Primary Care for Homeless Veterans: A Narrative Review

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Abstract

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Context: There is a high burden of homelessness among veterans. Primary care can be an important mitigating factor of poor health outcomes such as duration of homelessness and control of chronic medical conditions. However, traditional primary care models have not met the unique needs of homeless individuals. The VA has addressed this by adopting a homeless-tailored primary care model for homeless veterans. However, there are no reviews on homeless-tailored primary care or primary care for homeless veterans.

Objective: To evaluate and identify gaps in the existing knowledge on primary care for homeless veterans to facilitate ongoing program development and direct further research.

Methods: Systematic literature search to identify relevant articles on primary care for

homeless veterans. Two authors independently screened and reviewed full text of articles that met inclusion criteria. Data was extracted then analyzed using a narrative synthesis methodology.

Results: 8 articles were included in this review. Health care utilization patterns of increased primary care use and decreased emergency services use were linked to homeless-tailored care. Homeless-tailored care also conferred improved patient satisfaction and provider trust. There were not conclusive data on health outcomes or housing related to primary care.

Conclusions: Homeless-tailored care is a productive care model within the VA. However, further investigation is needed to maximize the potential of primary care for reaching and caring for this vulnerable population.

Introduction:

Homelessness is associated with a greater prevalence of chronic disease and increased risk of mortality.[1-4] These disparities are even more pronounced among homeless veterans who make up approximately 10% of the adult homeless population.[5-8] Homelessness also affects the overall healthcare system through greater utilization of emergency department care, but lower utilization of primary care and preventive services.[9,10] However, primary care can be an important mitigating factor of poor health outcomes, such as duration of homelessness and control of chronic medical conditions.[11]

Traditional primary care models and health care systems have often not met the needs of homeless individuals, even when their poor health places them at high risk of death.[2,12] Therefore, these traditional models of primary care need to evolve to meet the unique needs and challenges facing homeless persons. To accomplish this, experts have advocated for homeless-focused, coordinated primary care with expanded services as a way to diminish health disparities and poor outcomes experienced by homeless patients.[12-14]

The U.S Department of Veteran's Affairs (VA) has made significant efforts to combat the high burden of homelessness among veterans. Most notably, The Opening Doors Campaign set a goal in 2010 to end homelessness among veterans by 2015. Programs were added or increased to create multiple channels to access health care, social services and housing.[15] This included adapting the VA's medical home model (Patient Aligned Care Team, PACT) into a homeless population-tailored primary care clinic (Homeless-PACT or H-PACT). The H-PACT model was adopted nation-wide in 2011 and is a multi-disciplinary, population-based medical home aimed at meeting the unique

medical and social challenges facing homeless veterans accessing and engaging in care.[16] The five core elements that differentiate the H-PACT model from traditional primary care models are: 1) reducing barriers to care: open-access, walk-in care and community outreach; 2) one-stop, wrap around services: integrated and coordinated mental health, homeless programs and primary care co-located services with some H-PACTs providing food, clothing, hygiene and laundry assistance; 3) intensive case management: coordinated with community agencies; 4) high-quality, evidence-based and culturally sensitive care: ongoing homeless care skill development for staff; 5) performance-based and accountable: real-time data and predictive analytic applications to target those most in-need.[16] With this adoption and expansion of homeless-tailored primary care within the VA, new questions regarding the efficacy, performance and execution of this model have emerged.

Previous reviews have evaluated access to primary care for homeless persons, interventions to improve the health of homeless persons, and homelessness among female veterans.[2,17-19] However, little is known about primary care delivery for homeless veterans. To our knowledge, there are no reviews on primary care for homeless veterans. Therefore, the purpose of this review is to evaluate and identify gaps in the existing knowledge on primary care for homeless veterans to facilitate ongoing program development and to direct further research.

To that end, our primary question is: what is the extent and quality of evidence that has been reported on primary care for homeless veterans? Our secondary questions are: 1) What are the focus areas of current research; and 2) What are the effects of primary care on health outcomes, housing status and quality of life for homeless veterans? The specific aims of this review are to:

- Synthesize the available literature on primary care for homeless veterans.
- Assess the quality of the available literature.
- Evaluate outcomes of primary care studies on homeless veterans - with special emphasis on disease management, housing status, and quality of life.

Methods:

This study was designed and conducted in adherence with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[20] with a pre-specified, documented protocol (PROSPERO registration number: CRD42016044074).[21] Given various study designs that were not amenable to pooling, a meta-analysis was not appropriate for this systematic review.

Search strategy:

A systematic literature search of the PubMed, PsychINFO (Medline), CINAHL Plus and Scopus databases was conducted on November 21, 2016. Search parameters incorporated a combination of controlled vocabulary terms and words describing the concepts of veterans, homelessness, and primary or patient-centered care. Grey literature was identified through searches of ProQuest Dissertations, Thesis Global and GreyLit.org. The search was not restricted by date of publication.

Study selection:

Studies were included if they met the following criteria: (1) peer-reviewed articles published in English; (2) study population consisted of at least 50% homeless veterans; (3) design was experimental, observational, descriptive or qualitative; and (4) evaluation of primary care as an intervention or related to an outcome (categorized as: implementation, care model, utilization, access, engagement, patient outcomes or

patient/provider perspectives).

