



Improving Care Outcomes for PLWH Experiencing Homelessness and Unstable Housing: a Synthetic Review of Clinic-Based Strategies

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Abstract

Purpose of Review Singular interventions targeting vulnerable populations of people living with HIV (PLWH) are necessary for reducing new infections and optimizing individual-level outcomes, but extant literature for PLWH who experience homelessness and unstable housing (HUH) has not been compiled. To inform implementation of clinic-based programs that improve care outcomes in this population, we present a synthetic review of key studies examining clinic-based interventions, specifically case management, patient navigation, financial incentives, and the use of mobile technology.

Recent Findings Results from unimodal interventions are mixed or descriptive, are limited by inability to address related multi-modal barriers to care, and do not address major challenges to implementation.

Summary Multi-component interventions are needed, but gaps in our knowledge base may limit widespread uptake of such interventions before further data are compiled. Future research evaluating interventions for PLWH experiencing HUH should include implementation outcomes in order to facilitate adaptation across diverse clinical settings.

Keywords HIV · Homelessness and unstable housing · Retention in care · Review · Interventions

Introduction

Homelessness and unstable housing constitute a major implementation challenge to realizing the aims of the End the HIV Epidemic to reduce HIV incidence and improve treatment outcomes across the United States (US) [1]. The ecology of homelessness—in which violence, incarceration, stigma, and structural inequalities [2] synergize with co-

occurring individual-level factors, such as psychiatric disease [3–6], substance use [7], and poverty [2] to exacerbate barriers to care engagement, such as keeping scheduled appointments, that contribute to negative care experiences [8–20]. Fragmented care engagement patterns among PLWH experiencing homelessness and unstable housing (PLWH-HUH) reflect this confluence of individual-level and structural-level barriers to care, which shift care delivery towards drop-in, acute care, and emergency room settings that are poorly equipped to address both primary care and specialty HIV needs [11–13]. Consequently, poor clinical outcomes, such as low virologic suppression rates that decrease further with progressive housing instability, disproportionately burden PLWH-HUH [14–16]. Moreover, not only are HUH more likely to acquire HIV in the first place, but those with HUH at the time of diagnosis have a 27-fold higher risk of death [17, 18].

While more enduring improvements in clinical outcomes among PLWH-HUH require more housing units and housing subsidies [19], there may be untapped opportunities in the clinical settings to improve outcomes for these patients as housing provisions are being addressed [20, 21]. Proposed strategies for improving outcomes within this population must

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simultaneously address other drivers of disparities in HIV outcomes, including stigma, challenges in patient-provider relationships, mental illness if present, substance use if present, and competing unmet needs including food insecurity, among others [8–10, 22–28]. Moreover, *the structure of systems of clinical care* (e.g., the current system of mandating scheduled appointments) and contextual challenges confronting implementation of evidence-based interventions require addressing to successfully deploy programs for PLWH-HUH in real-world settings [26, 29].

Strategies that have been tested to improve care outcomes among PLWH-HUH are limited but have not been summarized in a single critical review to date. Hence, we present here a synthetic review of clinic-based interventions that impact important care cascade outcomes among PLWH-HUH, specifically focusing on case management [30, 31], patient navigators [32•], financial incentives [33•], and text messaging for patient communication [34•]. By highlighting the gaps in the current literature, we discuss future directions for structuring interventions and propose an implementation research agenda to refine and adapt clinical-based programs for PLWH-HUH.

Strategies for Improving Care Outcomes Among PLWH Experiencing Homelessness and Unstable Housing

Case Management

US guidelines for the care of PLWH, with or without unstable housing, recommend case management, a multi-disciplinary approach that coordinates patient care and provides services to address unmet needs, as a key strategy to improve retention in care [35–38]. Two randomized controlled trials examined linking PLWH-HUH to case managers to assist with rapid re-housing referrals versus passive referral to housing provisions [30, 31]. At the end of 12 months of observation, Towe et al. found that PLWH recruited from emergency housing in New York City for enrollment in case management program to provide rapid re-housing were more likely to be placed in to housing (45% vs. 32%, $p = 0.02$) and have improvements in rates of virologic suppression (adjusted odds ratio 2.1; 95% CI 1.1–4.0) [31•]. Buchanan et al. similarly observed significantly higher virologic suppression rates in PLWH-HUH randomized to case managers to assist with permanent housing placement for PLWH following release from inpatient hospital stay versus receiving passive referral to permanent housing (36% vs. 19%, $p = 0.051$) over 12 months, with only 65% in the intervention arm obtaining permanent housing [30]. Housing placement in the control arm was not evaluated. The differential impact of receiving housing provisions versus case

management alone without housing on the odds of achieving virologic suppression was not evaluated.

