# Applying the Chronic Care Model to Homeless Veterans: Effect of a Population Approach to Primary Care on Utilization and Clinical Outcomes

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*Objectives.* We compared a population-tailored approach to primary care for homeless veterans with a usual care approach.

*Methods.* We conducted a retrospective prolective cohort study of homeless veterans enrolled in a population-tailored primary care clinic matched to a historical sample in general internal medicine clinics. Overall, 177 patients were enrolled: 79 in the Homeless-Oriented Primary Care Clinic and 98 in general internal medicine primary care.

*Results.* Homeless-oriented primary care–enrolled patients had greater improvements in hypertension, diabetes, and lipid control, and primary care use was higher during the first 6 months (5.96 visits per person vs 1.63 for general internal medicine) but stabilized to comparable rates during the second 6 months (2.01 vs 1.31, respectively). Emergency department (ED) use was also higher (2.59 vs 1.89 visits), although with 40% lower odds for nonacute ED visits than for the general internal medicine group (95% confidence interval = 0.2, 0.8). Excluding substance abuse and mental health admissions, hospitalizations were reduced among the homeless veterans between the 2 periods (28.6% vs 10.8%; $P<.01$) compared with the general internal medicine group (48.2% vs 44.4%; $P=.6$; difference of differences, $P<.01$).

*Conclusions.* Tailoring primary care to homeless veterans can decrease unnecessary ED use and medical admissions and improve chronic disease management. (*Am J Public Health.* 2010;100:2493–2499. doi:10.2105/AJPH.2009.179416)

Homeless persons get sick more often, utilize acute medical services at substantially higher rates, and experience 1.5 to 3.5 times higher rates of mortality than do their age-matched nonhomeless counterparts.[1–6] Homeless persons also underutilize primary care services, often seek care in EDs,[2,7] and commonly require acute care hospitalization.[3] These utilization patterns are even more pronounced among homeless veterans. In a national sample of homeless persons, Kushel et al. found that although 62.8% of participants had 1 or more ambulatory visits and 26.8% were enrolled in the Veterans Affairs (VA) system, only 5.6% of care occurred in VA-based clinics.[1] Almost one quarter of the sample did not receive care when needed, and veterans were more than twice as likely to be hospitalized as were nonveteran homeless persons.[1]

Studies to date have typically focused on the emergency department (ED) or hospital as the site for intervention. Redelmeier et al., in a randomized controlled trial, showed a reduction in ED use when care was coupled with a social work intervention.[8] Okin et al. achieved similar results applying case management to high-frequency ED users.[9] O'Toole et al. showed a reduction in ED use for homeless persons with substance use disorders who enrolled in a day hospital program after an acute medical hospitalization.[10] Sadowski et al. demonstrated a reduction in ED use and in subsequent hospitalizations when case management and housing support followed an acute care hospital admission.[11] Much attention has also been placed on improving access to primary and preventive health services, with federally funded Health Care for the Homeless clinics serving as the model.[12–15] However, few controlled studies have evaluated whether this population-based approach to care optimizes outcomes for homeless persons.

The Homeless-Oriented Primary Care Clinic at the Providence VA Medical Center adapted the integrated care approach of the Health Care for the Homeless program to an urban hospital-based setting in the VA health system. The current retrospective cohort study compares health services utilization and chronic disease outcomes among Homeless-Oriented Primary Care patients with those of a matched sample of homeless veterans seen in a typical VA general internal medicine clinic. Our intent was to determine whether a population-tailored approach to how primary care is organized and delivered to homeless veterans is associated with better health care and utilization outcomes.

## METHODS

We conducted a retrospective prolective cohort study comparing 12-month chronic disease management outcomes and health services utilization among homeless patients enrolled in the Homeless-Oriented Primary Care Clinic and a historical sample of homeless patients seen in the general internal medicine clinics at the Providence VA Medical Center. Overall, 177 patients were included in the study: 79 consecutively enrolled patients from the Homeless-Oriented Primary Care Clinic and 98 seasonally matched controls from the general internal medicine clinics.

### Cohort Definition

Participants in the intervention group were homeless patients who voluntarily enrolled in the Homeless-Oriented Primary Care Clinic at the Providence VA Medical Center between December 2006 and June 2007. The Homeless-Oriented Primary Care Clinic, which was started in November 2006, was adapted from

the ambulatory care model developed by Health Care for the Homeless and structured to address 4 of 6 core elements of the Chronic Care Model in a manner specific to homeless persons (Table 1).[16] The clinic operates as a hospital-based, open-access care model with nurse case management, with wraparound onsite services that include food, assistance with housing and veterans' benefits, clothes, and mental health care, along with a harm-reductionist approach to patient encounters.