Studies were excluded if they met any of the following criteria: (1) study population less than 50% homeless veterans; (2) a case study or report, methods development, abstract only, commentary, preliminary reports, books or book chapters.

Two authors (AH and BA) initially performed independent screens of titles and abstracts to exclude obviously irrelevant articles then both performed independent, full-text reviews based on inclusion and exclusion criteria. Disagreements regarding eligibility were resolved by a consensus of all authors. The Covidence (Melbourne, Victoria) software program was used to track searches and included/excluded articles.[22]

Data Extraction:

The same two authors used a standardized review form to extract data from articles selected for final review. Data collected included: study aims, design, methods, population/setting, outcome measures, main findings and focus area. Focus areas were created based on their emphasis in the current literature on primary care delivery and homeless-tailored primary care.[12,14,17]

Quality Assessment:

The same two authors assessed risk of bias and study quality using the Checklist for Measuring Quality by Downs and Black.[23] Disagreements in ratings were resolved by discussion between the two authors. The Downs and Black tool was chosen for its applicability to a wide range of study designs and has been widely evaluated and recommended for use in systematic reviews.[24,25] The tool has 27 questions measuring 5 domains, which include: reporting, external validity, bias, confounding, and power. The

total score was taken into account in combination with study design in the overall rating of study quality (good, fair, poor).

Data Synthesis

Narrative synthesis provides analysis of relationships within and between studies with an overall assessment of the robustness of evidence.[25,26] The method involves developing a theoretical framework; preliminary synthesis of findings; exploring relationships within and between studies; and assessing the robustness of the synthesis.[25] Given that there was no single intervention evaluated in this study; our framework was comprised of the focus areas that emerged. We then explored how the focus areas were related in the ensuing synthesis. Therefore, the synthesis was an iterative process. In our analysis, we considered the strength of evidence and consistency of observed effects across studies with consideration for possible inconsistencies in our attempts to draw reliable conclusions.

Results

Description of studies:

The electronic database search retrieved a total of 162 articles. Of those, 18 articles appeared to meet inclusion criteria after initial title and abstract review. Following full text review, a total of 8 articles remained for inclusion. Of the articles excluded after full text review, 7 articles had an indeterminable percentage or less than 50% homeless veterans, 2 articles did not specifically evaluate aspects of primary care and one was a methods article. (Figure 1)

Of the 8 articles included in this review, 7 utilized observational data and 1 utilized data from an experimental randomized, non-blinded study. Among the observational studies,

2 used longitudinal cohort data, 1 used retrospective cohort data, 2 were cross-sectional, 1 used a pre-post design, and 1 was a case-series study. Most studies incorporated some amount of survey data into their findings, and two studies were program evaluations. Two sets of articles were based on the same study populations. Only 2 studies included nation-wide data; 1 study compared multiple sites from Massachusetts, California, Pennsylvania and Alabama, while the rest of the studies were based on populations in the greater Los Angeles area or New England (specifically Rhode Island or Massachusetts). Finally, one author published over half of the articles. (Table 1)

Quality assessment:

The majority of studies were of fair or good quality (Table 2). The main limiting factors in quality were the inherent risk of bias with study designs, specifically cross-sectional and case series. In addition, variation in comparison groups (historical controls); loss to follow up; and inability to determine if study groups were a true representation of the source population were also factors that limited manuscript quality.

Study populations:

Overall, the study populations were fairly similar and representative of national statistics for homeless veterans.[5] The average age ranged between 46 and 53 with over 90% males in all studies. Race/ethnicity was the most variable demographic factor between study populations, ranging between 50% African American to 81% white, with reporting of race/ethnicity different between all studies. Notably, not all studies measured time spent homeless, service-connected disability status, rates of chronic medical conditions, presence of mental illness or substance or the definition of homelessness used. (Table 1)

Focus areas:

Five studies evaluated homeless-tailored primary care models with health services utilization being the most common outcome studied. Three studies assessed engagement with care or patient's perceptions of care, however evaluation methods varied among studies. Only one study measured clinical outcomes[27], while another included self-reported health status as a secondary outcome[28]. (Table1)

Outcomes:

Receipt of care:

Two studies looked at time to initial receipt of care and found improvement with homeless-tailored efforts. Nearly all patients in a co-located model received a same-day visit compared to those in traditional primary care (0.3 days ± 1.8 v. 53.2 days ± 1.7, $p<0.001$).[28] Only one study looked directly at patient engagement interventions.[29] A personal health assessment/behavioral intervention (PHA/BI) paired with a clinic orientation (CO, consisting of a clinic tour and introduction to staff and services) had the highest rates of primary care access within both 4 weeks and 6 months, followed by the CO-only group, both were significantly higher than the PHA/BI-only and usual care groups (CO-only: HR 2.64 95% CI 1.5-4.53; PHA/BI+CO: HR 3.41 95% CI 2.02-5.76).

