p=0.03). A similar association was not observed with unmet medical needs (see Table 5).

Table 5.

Multivariable logistic regression analysis examining the association between VL improvement, retention in care, and number of subsistence unmet needs and medical unmet needs (n = 417)

	Subsistence needs [a]					Medical needs [b]				
	0	1–2		≥ 3		0	1–2		≥ 3	
		OR (95% CI)	P	OR (95% CI)	P		OR (95% CI)	P	OR (95% CI)	P
VL improvement	Ref	0.70 (0.43–1.15)	0.16	0.51 (0.28–0.92)	0.03	Ref	0.78 (0.48–1.26)	0.31	0.52 (0.25–1.07)	0.07
Retention in care	Ref	0.72 (0.45–1.15)	0.17	0.52 (0.28–0.95)	0.03	Ref	1.01 (0.63–1.61)	0.98	1.32 (0.66–2.63)	0.43

Abbreviations: CI, confidence interval; OR, odds ratio; VL, viral load

[a]Subsistence need is defined as housing, food, financial, or transportation needs

[b]Medical need is defined as dental care, information about medication side effects, help taking medications, case management, substance abuse treatment, or mental health

Odds ratio are adjusted for age, gender, race, HIV risk factor, initial CD4 cell count and viral load, being in the mentored or in the education control arm, new HIV diagnosis, and health insurance status

Discussion

In this study of a cohort of persons hospitalized and not in care for HIV, we found a high prevalence of unmet needs that varied by demographic and clinical characteristics. A greater number of unmet needs was associated with worse VL improvement and retention in outpatient HIV care at six months. Subsistence needs were particularly impactful. While other research has established many of these factors as barriers to successful HIV care, this study is one of few to focus on hospitalized persons, a group that is highly vulnerable.

An important and novel finding in our study is that the number of unmet subsistence needs had a significant effect on retention in care and VL suppression. The number of needs a patient experiences may reflect more than poor access to care and having few resources. It may also reflect a weak or under-resourced social network, low self-efficacy, low health literacy, and possibly other factors that make it more difficult for some patients to effectively manage their HIV infection.[29,30] For example, research shows that inadequate knowledge on ways to obtain services or perceived ineligibility for services is a barrier to services.[26] Increasing awareness of the availability of ancillary services might reduce the number of unmet needs burdening patients and could help them to be more adherent to their clinic visits and their medication regimens.[24,27] Broader access to programs that can assist in meeting subsistence needs could have significant individual and public health benefits.

The Ryan White HIV Program, public health insurance programs, and publicly funded health systems were developed to ensure better access to care and to achieve health equity.[31] However, we found evidence that gender, racial/ethnic, and social disparities do indeed still exist. Women reported more medical needs than men, which is consistent with other studies.[16] African-Americans were more likely to report unmet needs, while Hispanics were less likely to do so, compared to non-Hispanic white participants. Lower unmet needs among Hispanic participants was not anticipated based on prior research findings.[26,32] In our cohort, the variance in unmet needs by race and ethnicity was not explained by employment status, health insurance status, or income. Unmet needs are complex and related to the social determinants of health. They may be unlikely to be completely remedied by healthcare institutions, insurance programs, or other health-focused programs.[33] In addition, many other complex factors not explored in our study, including resources available through social and family networks, unreported income, variable reporting of need, and different perception of need could be areas to explore in future research.

Participants who were newly diagnosed with HIV reported fewer subsistence and medical needs. Newly diagnosed patients had higher rates of retention in care and VL improvement compared to patients who were out-of-care, even after adjusting for demographic and clinical variables and unmet needs. The patient group with an established diagnosis of HIV and who are then hospitalized is enriched with persons who have been unsuccessful in caring for their HIV, while the newly diagnosed appear to be a more heterogeneous population.

Regarding specific unmet needs, requiring help or assistance with transportation consistently and significantly reduced the chances of achieving VL improvement and remaining in care. On the other hand, when this need was met during the follow-up period, it was significantly associated with better retention in care and VL improvement (Table 3). Even after adjusting for other factors, patients who had difficulty securing transportation at baseline were less likely to be retained in care at 6-month follow up. Harris County, which includes Houston and which Ben Taub Hospital serves, is one of the largest counties, in terms of square miles, in the U.S.; using its public transportation system can require considerable travel time. Our results are consistent with numerous other studies which have found that unmet transportation needs have a negative impact on retention in care and clinical outcomes.[24,34,35] The evidence from our study supports broadening and strengthening transportation assistance programs.

Dental care was the most commonly reported unmet medical need at baseline and at three months. After adjusting for other factors in a multivariable analysis, receiving dental care had a positive relationship with VL improvement and retention in care. We suspect the association

observed in our study reflects confounding with more resources or more engagement with the health care system among those who had a need that was met for dental care rather than a causal relationship between dental care and VL improvement and retention in care. Prior studies have established significant unmet dental care needs, especially among low-income PLWH.[27,36] Despite initiatives to provide dental services to PLWH, service utilization remains low and unmet needs remain high.[37] PLWH are more likely to receive dental care if they are in stable housing, have higher education, or have had help to get dental care[37] and less likely to get dental care if they are African-American and have more urgent physical and mental health needs.[38] Our findings suggest that offering access to dental care as part of integrated health services may draw PLWH into care and increase the likelihood of achieving viral suppression and result in improved patient health outcomes.[39]

Needs for mental health services and substance abuse treatment were not prominent in our study. Only about 10% of participants reported an unmet need for each of these medical services. Collection of self-reported data about substance abuse and mental health is often the most practical approach in research; however, responses may be influenced by multiple factors, including a participant's ability to recall or unwillingness to disclose this information.

Although we found a significant relationship between some specific needs and retention in care and VL suppression, the relationship of other needs with these outcomes was not always as expected. There are several possible reasons why some unmet needs did not correlate with retention in care and VL suppression. In contrast to other studies, we only included hospitalized patients who were out of care, a large percentage of whom had advanced HIV disease. Comorbid medical conditions and illness related to the hospitalization could have driven some persons to obtain follow-up care and achieve better outcomes despite unmet needs. This effect might be less pronounced in a population of outpatients with HIV infection. Second, patients living with HIV face multiple barriers to retention to care and VL suppression that are complex and intertwined, such as competing life events, HIV stigma, poor relationships with medical providers, and unsatisfactory experiences with clinic services.[30,40]–[42] Some of these barriers are difficult to measure, and we could not account for them in our study. Our study has additional limitations. The needs in our study were self-reported, and a simple count of unmet needs may not reflect the true magnitude of these needs. Our analysis is limited to a cohort enrolled from a single hospital; thus, our results may not be broadly generalizable.

Unmet medical and subsistence needs are very common in a highly vulnerable group of PLWH who are hospitalized and not in HIV care. Incorporating a needs assessment on hospital admission for PLWH and trying to address those needs in discharge management could potentially help patients attend their clinic visits and achieve viral suppression. Transportation needs uniquely contribute to poor continuum of care outcomes after hospital discharge, and, in general, a greater number of unmet subsistence needs predicts worse retention in care and VL improvement after discharge. These findings provide evidence that a needs assessment and provision of ancillary services to individuals who are most in need are essential to reduce health disparities and improve clinical outcomes of PLWH.

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Footnotes

Conflicts of Interest

The authors have no conflicting financial interests.

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