We defined homelessness by using the sheltering criteria of the Stewart B. McKinney Homeless Assistance Act.[17] Sheltering categories were as follows: (1) no shelter, defined as nights spent in a car, abandoned building, or homeless encampment or streets; (2) emergency shelter in a "dusk-to-dawn" shelter; (3) transitional and supportive housing; and (4) doubling up with a family member or friend without paying rent or a long-term commitment to staying. When more than one sheltering arrangement was documented during a 6-month interval, we coded the sheltering type that represented the majority of the patient's time.

We identified the sampling frame of control participants through a master list of all patients who were homeless according to the V.60 codes of the *International Classification of Diseases, Ninth Revision* (*ICD-9*)[18] and who received primary medical care through a Providence VA general internal medicine clinic from 2004 to 2006. From the master list of V.60-coded patients, we selected a systematic sample of every fourth patient for review and potential inclusion in the control group. The master list was divided into seasonal quarters and matched with intervention groups sequentially identified from Homeless-Oriented Primary Care Clinic patient logs. We did not match participants on the basis of duration of time in primary care. Although all patients in the Homeless-Oriented Primary Care Clinic were new to primary care, only 14.1% of patients in the control group were new to primary care; 20.0% of them began receiving primary care within the previous 12 months, 32.9% within the previous 1 to 3 years, and 33.0% more than 3 years earlier. We excluded potential control participants if there was positive documentation that the patient was living in an apartment or house that the patient owned or paid rent for, regardless of the V.60 code, or if the patient moved out of the area or was institutionalized (e.g., in prison or a nursing home) during a significant period of the 12-month study period. The control group was identified from 2004–2006 patient registries; we selected those years because they preceded the establishment of the Homeless-Oriented Primary Care Clinic and would limit crossover effects or selection bias. If a study participant initially received care in the general internal medicine clinic and then transitioned over to the Homeless-Oriented Primary Care Clinic during the study period, that participant was excluded from the analyses.

### Data Collection

One member of the research team abstracted clinical information from the electronic medical record in the Veterans Health Administration Computerized Patient Record System. A second member of the team performed an independent abstracting review, and a third member arbitrated any discrepant items from the 2 chart reviews. To capture any temporal effects on health-seeking behavior and disease stabilization, we recorded clinical events and chronic disease measures for each study participant in total and in two 6-month increments.

We defined primary care and ED episodes as ones for which there was a completed physician or nurse practitioner note. Those care episodes that originated in primary care but were triaged to the ED for disposition were coded as primary care episodes. Similarly,

**TABLE 1—Comparison of Clinical Design Models of the HOPC Clinic and GIM Clinic: Providence Veterans Affairs Medical Center, Providence, RI**

| Chronic Care Model Component | HOPC | GIM |
|---|---|---|
| Organization of health care | Open access: fixed day schedule for drop-in care that includes both acute or episodic care as well as follow-up care | Recall system, in which the patient is notified by mail that it is time to make an appointment and the patient then calls to schedule a time to be seen |
| Delivery system design | Primary care provider (PCP) assigned and nurse case-managed: each patient is assigned a PCP (either a physician or nurse practitioner) and a nurse case manager who routinely tracks cases for clinical reminders and initiates PCP contact as needed<br>On-site integration of homeless-specific services: housing and benefits assistance staff available on-site; job referral program incorporated into ordering package | Each patient is assigned a PCP (either a physician or nurse practitioner); case management available for disease-specific care<br>Specialty or ancillary services available ad hoc and through formal consult process |
| Decision support | Homeless-specific patient assessment at initial visit, updated quarterly | Standard history and physical template |
| Clinical information systems | Veterans Health Administration (VHA) electronic medical record with built-in clinical reminders | VHA electronic medical record with built-in clinical reminders |
| Community resources | Outreach and coordination of care with community shelters: frequent meetings, case conferencing with area shelter providers | Ad hoc contact outside of clinic team |
| Promoting self-care | Standard patient educational material and access to self-management classes | Standard patient educational material and access to self-management classes |

*Note.* GIM = general internal medicine; HOPC = Homeless-Oriented Primary Care.

those care episodes triaged in the ED and referred to primary care for disposition were coded as ED visits. We subsequently analyzed ED events as to whether they were of a lower acuity (level IV or V on the Canadian Triage and Acuity Scale[19]) that could have been treated in an ambulatory setting. We also characterized ED visits and hospitalizations as to whether active substance use or intoxication was associated with the care event. We did not capture care events that took place outside the VA Medical Center.