Utilization:

Primary Care:

All the studies that evaluated health services utilization reported increased primary care utilization following enrollment in homeless-tailored primary care *(Table 1*). One study[28] reported a higher number of visits/user as well as a higher preventative service receipt ratio (number of 10 services received/number of services eligible for) over 18 months follow up for patients in a co-located clinic compared to traditional care (7.4 ± 0.6 v. 4.7 ±

0.6 visits/user, p=0.01; 0.57 ± 0.1 v. 0.44 ± 0.1 service receipt ratio, p=0.01). Another study[27] found an initial increase then decrease in visits/users over 12 months following enrollment in tailored-care; yet was still greater than the control group in non-tailored care (p=0.05). An additional study[30] reported six-month post-enrollment data with 8.4 visits/person compared to 2.5 in a non-homeless group newly enrolled in traditional primary care (no p-value). Finally, a fourth study[31] reported 5.9 visits/user after enrollment in an H-PACT compared to 1.8 visits/user prior to enrollment.

Emergency Department (ED):

ED use was the most extensively studied utilization outcome. Although measurements varied widely, there was supportive evidence that homeless-tailored primary care improved ED utilization. Two studies reported similar patterns of decreased total patients accessing the ED but similar or increased visits per person in comparisons of homeless veterans newly enrolled in tailored care to traditional primary care. The first study[28] reported a significant decrease in 18-month ED use for patients in a co-located clinic compared to a traditional clinic (54 people v. 80, p<0.001, no difference in visits/person). The second study[27] reported decreased ED use during 12 months after enrollment in homeless-tailored primary care (any use, first to second six months: 55.3% to 36.8%, p<0.01), but more total ED visits/person compared to traditional primary care (2.68 v. 1.95, no p-value reported). However, there were less non-emergent visits in the tailored group (21.6% v. 36.2%), reported as 60% lower odds of having an ED visit for a non-acute condition (OR= 0.4, 95% CI 0.2, 0.8).

In contrast, a different study[30] reported higher ED use by homeless veterans newly enrolled in homeless-tailored care, however this was compared to non-homeless veterans enrolled in traditional primary care for an indeterminable amount of time (48%

v. 26.4%, p<0.01, visits/person were not statistically compared). It was difficult to attribute this difference to new-enrollee status, homelessness or type of primary care model. This study also reported factors associated with reduced ED use for homeless patients in a nested-cohort study: ≥5 primary care visits (RRR 1.46, 95% CI 1.11, 1.92); a combination of ≥5 specialty and primary care (RRR 10.95, 95% CI 1.58, 75.78.); and "stable housing at baseline" (compared to "unstable housing") (RRR 3.4, 95% CI 1.21, 9.42). Finally, a fourth study[31] reported a 19% reduction in ED use in the 6 months following enrollment in H-PACT for the national VA sample (3,022 visits compared to 2,447 prior to H-PACT enrollment).

Hospitalizations:

Hospital utilization varied between studies; more recent data showed decreased hospital utilization after H-PACT enrollment, but earlier studies indicated more nuanced reasons utilization findings. One study[28] reported no difference in the number of persons hospitalized during 18 months following enrollment in either co-located or traditional primary care (89 people v. 96, p=0.09). Another study[27] reported an increased total number of hospitalization for the tailored care group compared to the non-tailored care group in 12 months following enrollment (72 v. 47, p=0.02). However, when reason for admission was considered, there was a significant decrease from the first to second six months for non-drug/alcohol or mental health-related admissions among the tailored group (28.6% to 10.8%, p<0.01), with no change in the non-tailored group (48.2% v 44.4%, p=0.6). A third study[30] mentioned a decrease in hospitalizations after enrollment in homeless-tailored care; however, no data were provided to support this. Finally, a fourth study reported a 34.7% reduction in hospitalizations in the 6 months after enrollment in H-PACT for the national sample (812 visits compared to 530).[31]

Mental Health/ Substance use treatment/ specialty care:

Only one study evaluated other areas of utilization. Of patients new to primary care, there were more homeless veterans accessing mental health and substance use treatment services compared to non-homeless veterans during 6 months post-enrollment (mental health: 88.2%, 12.0 visits/person v. 43.4% 3.4 visits/person, $p<0.001$; substance use treatment: 37.8% v. 7.5%, $p<0.001$). There were no differences for specialty care (86.6%, 6.9 visits/person v. 86.6% 3.0 visits/person, p-value >0.99).

Homeless Patient Perceptions:

Three studies evaluated aspects of patients' perceptions of primary care and indicated that homeless-tailored care conferred more positive patient perceptions compared to usual care, and that homeless tailoring was beneficial in meeting the unique needs of homeless patients.

One study reported an overall increased trend in patient satisfaction corresponding to the degree of homeless-tailored care using a patient satisfaction survey.[32] Unadjusted scores were highest for the tailored non-VA site in all four subcategories, and a tailored VA site generally had similar or slightly better scores than mainstream VA sites. Additionally, unfavorable experiences were more common at non-homeless tailored sites ($p<0.01$).

Another study evaluated patient trust in providers with an initial increase then decline over 18 months.[33] Both continuity with provider (beta=3.48, SE=0.52, $p<0.001$) and satisfaction with provider (beta=9.92, SE=0.77, $p<0.001$) were significant predictors of trust over time.