To evaluate whether addressing unmet housing needs served as a mediator in improving HIV care outcomes via case management interventions, Rajabian et al. performed a descriptive analysis of a multi-site, Ryan White-funded Special Project of National Significance demonstration project in which PLWH-HUH were enrolled in a combined case management and patient navigation program [39]. The program demonstrated high rates of retention in care (82.9%), defined as having two HIV primary medical appointments at least 90 days apart in the 12-month observation period, and high virologic suppression rates at 12 months (72.6%). However, among those who improved their housing status—through obtaining either temporary or permanent supportive housing—compared to those who remained homeless or unstably housed showed greater improvements in retention in care by this definition (86% vs. 79%; $p = .02$; adjusted odds ratio [AOR] = 2.12; 95% confidence interval [CI] = 1.11, 4.05) and achieving virologic suppression at any time during the observation period (77% vs. 66%; $p = .002$; AOR 1.62; 95% CI = 1.03, 2.55). Similarly, a second observational study of care cascade outcomes following enrollment in a case management program in Ryan White clinics in New York City (NYC) [40] showed higher rates of engagement in care (EiC; defined as having at least two laboratory tests dated ≥ 90 days apart, with at least one in each half of the year) and virologic suppression (VS) for people with unstable versus stable housing at baseline in a pre-post analysis: EiC 63.8 to 90.6% (relative risk of EiC [RREiC] = 1.42 (95% CI 1.36–1.48)) versus 71.5 to 91.0% (RREiC = 1.27 (95% CI 1.25–1.30)); VS 21.8 to 44.3% (relative risk of virologic suppression (RRVS) = 2.03 (95% CI 1.83–2.25)) versus 33.1 to 57.8% (relative risk of VS = 1.74 (95% CI 1.67–1.82)). Moreover, greater improvements in EiC and VS were observed for those that improved housing status, defined as obtaining stable housing: 57.9 to 96.2% (RREiC 3.03, 95% CI 2.27–4.03) and 18.2 to 55.0% (RRVLS = 1.74 (95% CI 1.67–1.82)).

Brief case management interventions have also been evaluated in vulnerable populations, but the efficacy in these studies has been mixed. A multi-center, randomized controlled trial evaluating a brief, 5-session strength-based case management intervention (i.e., a relationship-centered strategy that identifies the patient's internal strengths and abilities and develops a personal plan to acquire needed resources to overcome barriers to care) versus passive referral to HIV care found statistically significant improvements in having attended at least one visit within 6 months of diagnosis (78 vs. 60%; adjusted relative risk (aRR), 1.36; $p = 0.0005$) and having at least two visits in 12 months (64 vs. 49%; aRR, 1.41; $p = 0.006$) [41]. A secondary analysis of this intervention showed that the intervention had a stronger effect among PLWH who reported HUH compared to those who reported stable housing at baseline (RR 2.47 vs. 1.18, $p = 0.046$) [42•]. Additionally, in a small feasibility study conducted among 89

previously diagnosed PLWH in jail, Spaulding et al. evaluated a brief (6-session) strength-based case management intervention ($n = 44$) compared to passive referral to HIV care ($n = 45$) and found a non-statistically significant higher rate of retention in care (defined as having 2 viral load measurements over the 12 months after being released from jail) in the intervention group compared to the comparison group (52% vs. 40%, 95% CI 0.71–3.81) [43]. Housing status was only evaluated at baseline in the intervention arm and showed a statistically significant lower odds of achieving virologic suppression 12 months after release (unadjusted odds ratio 0.13; 95% CI 0.02, 0.78; p value = 0.02). In all studies, attending more sessions with a case manager was associated with improved outcomes, suggesting a complier effect [42, 43].