### Measures of Chronic Disease Management

We tracked chronic disease management for the 3 most prevalent conditions seen in primary care: hypertension, diabetes, and hyperlipidemia. We identified disease management measures (blood pressure for hypertension, hemoglobin A1c [HbA1c] for diabetes, and low-density lipoprotein [LDL] for hyperlipidemia) from the electronic medical record vital signs (blood pressure) or laboratories (LDL, HbA1c). Only the first recorded value and last recorded value within each 6-month study period were considered in the analysis. Target goals for each condition were blood pressure under 140/90 mm Hg, HbA1c under 7.0, and LDL under 100 mg/dL for patients with comorbid diabetes and coronary artery disease and under 130 mg/dL for all others.

### Data Analysis

We analyzed achievement of goals for chronic disease management with the $\chi^2$ analysis of proportions by using Stata 8.0 software (StataCorp LP, College Station, TX); actual values and trends were analyzed and reported separately. We report absolute differences and difference of means for net changes in clinic measures and dichotomous comparisons of measured versus targeted outcomes. We also report differences of means for utilization data, including overall use and the proportion of the population within each group that utilized specific services. Finally, we conducted intra- and intergroup comparisons of first and second 6-month utilization data to evaluate temporal trend in use.

We controlled for substance use and use of acute-level services for nonemergency needs in analyses of care use in the ED and hospital; these control variables are reported as both a combined outcome and separately. We constructed ordinal logistic regression models for the dependent variables of ED use and of acute care hospitalization, controlling for substance abuse, the presence of any mental health condition, sheltering arrangement (stable vs unstable), and primary care clinic type.

## RESULTS

There was no difference in age, race/ethnicity, or gender between the 2 groups (Table 2). The intervention group had significantly more emergency shelter–housed homeless veterans than the control group (14.7% vs 5.5%, respectively; $P=.05$) and more depression (66.7% vs 47.3%; $P=.01$), cocaine use (42.7% vs 18.7%; $P<.01$), and heroin use (17.3% vs 1.0%; $P<.01$). There was no significant difference in medical comorbidities, although the control group tended to have more hyperlipidemia ($P=.06$).

### Clinical Outcomes

Among intervention and control participants with documented hypertension, there was no difference in the proportion whose blood pressure was at the target goal (<140/90 mm Hg) after the initial 6-month study period (78.8% vs 75.0%; $P=.45$). However, hypertensive patients in the intervention group had a greater reduction in blood pressure during the study period (systolic, –10 mm Hg; diastolic, –7.4 mm

**TABLE 2—Demographics and Comorbidities of Homeless Veterans in the HOPC Clinic and GIM Clinic: Providence Veterans Affairs Medical Center, Providence, RI**

| | HOPC (Intervention; n = 79) | GIM (Control; n = 98) | *P* |
|---|---|---|---|
| Age, y, mean (SD) | 51.8 (0.94) | 52.9 (7.7) | .22 |
| White race, % | 81.3 | 80.7 | .92 |
| Male gender, % | 96.0 | 96.7 | .81 |
| Housing status, % | | | |
| Unsheltered | 9.3 | 6.6 | .52 |
| Emergency sheltered | 14.7 | 5.5 | .05 |
| Transitional housing | 49.3 | 54.9 | .47 |
| Doubled up | 26.7 | 17.6 | .16 |
| Undocumented | 0.0 | 15.4 | |
| Medical conditions, % | | | |
| Hypertension | 45.3 | 43.9 | .86 |
| Hepatitis | 28.0 | 16.5 | .07 |
| Diabetes | 9.3 | 14.3 | .32 |
| Hyperlipidemia | 34.7 | 49.5 | .06 |
| Respiratory condition | 17.3 | 15.4 | .74 |
| DJD or arthritis | 53.3 | 53.8 | .95 |
| Mental health conditions, % | | | |
| Depression | 66.7 | 47.3 | .01 |
| Anxiety | 37.3 | 30.8 | .38 |
| Bipolar | 10.7 | 16.5 | .28 |
| Schizophrenia | 4.0 | 10.9 | .1 |
| Substance abuse, % | | | |
| Alcohol | 70.7 | 60.4 | .17 |
| Cocaine | 42.7 | 18.7 | <.01 |
| Heroin | 17.3 | 1.0 | <.01 |
| Marijuana | 18.7 | 9.8 | .01 |

*Note.* DJD = degenerative joint disease; GIM = general internal medicine; HOPC = Homeless-Oriented Primary Care. Data are from 2006–2007 (HOPC) and 2004–2006 (GIM).