A third study reported reasons for not having a regular source of care from a survey of homeless veterans eligible but not receiving primary care.[34] The most common motivation for wanting primary care was "*to do more with life"*. The main reasons for not having regular care were affordability and convenience. Top reasons for seeking primary care for patients with a health need focused on mental health or substance use, leaving homelessness and chronic pain. The top reasons for delaying care fell into three domains: care processes (eg. *can't smoke, too many questions, student doctors*); trust (eg. *afraid, don't trust VA*); and stigma (eg. *embarrassed about appearance, they treat me poorly*).

Health outcomes:

There was little evidence regarding clinical outcomes related to homeless-tailored primary care. Only one study reported changes over 12 months for specific clinical markers from small samples of patients in homeless-tailored care compared to traditional care.[27] There was some improvement in the tailored group: net decrease in blood pressure (-10/-0.74 ± 22.37/12.31 v. -4.2/-0.5 ± 19.75/13.8, SBP p=0.24, DBP p=0.03) and decreased hemoglobin A1C (-2.3± 3.60 v. 0.2±1.3, p=0.03). There was no significant difference in LDL level between the two groups, however, percent at target LDL level was significantly higher in the tailored group (65.4% v 45.5%, p<0.01); however, we could not determine if this actually reflected a change during the study period.

Another study reported no significant difference in self-reported health status over 18 months between a co-located care group and traditional care group (50.5+/-10.3 v 51.8+/-10.4, p=0.35).[28] A different study reported new diagnoses in 6 months following enrollment in homeless-tailored primary care: average 4.1 per person (67.7% chronic

disease, 45.7% mental health and 28.3% substance abuse diagnoses). Comparatively, there were on average 0.9 per person (78.1% medical conditions, 17.7% mental health and 4.2% substance abuse diagnoses) for non-homeless veterans seen in traditional primary care.

None of the studies evaluated housing status or quality of life as an outcome. However, one study reported a decrease in “unstable” housing and increase in “stable” housing during 6 months after enrollment in homeless-tailored primary care.[27]

DISCUSSION

Homeless-focused primary care is a growing and evolving field; the studies included in this review reflect the pioneering efforts made to develop a care model to meet a specific demand seen within the VA system. These results demonstrate that this is an emerging field, with only 8 articles published that met inclusion criteria – the majority of which were observational and descriptive studies. There were large variations in study design, intervention and outcome measurements that made direct comparisons difficult.

Homeless-tailored care was the main topic area of most of the reviewed studies. This has been promoted as necessary and effective for addressing the unmet needs and unique barriers to care that homeless persons face; and historically, the Health Care for the Homeless Network (HCHN) was the most widely developed model.[12,13 35] However, apart from the studies reviewed here, there has not been substantial literature on the development, implementation, and care implications for such a model within a large healthcare system. Therefore, our findings are important in that the research reflected in this review supports not only the feasibility and utility of a homeless-tailored model in the VA system; but now with 60 active H-PACTs throughout the nation,[16] also provides

valuable information on how a large healthcare system can adapt and institute a new model of care.

Access/ Patient Engagement

Same day access is a core principle of homeless-tailored primary care, and has been theorized to discourage inappropriate emergency services use as well as increase engagement with primary care.[27] While same day access was only evaluated in one study, the evidence supported these theories and the viability of incorporating this into a care model. In terms of patient engagement, the feasibility of the interventions evaluated may be difficult on a larger scale. Taken in conjunction with the patient motivations results that nearly one third of patients with a health care need did not access or receive care, we anticipate that patient engagement will continue to be an ongoing area for investigation.

Health Care Utilization

We could not make exact comparisons between studies that evaluated health care utilization patterns for multiple reasons, some of which included differences in follow-up time, comparison groups and measurements. However, there was consistent evidence indicating an association between increased primary care use and decreased ED use with homeless-tailored primary care. Some evidence[27] indicated that enrollment in a tailored-care decreased inappropriate use of the ED, which is in accordance with findings relating to general homeless populations.[36] Of note, in studies evaluating homeless-tailored care, two studies of general homeless populations found that stable housing was associated with significantly less non-acute ED utilization, emphasizing the importance of linking housing services with primary care.[36,37] There was less consistency

for findings on hospitalizations, yet there was still an overall decrease in hospitalizations found among the national H-PACT sample after enrollment in H-PACT.[31]

The specific aspects of homeless-tailored care responsible for the beneficial relationship between homeless-tailored primary care and improved health services utilization were not clear, as no study directly evaluated this. Additionally, while less defined, there seemed to be a pattern of increased utilization of primary care within the first few months following enrollment– likely to address previously undiagnosed or under-treated conditions, as indicated by the number of new diagnoses, followed by a relative decrease in utilization.[27] The increased mental health and substance use treatment utilization reported also suggest that there is successful integration into the greater VA healthcare system or integration of behavioral health services into the primary care system.

Patient Perspectives Including Patient Satisfaction

Patient perspective's can be an important measure of quality and utility of primary care- indicating appropriate resource utilization and adherence to recommendations.[32,33,38,39] Comparisons between the reviewed studies were limited by multiple factors (differing aims, sizes and measurements) and did not allow for conclusions regarding appropriate resource utilization or adherence to recommendations. However, we were able to draw other important conclusions to guide further areas of inquiry.