These studies suggest that while case management can be an effective strategy at improving linkage to care, intervention efficacy may be limited by multiple competing needs. Further analyses are needed to understand the impact of important mediators of case management on both unmet needs (e.g., food insecurity, transportation needs, and receipt of social benefits programs), with specific emphasis on housing status, and their impact on patient experience in medical care (e.g., reduction in stigma, behavior change, developing a trusting relationship with providers) on care outcomes [44]. Moreover, using implementation science methodology to evaluate these outcomes can inform refinement and adaptation programs to enhance the most effective components and can inform the feasibility and adoption of programs across a diversity of regions, where contextual, political, and economic conditions (e.g., cost of living, housing affordability) can limit implementation, and across unique clinical settings (e.g., jails, community-based relinkage programs) which have unique logistical constraints [39, 45, 46].

Patient Navigation

Clinical trials examining patient navigation, a patient-centered care model designed to coordinate care utilizing either peers (people who share similar sociodemographic characteristics) or trained professionals (e.g., social workers, case managers), have demonstrated efficacy in improving retention in care outcomes for PLWH, but the few evaluations that examine the impact of navigation for PLWH-HUH have demonstrated mixed results [47]. In a well-designed randomized controlled trial among PLWH who were exiting jail in Los Angeles County, the use of peer navigators for appointment reminders and accompanying patients to appointments in addition to providing transitional case management resulted in higher virologic suppression (49%) rates at 12 months over transitional case management alone (36%; unadjusted treatment difference of 13.6%; 95% CI 1.34%–25.9%; $p = .03$). A test for interaction suggested higher efficacy of the intervention for PLWH experiencing homelessness ($p = .004$ for the interaction). However, a multi-site study

examining a peer navigation program for African Americans administered across three urban centers demonstrated that those with unstable housing at baseline were no more likely to have a 4-month gap in care than those who were housed, despite the navigation intervention, but subgroup analysis showed lower rates of having a 4-month gap in care for people reporting stable housing at baseline compared to those who were experiencing HUH [48]. Other studies of patient navigators have shown efficacy, even in patient populations with multiple competing needs: a study among PWLH leaving jail found a higher odds of retention in care over 12 months with peer navigation (OR = 1.95; 95% CI = 1.11, 3.46) [49]; in a study among PLWH with injection drug use, 49% of whom reported homelessness or unstable housing, patient navigation resulted in higher rates of virologic suppression (46.2% vs. 35.2%; 95% CI 2.5–19.4%; $p = .04$) and higher rates of linkage to care (86.7% vs. 66.8%; 95% CI 12.4–27.3%; $p = .003$) at 6 months [33]; in a small non-randomized pilot intervention of patient navigation among PLWH, where 67% were homeless, virologic suppression rates were higher for those in the navigation arm compared to those in the control arm (74% vs. 34%, respectively; $p = 0.008$).

Differences in efficacy between these studies examining patient navigation likely resulted from a multitude of factors and suggest further areas of research. First, heterogeneity in program design may explain differences between study results. For instance, some programs had higher navigator attrition rates, which may negatively impact the maintenance of trust and report between clients and navigators, but these navigator-level characteristics were not evaluated [32, 47, 50]. Similarly, level of navigator training and peer-based models may be important components driving navigator efficacy, but these factors were not evaluated. Second, program success may be significantly limited by community-level factors, such as availability of psychiatric or substance use services, which many studies did not evaluate. Lastly, study populations may play a crucial role in determining efficacy of navigator interventions—navigation was beneficial for individuals being released from jail and from the hospital, where study participants were linked at a stable institutional touch-point [23].

Mobile Technology

Mobile technology, which can be used to support health promotion and behavior change, can be used across diverse clinical settings [51, 52], but domestic literature on this intervention has been limited, especially among socioeconomically marginalized populations [53, 54]. In a large randomized controlled trial which evaluated the use of (1) thrice-weekly text messages, plus texted primary care appointment reminders and a monthly text message requesting confirmation of study participation versus (2) texted reminders and monthly messages alone, in an urban, domestic HIV clinic among PWLH with poor retention in care or who were new to the clinic showed no improvement in virologic