Hg) than did patients in the control group (systolic, –4.2 mm Hg; diastolic, –0.5 mm Hg). Although the sample size was small, there was no difference in the proportion of diabetic patients whose HbA1c was at the target goal at the end of the study period (57.1% vs 53.8%; $P$=.76). The intervention group recorded a decrease in HbA1c of 2.3, whereas the control group recorded an HbA1c increase of 0.2 ($P$=.03). Patients with hyperlipidemia did better in the intervention group, with 65.4% at the target goal compared with 45.5% of control patients ($P$<.01), and recorded a larger decrease in LDL during the study period (–6.4 mg/dL vs –1.1 mg/dL; Table 3).

### Emergency Department Utilization

Overall, the intervention group (Homeless-Oriented Primary Care Clinic) had 204 total ED visits during the 12-month study period, or 2.68 visits per person. In contrast, the control group (general internal medicine clinic) had 185 total ED visits, or 1.95 visits per person. Of those visits, 21.6% of the intervention group visits were for conditions that could have been treated in a primary care clinic and 36.2% of the control group visits were for similar nonemergency conditions. The event rate for substance abuse–related ED visits was 0.89 for the intervention group and 0.32 for the control group (Table 4).

The logistic regression model found that study participants enrolled in the Homeless-Oriented Primary Care Clinic had 40% lower odds of having a visit to the ED for a nonacute condition (odds ratio [OR]=0.4; 95% confident interval [CI] =0.2, 0.8). Mental health and substance abuse conditions were not independently significant, although having stable housing (transitional or supportive housing vs being doubled up, unsheltered, or emergency sheltered) was associated with 50% lower odds of having a nonacute ED visit (OR=0.5; 95% CI=0.2, 1.0).

When we looked at use patterns in 6-month increments, during the first 6 months of the study period, 55.3% of intervention group participants went to the ED and the overall group had an event rate of 1.62 ED visits per person. However, during the second 6 months of the study period, the proportion of intervention group participants going to the ED dropped to 36.8% and the event rate dropped to 1.07 ED visits per person, representing declines of 33.5% and 34.0%, respectively, from the first 6 months. The drop was more pronounced for treatment of nonemergency conditions. During the first 6 months, 22.5% of the intervention group accessed the ED for a nonemergency condition, which represents 23.6% of all ED visits for that group. During the second 6 months, there was a 39.6% reduction in the number of intervention group participants seeking care for nonemergency needs, although the proportion of visits that were nonemergency was essentially unchanged (18.5%).

In contrast, 44.2% of control group participants went to the ED during the first 6 months, for an event rate of 1.21 ED visits per person. During the second 6 months, the proportion of participants going to the ED was essentially unchanged at 41.1%, whereas the event rate dropped to 0.75 ED visits per person (38.0% reduction). Similar to the intervention group, 24.2% of control participants went to the ED for a nonemergency condition during the first 6 months, representing 34.8% of all ED care for that group. However, during the second 6 months, the proportion of control group participants going to the ED for nonemergency care needs was essentially unchanged (22.1%), whereas the proportion of nonemergency visits increased (to 38.6%). The difference between the study groups in the proportion of nonemergency ED visits during the second 6 months showed a strong trend ($P$=.06); otherwise, none of the intergroup comparisons were significantly different (Table 4). In the multiple logistic regression model, study participants with documented substance abuse had over 4 times the odds of going to the ED during the first 6 months than did those without any substance abuse (OR=4.3; 95% CI=1.8, 10.0).