Patients found more satisfaction and endured fewer unfavorable experiences with a homeless-tailored model in one study while another study reported certain factors of stigma and care processes that inhibited seeking care. These findings are important in that they support the reasons that homeless-tailored care had been advocated- to

address needs and motivations that are unique to homeless patients.[12-14] Additionally, these findings indicated that the H-PACT model addresses these features better than traditional primary care; yet, we don't know what aspects of the H-PACT model best addresses these features best and tailored care within the VA can still improve to HCHN standards.

Provider trust was an important care element that emerged in this review. As pointed out in other literature for homeless patients, continuity-of-care and satisfaction with providers are positively associated with provider trust, which leads to improved primary care outcomes.[38,40,41] Interestingly, trust (or lack of trust) was identified as an important factor in delaying or lacking care by one of the studies reviewed. This highlighted an important challenge in both engaging and providing care for homeless veterans, which have also been found in literature on general homeless patients seeking care.[39] The current H-PACT model is already addressing some of these issues, but many are not easily addressed and necessitate further creative solutions to increase engagement, address stigma and build trust between patients and providers.

Clinical Outcomes

There were little data on clinical outcomes. Although there was limited evidence that suggested a positive relation to homeless-tailored primary care compared to non-tailored care, we recommend taking these results with caution due to the small study size and comparison groups. While it is reasonable that a tailored clinic is better equipped to manage chronic conditions than a non-tailored clinic, further investigation is needed to fully evaluate the efficacy of homeless tailored care for improving chronic disease outcomes.

Housing Outcomes, Quality of Life Outcomes

There was no direct evaluation of improvement in housing outcomes or quality of life in relation to primary care.

Limitations of the Literature on the Efficacy of Homeless-Tailored Primary Care:

This review has certain limitations. First, a relatively small number of studies were included and all but one was observational. Although the majority of studies were of fair to good quality for their respective designs, observational studies are inherently subject to confounding and other sources of bias. Additionally, many used survey data or self-reported data with potential for recall and information bias. To address this, we used a systematic approach and were cautious with any generalizations to avoid introducing further sources of potential bias. The studies were also very different in topic area, aims and measurements. While this increased the scope of our review, it made drawing precise conclusions difficult and limited the strength of conclusions made. There was also the potential for redundant sampling given there were two sets of overlapping study populations represented in four of the included articles; however, different measurements from each article were evaluated as to not evaluate results twice. Second, there was the potential that we did not identify additional relevant studies. Our search strategies were fairly broad leaving us confident we did not miss any significant studies. While our inclusion criteria excluded studies that did not focus on a VA population, this required that studies explicitly stated the number of veterans included in their study and therefore left the possibility for exclusion of studies that did not explicitly state this. Third, we focused on care within the VA system, thus limiting the generalizability of our findings. Finally, the narrative review methodology has potential for subjectivity. However, we set forth a rigorous systematic approach and analyzed studies in accordance with our pre-defined criteria.

Conclusions:

This review revealed multiple gaps in our current knowledge. Access and patient engagement continues to be an important and challenging area. While increased community outreach, open-access, proximity to public transportation and improved coordination and management systems have been suggested as ways to enhance access and engagement;[12,13,42] further investigation is needed into feasible ways to accomplish this. The current H-PACT model has not been evaluated in-depth to determine what outreach or clinic features are most successful and additional program development should focus on further engaging patients. Additionally, further understanding of utilization patterns beyond the emergency department and primary care is needed to anticipate the best resource allocation and streamline the establishment of care and coordination with other specialties or treatment services. Finally, clinical outcomes as well as housing outcomes are important areas for further investigation.

Overall, we found consistent evidence for health care utilization and patient satisfaction outcomes that support homeless-tailored primary care as a superior model for care than the traditional primary care for homeless veterans within the VA system. Provider trust and continuity are important care features for homeless veterans and are areas that should be reinforced in the current care model. There are few studies that evaluate clinical outcomes associated with homeless-specific primary care with the VA.

The VA has made great efforts to address homelessness among veterans, however they are still a long way from reaching their goal of ending homelessness among veterans. This review demonstrates that primary care can be an important facilitator in progressing

towards the goal of ending homelessness among veterans. However, it is also apparent that more investigation and program development is needed to fully maximize the potential of primary care for reaching and caring for this vulnerable population.

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Table 1. Description of studies