suppression rates (48.8% vs. 45.8%; OR 1.07; 95% CI 0.82–1.39) or mean visit adherence (63.5% vs. 68.2%; OR 0.95; 95% CI 0.84–1.03) over 12 months. Participants reported a high prevalence of homelessness and unstable housing (65%), but the effect of socioeconomic vulnerabilities (e.g., housing status) on engagement with the intervention's text messages and study outcomes was not performed [34, 55]. In contrast, two smaller studies showed more favorable results, but conclusions were limited by non-randomized study designs and small sample sizes [56, 57]. One study by Wohl et al. was performed among PLWH leaving prison and evaluated the impact of provision of mobile phones upon release and text reminders for pill adherence. This study found no difference in virologic suppression rates between the intervention and control groups, although a higher proportion of participants in the intervention arm demonstrated linkage to a first appointment (82% vs. 76%; $p = 0.02$) [56]. The second small pilot study evaluated the use of a mobile smartphone program with two-way messaging, via a pre-post design, in a cohort of 77 PLWH, 26% of whom were homeless or unstably housed. This study showed improved retention in care and virologic suppression rates after the intervention compared to baseline (88% vs. 51%, $p < 0.001$) at 6 months [57]. Evaluation of outcomes after 24 months of enrollment in this clinic intervention showed similar effects [58].

The use of mobile technology may be a low-cost, effective strategy to engage patients for whom mobile phone communication is a preferred means of remaining connected with clinic staff, but may be limited by high rates of cellphone turnover among PLWH-HUH [34]. Moreover, questions remain regarding patient preference for and impact of different mobile phone-based intervention designs on clinical outcomes, including program functions (e.g., providing reminders, two-way vs. one-way, direct provider communication), the use of personalized messaging, or interactive communication [34, 59, 60].

Financial Incentives

Financial incentives can promote behavior change and assist in mitigating unmet needs of PLWH-HUH to enhance linkage and retention in care. One large, three-armed randomized controlled trial performed among hospitalized PLWH who inject drugs (48% of whom reported unstable housing), conducted by Metsch et al., compared patient navigators plus financial vs. financial incentives versus treatment as usual, defined as referral to HIV care provider following release, for a duration of 6 months. Financial incentives were administered for achieving certain targeted behaviors: (1) attending up to 11 patient navigation sessions (up to \$220); (2) completion of required identification, insurance, and other paperwork (\$80); (3) four visits to an HIV clinic over 12 months (\$180); (4) attending substance use disorder treatment (\$90); (5) submitting drug and alcohol-negative specimens to the patient navigator (\$220); (6) having blood drawn at two

laboratory visits (\$50); and (7) filling an active prescription for antiretroviral therapy (ART) (\$170). The group receiving financial incentives plus navigation showed higher rates of having a visit with an HIV care visits at 6 months (86.7% vs. 66.8%, risk difference 19.9% (95% CI 12.4–27.3%; $p = .003$)) when compared to the usual care group, but there was no difference between the navigation plus incentives group versus navigation alone; the risk difference for virologic suppression between participants in the navigation versus navigation plus incentives arms was -8.0% (95% CI -14.9 to -1.1% ; $p = .01$) [33]. In a secondary analysis, provision of financial incentives was associated with an increased frequency of meetings with patient navigators compared to the patient navigation arm alone [61], although no additional improvements in virologic suppression were observed in the group receiving financial incentives compared to those receiving patient navigation alone. Regardless, intervention efficacy waned in the 6 months following the removal of financial incentives and subgroup analysis showed no additional benefits for individuals reporting homelessness and unstable housing. In an additional study that randomized community clinics to administering financial incentives to patients for viral suppression and continuity of care, financial incentives improved viral suppression rates (absolute risk difference 3.8%; 95% CI 0.7–6.8%; $p = .01$), but not retention in care, although the prevalence of PLWH-HUH was not reported [62]. Lastly, a number of smaller, single-site studies of conditional economic transfers found improved rates of antiretroviral adherence and virologic suppression among PLWH, but housing status was not characterized among participants [63–65].

Financial incentives are a promising intervention to improve visit attendance, virologic suppression rates, navigator engagement, and retention in substance use treatment, but evidence for this strategy is scarce in the domestic setting. Moreover, the cost of such incentives may be prohibitive to implementation and maintenance. Metsch et al. reported that the median payment to participants in the financial incentive arm was \$716 (IQR \$495–\$890) over 6 months. Furthermore, studies consistently observe that efficacy is not sustained after removal of the incentives, suggesting that financial incentives require additional interventions to promote sustained behavioral change [33, 64].

Future Directions of Clinic-Based Interventions

Relationship-Centered Care

Relationship quality between the patient and provider, enhanced by a positive communication style and mutual trust, mutual trust, is an important component of primary care delivery to enhance patient satisfaction, retention in care, and adherence to ART [8, 9, 66]. Multiple observational studies have reported that high self-reported satisfaction with the

patient-provider relationship is associated with improved adherence [44, 66–68] and retention in care [69]. While no intervention has been specifically designed to improve patient satisfaction with providers, qualitative evaluations of some randomized controlled trials report improvements in patient-provider relationships, or the perception of a caring provider is a commonly reported benefit of intensive interventions to improve retention in care, which have been reported benefits for navigator programs [34•].