**TABLE 3—Clinical Outcomes of Homeless Veterans in the HOPC Clinic and GIM Clinic: Providence Veterans Affairs Medical Center, Providence, RI**

| | HOPC (Intervention) | GIM (Control) | *P* |
|---|---|---|---|
| Blood pressure | | | |
| No. of participants | 33 | 40 | |
| Net change, mm Hg, mean systole/diastole (SD) | -10/-7.4 (22.37/12.31) | -4.2/-0.5 (19.75/13.80) | Systole: .24; Diastole: .03 |
| At target goal, % | 78.8 | 75.0 | .45 |
| Diabetes care | | | |
| No. of participants | 7 | 13 | |
| Net change, mean (SD) | -2.3 (3.60) | 0.2 (1.3) | .03 |
| At target goal, % | 57.1 | 53.8 | .76 |
| Lipid management | | | |
| No. of participants | 26 | 44 | |
| Net change, mean, mg/dL (SD) | -6.9 (56.80) | -1.1 (10.55) | .51 |
| At target goal, % | 65.4 | 45.5 | <.01 |

*Note.* GIM = general internal medicine; HOPC = Homeless-Oriented Primary Care. Data are from 2006–2007 (HOPC) and 2004–2006 (GIM).

### Primary Care Utilization

During the first 6 months of the study period, the intervention group averaged 5.96 primary care visits per person whereas the control group averaged 1.63 primary care visits per person. During the second 6 months of the study period, there was a significant drop in primary care visits in the Homeless-Oriented Primary Care Clinic intervention group, from 5.96 to 2.01 visits per person (66% reduction), although the intervention group's event rate was still more than the control group's 1.31 visits per person, which represents a 19% reduction from the first 6 months.

### Hospitalizations

The intervention group had 72 hospitalizations and the control group 47 hospitalizations

**TABLE 4—Utilization of Health Services by Homeless Veterans in the HOPC Clinic and GIM Clinic, Providence Veterans Affairs Medical Center, Providence, RI**

| | HOPC (Intervention; n = 79) | | | GIM (Control; n = 98) | | | HOPC Versus GIM |
|---|---|---|---|---|---|---|---|
| | First 6 Months | Second 6 Months | *P* | First 6 Months | Second 6 Months | *P* | (Second 6 Months), *P* |
| Primary care: no. of visits/person, mean (SD) | 5.96 (4.13) | 2.01 (3.56) | <.01 | 1.63 (1.26) | 1.31 (1.17) | .1 | .05 |
| Emergency department (ED) | | | | | | | |
| No. of visits/person, mean (SD) | 1.62 (2.53) | 1.07 (2.35) | .06 | 1.21 (1.91) | 0.75 (1.17) | .05 | .27 |
| No. of nonemergency visits/person, mean (SD) | 0.38 (1.13) | 0.20 (0.60) | .22 | 0.42 (1.00) | 0.29 (0.59) | .26 | .29 |
| No. of substance abuse–related visits/person, mean (SD) | 0.46 (1.15) | 0.43 (1.74) | <.99 | 0.21 (0.64) | 0.11 (0.42) | .13 | .06 |
| Accessing ED, % | 55.3 | 36.8 | <.01 | 44.2 | 41.1 | .53 | .57 |
| Accessing ED nonemergency care, % | 22.4 | 13.2 | .02 | 24.2 | 22.1 | .62 | .13 |
| ED visits that were nonemergency, % (proportion) | 23.6 (29/123) | 18.5 (18/81) | .39 | 34.8 (40/115) | 38.6 (27/70) | .29 | <.01 |
| Hospitalization | | | | | | | |
| No. of admissions/person, mean (SD) | 0.46 (0.85) | 0.47 (1.21) | .94 | 0.30 (0.72) | 0.15 (0.48) | .11 | .02 |
| Admissions not related to drug or alcohol use or mental health, % (proportion) | 28.6 (10/35) | 10.8 (4/37) | <.01 | 48.2 (14/29) | 44.4 (8/18) | .6 | <.01 |

*Note*. GIM = general internal medicine; HOPC = Homeless-Oriented Primary Care. Data are from 2006–2007 (HOPC) and 2004–2006 (GIM).

during the 12-month study period ($P$=.02). From the first 6-month period to the second period, admissions decreased among the control group (from 0.30 to 0.15 visits per person; $P$=.11) but not among the intervention group (0.46 and 0.47 visits per person, respectively; $P$=.94). However, between the first and second 6-month periods, medical admissions not related to an acute substance use or mental health condition were significantly reduced among the intervention group, from 28.6% to 10.8% ($P$<.01), whereas among the control group, admissions were essentially unchanged (48.2% vs 44.4%; $P$=.6; difference of differences, $P$<.01; Table 4). There were no independently significant variables identified for hospitalizations in the multiple logistic regression modeling.