Study: Author Year Design	**Focus Area**	**Aim(s)**	**Population/Setting Methods**	**Outcome measures**	**Results and Main findings**
McGuire 2009 Cohort (Same study population as van den Berk-Clark 2014)	1. Care delivery model: co-location 2. Engagement with care 3. Health services utilization 4. Physical health outcomes	Determine if co-location of primary care, mental health and social services impacts (1) care utilization and (2) physical health status	Homeless Veterans with substance abuse or mental illness in the greater Los Angeles region. Cohorts: • **Intervention**: Co-located primary care with mental health and homeless social services. (Recruited 2/2003-4/2004) Goal: screen Veterans then direct to appropriate services for same-day visit. • **Control**: Traditional primary care clinic, located half mile from Homeless Program. Typical wait time of 2 months (Recruited 5/2001-2/2o02) Recruitment from same drop-in center • EMR abstraction of data • 18 months follow-up • Self-reported physical health survey • Adjusted regression models comparing 2 cohorts for each outcome.	1. Initial timeliness of access to primary care 2. 12 month receipt of prevention services 3. 12 month utilization (primary care, emergency, inpatient) 4. Self-reported physical health	Demographics (both groups): Age: 45.8 +/- 7.0 years. 99% male. 50% African American. Average time homeless: 13.2 +/1 11.4 days; 38% >/= 2 years homeless. 19% VA service-connected disability status 1. Intervention compared to control: faster time to initial visit (<1 day compared to nearly 2 months); higher primary care use and preventative service receipt; lower ED use 2. No difference in inpatient hospital days or physical health ratings between groups
O'Toole 2010 Retrospective cohort	1. Care delivery model: homeless-tailored 2. Clinical outcomes 3. Health services utilization	Determine if there is a difference in (1) utilization and (2) chronic disease outcomes between homeless-tailored primary care and standard primary care model	Homeless Veterans in Providence, Rhode Island VA system Cohorts: • I**ntervention**: Homeless-Oriented Primary Care clinic. (Enrolled between 12/2006 - 06/2007) • **Control**: General Internal Medicine clinic, historical sample. Subjects selected from master list of all patients with V.60 code (ICD-9 homeless). Every 4th patient included and matched by seasonal quarter. (Received care between 2004-2006) • EMR abstraction of data • 12 month follow up • Temporal trend analysis: Intra- and intergroup comparisons of first and second-6months of utilization. • Adjusted regression models for ED use and acute care hospitalization.	1. 12 month disease-management outcomes (BP, A1C, LDL) 2. 12 month utilization (primary care, emergency, acute care, inpatient)	Demographics: Intervention group: Age 51.8 +/- 1.94 yrs, 96% male, 81.3% white Control group: Age 52.9 +/- 7.7, 96.7% male, 80.7% white, 14.1% new to care 1. Increased primary care use in intervention group compared to control group 2. Greater overall ED use but less non-emergency ED utilization for intervention group over 12 months compared to control - Significant decrease in ED utilization from first to second six months in intervention group compared to control - Mental health and substance use were not independently associated with non-acute ED visit; stable housing was associated with 50% lower odds of having non-acute ED visit. 3. Greater overall hospitalizations in intervention compared to control. - Decrease in non-substance use or mental illness-related hospitalizations after first 6 months in intervention group - No independently significant variables associated with hospitalizations

					4. Decrease in A1C and LDL for intervention group (No difference in BP changes between groups)
Kertesz 2013 Cross-sectional	1. Care delivery model: homeless-tailored 2. Patient perception of primary care experience	Assess patient's assessment of care over varying degree of homeless-tailored service design	Veteran and non-Veteran homeless adults 5 primary care locations differing in homeless-tailored service (4 VA, 1 non-VA) • Analysis of survey data: Unadjusted and adjusted models comparing survey scores from the 5 clinic sites	Survey results (Primary Care Quality Homeless Survey, developed by Kertesz et al) 4 sub-scales of care (relationship, cooperation, access/coordination, homeless-specific needs) Unfavorable outcomes	Demographics (by site): Tailored non-VA: Age 51.1 +/- 10.5 yrs; 68.2% male; 61% non-white, 14.4% ever served in military Tailored VA: Age 55.9 +/- 6.8 yrs; 200% male; 86.2% non-white; 100% military VA-a: 53.6 +/- 6.9 yrs; 90.3% male; 60.5% none-white; 100% military VA-b: 53.7 +/- 7.1 yrs; 92.7% male; 78% non-white; 100% military VA-c: 50.9 +/- 9.6 yrs; 89.5% male; 68.4% non-whie; 100% military (p<.001 for all categories except military service) 1. All sub-scale scores were significantly higher scores at tailored v non-tailored sites (unadjusted), dose-response relationship observed 2. Higher adjusted scores at tailored v non-tailored sites for relationship and cooperation scores 3. Unfavorable experiences were greater at non-tailored sites in all sub-scales
O'Toole 2013 Case series	1. Care delivery model: homeless-tailored primary care 2. Health services utilization	1. Identify (1) demand for care and (2) service utilization among homeless Veterans newly enrolled in primary care 2. Identify factors associated with redirecting health services use to ambulatory settings	Homeless and non-homeless Veterans enrolling in primary care, Rhode Island VA system. At least 2 visits with primary care team within first 6 months of enrollment. **Case**: Consecutive enrollments of homeless Veteran to H-PACT (Homeless Patient Aligned Care Team, homeless tailored) from 1/2008-6/2011 **Comparison group**: Age/sex –matched non-homeless Veterans enrolled in PACT (Patient Aligned Care Team, non-tailored) from 1/2011-7/2011 • EMR abstraction of data • 6 month follow-up • "nested cohort": comparison of homeless enrollees based on ED use v. no ED use • Comparison of rates of use for specific care use categories • Adjusted regression model for decrease in ED use in latter 3 months of study period	1. Health services utilization 2008-2011 (emergency, primary care, mental health/substance use care, specialty care) 2. New diagnoses made during first 6 months enrolled in primary care	Demographics: Case: Age 51.2yrs; 94.5% male; 76.4% white Comparison: 50.1 yrs; 96.2% male; 93.4% white 1. More primary care, mental health, substance use and emergency services use among cases (more visits/case) 2. Over 6 months there was a decrease in primary care, mental health and emergency care use but increase in specialty care and vocational rehab services use and sheltered status among cases 4. Among homeless ED users, >5 primary care visits, combination of primary/specialty care and stable housing was associated with no ED use in the latter 3 months. 5. Average of 4.1 new clinical diagnoses for homeless veterans compared to 0.9/patient for non-homeless veterans
van den Berk-Clark 2014 Cohort, secondary data analysis	Patient's perception/experience of primary care	1. Determine if factors that apply to general health care users' provider trust also predict homeless	Homeless Veterans in the greater Los Angeles region- pooled cohort data • Survey data from 4 separate sampling times • 18 month follow-up • Adjusted regression models for predicting provider trust	Provider trust scale score	Demographics: Age 45.8 +/- 7.0 yrs; 99% male; 50% African American; 19% VA service-connected disability status 1. Trust in provider initially increased then decreased significantly over time 2. Primary care experience factors of continuity of