Multi-component Clinic Programs Coupled with Low-Barrier Access to Care

The need for adhering to scheduled clinic appointments is frequently cited as a barrier to retention in care by PLWH [8–10]. Despite the absence of data from prospective studies evaluating low-barrier access to care, allowing for unscheduled visits has been recommended for primary care programs serving PLWH experiencing homelessness and unstable housing [70]. Evaluations of clinics with open-access combined with multi-component interventions to improve care outcomes have shown promise among vulnerable PLWH and for people without HIV, but results are difficult to generalize outside of the single sites involved in these studies. The MAX clinic at the University of Washington provides open-access HIV primary care alongside a package of interventions (e.g., financial incentives, intensive case management, and enhanced outreach) to PLWH (65% with homelessness or unstable housing) struggling to engage in the traditional HIV primary care model [71]. This model of care led to improvements in viral suppression from the 12 months before to the 12 months after enrollment into this model, compared to contemporaneously matched controls who maintained routine clinic-based care (from 20 to 82% MAX patients, $p < .001$; from 51 to 65% controls; $p = .04$), although this study was not randomized [72]. An additional adjusted analysis of the MAX clinic that used a more rigorously designed comparator group demonstrated improvements in engagement in care for the intervention group compared to the comparison group (82% vs. 44%; adjusted relative risk ratio, 1.3; 95% CI 0.9–1.9). Another descriptive study evaluating a mobile, interdisciplinary HIV care team for PLWH-HUH consisting of a medical provider, registered nurse, medical social worker, housing case manager, peer navigator, and program manager demonstrated that rates of viral suppression measured at least once during the 12 months of program enrollment were high (79%) [73]. Similar models of open-access primary care among people experiencing homelessness and unstable housing without HIV have shown promise in achieving retention in care, patient satisfaction, and decreases in acute care utilization but are resource intensive, and generalizability may be limited by intervention heterogeneity and diversity of clinical settings [73–75].

Multi-component interventions in clinic-based settings, while promising by virtue of their ability to address multi-

level barriers to care, require rigorous evaluation to accommodate heterogeneous intervention implementation [72]. Evaluations of important components of program reach, efficacy, and implementation may be resource intense, but can provide a nuanced understanding of these outcomes can facilitate widespread adoption across diverse clinical settings with competing logistical constraints. Moreover, sustainability of resource-intensive interventions may be limited by regional funding constraints, which require further understanding for successful adoption [71].

Conclusions

Clinic-based interventions, including case management, patient navigation, text messaging, and financial incentives, are feasible strategies to improve care outcomes among PLWH-HUH, although results have been mixed. Some data exist to support the use of long-term, intensive case management interventions and patient navigation services, while weak evidence supports the use of providing financial incentives or using mobile technology to improve care engagement. Moreover, the heterogeneity of intervention designs to date is a major obstacle to understanding challenges to real-world implementation. For instance, further research on financial incentives is needed to refine our understanding of the most effective amount and justification for administration will result in durable improvements in care outcomes [76]. Similarly, in terms of mobile technology, the combination of two-way, interactive mobile technology with peer navigation may enhance effectiveness [34•]. Finally, although combining multi-component interventions with re-structuring of primary care delivery to offer patient-centered, low-barrier primary care visits (without the need for appointments) is a promising strategy for PLWH-HUH, rigorous research evaluations of these programs may be logistically challenging [11, 71].

Successful adaptation of multi-component programs across unique geographic, economic, social and political contexts will require further implementation research in order to understand effective methods for engaging local public health and community institutions [77–79]. Future research can be enhanced by evaluating the differential impact of key individual-level characteristics (e.g., substance use, non-conforming gender identification, and psychiatric disease) versus broader structural and social characteristics on program implementation and outcomes [28, 77, 80, 81]. Given that clinical outcomes among PLWH-HUH are poor, further research and implementation of effective clinic-based programs for this group, combined with greater housing advocacy and provision, are essential to achieving the goals of the US End the HIV Epidemic initiative [28, 79].

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Compliance with Ethical Standards

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