(Same study population as McGuire 2009)		patients provider trust 2. Identify additional homeless-specific predictors of provider trust			care and satisfaction with provider were positive predictors of provider trust over time, not different from general health care users 4. Homeless-specific factor of social support positively predicted provider trust
O'Toole 2015 (a) Cross-sectional, nested within larger study (Also reported within O'Toole 2015-b)	1. Engagement with care 2. Patient's perceptions of primary care	Understand reasons for not having regular source of care among homeless Veterans.	Homeless Veterans without regular source of care from seven community settings in two cities (Providence, RI and New Bedford, MA) • Analysis of survey data: Comparison between groups reporting need for care and no need for care and those with a need who accessed and did not access care. • Regression models (not enough information for quality evaluation)	Adapted survey instrument data evaluating: reported needs, health status, VA service utilization, attitudes towards the VA, motivating factors for wanting primary care, role of primary care)	Demographics: Age 48.7 +/- 10.8 yrs; 94.6% male; 43.2% non-white 1. Those reporting need for care had at least one active medial problem as well as mental health condition and/or substance abuse, significantly higher than those who reported no need. 2. Motivations for wanting primary care: mental health; substance abuse; need care to leave homelessness; to do more with life; chronic pain 3. Significant reasons for delaying care reported: Care processes: can't smoke; can't keep appointment; can't afford it; too much of a run-around; doesn't help; ask too many questions Stigma: embarrassed about being homeless; not sober; just don't care what happens Trust: concerned about what they might find; worried about pain it may cause; don't trust the VA (83.6% of those reporting needing care)
O'Toole 2015 (b) Randomized Controlled Trial (Also reported within O'Toole 2015-a)	1. Engagement with care 2. Health care utilization	Determine if certain interventions increase health-seeking behavior and receipt of health care among homeless veterans	Homeless veterans in Providence, RI and New Bedford, MA. Eligible for VA services, not currently receiving primary care in previous 6 months. PHA/BI: randomization by random number generator scheme CO randomization: block based on calendar days Recruitment from 11 community sites. Comparison groups: 1. Personal health assessment/brief intervention (PHA/BI) alone 2. Clinic orientation (CO) (PACT or H-PACT) alone 3. PHA/BI + CO 4. Usual care (UC)(social work assessment) • Survey data and EMR health utilization analysis • 6 month follow up • Regression model for time to treatment	Receipt of primary care within 4 weeks of enrollment Receipt of other health care services	Demographics: **PHA/BI**: Age 51.2 +/- 8.6; 92.3% male; 56.4% white; 21.2 +/- 19.3 months homeless in past 5 yrs **PHA/BI+CO**: 46.6 +/- 13.4 yrs; 93.2% male; 56.8% white; 16.1 +/- 19.1 months homeless in past 5 yrs **CO**: 48.3 +/- 9.0 yrs; 95.1% male; 55.7% white; 23.2 +/- 19.8 months homeless in past 5 yrs **UC**: 48.7 +/- 11.8 yrs; 97.5% male; 60.0% white; 22.6 +/- 22.7 months homeless in past 5 yrs 1. Percentage accessing primary care at 4 and 6 weeks: PHA/BI+CO > CO alone > PHA/BI alone > UC, significant differences between groups. 2. Hazard ratio for CO alone and PHA/BI+CO were significant 3. Trauma in 6 months prior was only difference between those who received care and didn't (greater rates of no-care 23.3% v 10.1%, p=.02) 4. No difference in health utilization between any groups
O'Toole	1. Care delivery model:	1. Describe	Homeless veterans enrolled in H-PACT as of 8/1/2014, data	1. Health services use	Demographics: 14, 088 patients total. Age 53.4yrs;

2016 Cross-sectional Pre/post-study	homeless-tailored primary care 2. Health services utilization	development and implementation of clinical model 2. Evaluate pre/post enrollment care use 3. Evaluate H-PACT clinical performance	collected 6 months before and after enrollment. • EMR abstraction of nationwide VHA administrative data • Comparison of 6 months pre/post enrollment data • Comparison of care teams (33 total – in operation at least 18 months, had at least 100 patients): high performing (>30% reduction in ED use or >20% reduction in hospitalizations); moderate performing (0-30% reduction in ED use or 0-20% reduction in hospitalizations); low-performing (increase in ED use or hospitalizations) based on 6 months post-enrollment data • 2014 clinic survey data to define characteristics and care elements of sites	2. Clinic performance, graded as high, moderate, low	4% women 3,543 patients used for acute care use data 1. H-PACT patients were on average younger, with higher DCG scores than overall VA population 2. 19% reduction in ED visits, 34.7% reduction in hospitalization post-enrollment 3. 17 high-performing, 9 mid-performing, 7 low-performing clinics 4. Higher-performing site significant findings: (1) more tracking of housing status in notes; (2) >50% FTE clinical nurse staffing,; (3) social services/supports embedded in clinic; (4) clothes pantry; (5) community involvement/outreach

Table 2: Quality Assessment

QA Tool: Downs and Black Checklist for Measuring Quality	Study							
Author Year Study design	McGuire, 2009 (Cohort)	O'Toole, 2010* (Retrospective cohort)	Kertesz, 2013 (Cross-sectional)	O'Toole, 2013 (Case series)	van den Berk-Clark, 2014 (Cohort)	O'Toole, 2015-a (Cross-sectional)	O'Toole, 2015-b (RCT)	O'Toole, 2016 (Cross-sectional, pre/post)
Reporting								
Question clearly stated?	Y	Y	Y	Y	Y	Y	Y	Y
Outcomes clearly stated?	Y	Y	Y	Y	Y	Y	Y	Y
Participants clearly described?	Y	Y	Y	Y	Y	Y	Y	Y
Interventions clearly described?	Y	Y	Y	Y	Y	Y	Y	Y
Principal confounders described?	Y	Partial	Y	Y	Y	Y	Y	Y
Main findings clearly described?	Y	N	Y	Y	Y	Y	Y	Y
Estimates of random variability reported?	Y	Y	Y	Y	Y	Y	Y	N
Adverse events reported?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Participants lost to follow-up described?	Y	N	N/A	N/A	Y	N/A	Y	N/A
Probability values reported?	Y	Y	Y	Y	Y	Y	Y	Y
External validity								
Subjects asked to participate representative of entire population recruited from?	UD	UD	UD	UD	UD	UD	N	N/A
Subjects prepared to participate representative of entire population recruited from?	UD	UD	UD	UD	Y	UD	N	N/A
Setting representative of source population setting?	Y	Y	Y	Y	Y	Y	Y	Y
Bias								
Subjects blinded?	N	N	N	N	N	N	N	N/A
Evaluators blinded?	N	N	N	N	N	N	N	N/A
Data dredging made clear?	Y	Y	Y	Y	Y	Y	Y	Y
No difference in follow-up?	Y	UD	N/A	N/A	N/A	N/A	Y	N/A
Appropriate statistical tests?	Y	Y	Y	Y	Y	Y	Y	Y
Reliable compliance with intervention?	Y	Y	Y	Y	Y	Y	Y	Y
Accurate outcome measures?	Y	Y	Y	Y	Y	Y	Y	Y
Confounding								
Recruitment from same population?	Y	N	UD	Y	Y	Y	Y	Y/N
Recruited over same time period?	N	N	Y	Y	N	Y	Y	Y
Randomization?	N	N	N/A	N	N	N	Y	N
Concealment of randomization?	N/A	N/A	N/A	N/A	N	N/A	N	N/A
Adjustment for confounding?	Y	UD	Y	Y	Y	Y	Y	Y

Loss to follow-up accounted for?	N	N	N/A	N/A	Y	N/A	Y	N
Power	Y	Y	Y	Y	Y	Y	Y	Y
General Comments	Overall reasonable design for aims of study. Addressed study size Good adjustment for confounders Did have about >20% loss to follow-up Different sampling times	Although appropriate for aims, not a strong study design. Some discrepancy in reporting Differing comparability of groups (only 14% of control new to primary care) No mention of loss to follow up Moderate control of confounders.	Adequate compensation for limitations of cross-sectional study. Low % of random sample ultimately evaluated. Survey has potential for bias.	Design is a case series rather than a case-control that is promoted in the article. Comparison group was non-homeless and received care in a different setting.	Adequate design for aims. Very low rate of loss-to follow-up. Outcome listed as beta-coefficient is a little difficult to interpret.	Cross-sectional design has limitations. Adequate analysis. Potential for bias with survey.	Did have loss to follow up, accounted for with cox regression. Does have post-hoc analysis.	Good methods for pre/post study. More of a program evaluation, which methods reflect. Strong analysis to deal with limitations of available programmatic data.
Overall Quality	**Fair**	**Poor**	**Fair**	**Fair**	**Good**	**Fair**	**Good**	**Good**

Key: Y: yes; N: no; UD: unable to determine; N/A: not applicable
The Downs and Black Tool measures 5 domains:
Reporting: assessing whether the information provided in the paper is sufficient to allow unbiased assessment of the findings
External validity: evaluating the extent to which the findings from the study could be generalized
Bias: addresses biases in the measurement of the intervention and outcome
Confounding: addresses bias in the selection of study subjects
Power: addresses whether the negative findings from a study could be due to chance.

Figure 1. Diagram of Study Selection