## DISCUSSION

In this study, homeless veterans accessing a population-tailored open-access primary care model had significantly more primary care visits and fewer medical admissions than did those homeless persons attending a traditional general internal medicine clinic. Homeless veterans using the open-access primary care model also recorded greater improvements in LDL, blood pressure, and HbA1c levels. The intervention group also had 40% lower odds of inappropriate ED visits when we controlled for substance use, mental illness, and housing status. Our findings suggest that how primary care is organized and delivered to homeless persons is an important variable in improving chronic disease management and reducing inappropriate ED use.

The role of primary care for homeless persons has been described and discussed extensively in the literature.[20–23] Shortt et al., in a policy analysis of care models in Canada, found that traditional approaches performed poorly compared with fixed-site, fixed-outreach, and mobile clinic models.[20] Han and Wells reported a reduction in inappropriate ED use by persons accessing Health Care for the Homeless clinics.[24] McGuire et al., in a study evaluating a VA model similar to that of the current study, reported improved access to primary care and reduced ED visits but no difference in physical health status over 18 months.[25] We suspect some of the differences between our findings and those of McGuire et al. may be related to subtleties in the care delivery model, applications of the Chronic Care Model, or study participant selection criteria. That said, both studies adhered to the same principles of care for this population and confirm the need for an enhanced approach to primary care for homeless persons. The results reported by both Sadowski et al.[11] and Buchanan et al.[26] reflect the importance of housing as an integral component to disease management.[27] Their results also probably reflect the high baseline rates of utilization by persons identified during an acute care hospitalization,[28] in which targeted interventions are likely to have greater impact. The role of housing in health services utilization is further supported in our study, in which those veterans with stable sheltering arrangements, independent of mental health and substance abuse comorbidities, had 50% lower odds of inappropriate ED use than did those who were unsheltered, emergency sheltered, or in doubled-up arrangements.

These findings also demonstrate both the feasibility of basing a homeless clinic within an urban VA hospital setting and the utility of tailoring the chronic care model to this population within the context of an enhanced medical home.[29] Colocation within a hospital campus facilitates redirecting care to a primary care setting. The geographically proximate infrastructure also facilitates access to ancillary and specialty services. To optimize any clinical arrangement, it is essential to address the specific predisposing, enabling, and illness-based needs[30] of homeless people that drive their health-seeking behavior, as well as their need to secure shelter, food, clothing, or other sustenance needs that may take precedence over accessing health care.[31]

The initial high rate of primary care use in our study paralleled a progressive decrease in nonemergency ED use and in medical admissions to the hospital during the second 6 months of the study period. This difference was even more pronounced after we excluded substance use–related ED visits and hospital admissions. Improvements during the second 6 months likely reflect a conditioning effect in which the homeless person in the intervention group became more comfortable with the care model and less reliant on the ED for care needs. The improvements may also reflect stabilization in sheltering and engagement in mental health and substance abuse treatment—2 intended outcomes of this clinic model—resulting in reduced demand for acute and emergency care.

Blood pressures, HbA1c readings, and LDL values all improved more among the Homeless-Oriented Primary Care Clinic group, which we interpret as a direct result of increased contact with primary care and case management. Chronic disease management is an important and achievable component of homeless health care and should not be deferred because of unstable sheltering or low socioeconomic status, especially given the high rate of cardiovascular morbidity and premature mortality among homeless persons.[4]

Our data also underscore the limits of a primary care model that does not provide integrated substance abuse services. Both groups experienced high rates of alcohol-related and mental health–related ED visits and hospital admissions. Substance abuse was a positive predictor of ED use during the first 6 months of the study period for all patients, regardless of the primary care clinic in which they were seen. Previous research has shown that homeless persons and their housed counterparts have comparable levels of motivation for treatment and readiness for change.[32] Thus, a health care event can serve as a "treatable moment" for engaging homeless persons in substance abuse treatment.

There are several limitations to this study. First, the study occurred in one site in a Northeast urban setting and was limited to a population of veterans. The results may not necessarily generalize to other settings or to nonveteran populations. However, the hospital-based ambulatory care model in this site is relevant in that many urban hospitals and EDs are frequently accessed by homeless persons, and the model was purposely developed in a manner that can be easily replicated. Second, the retrospective cohort design has significant limitations. Although there was only a 12-month difference in the time periods, secular trends (e.g., changes in care standards, formularies, or other unmeasured factors) could have contributed to the differences noted.

The V.60 coding of homelessness used to identify the control group has inherent inaccuracies, and it was at times difficult to detail the specifics of homelessness (i.e., duration, current sheltering arrangements) on the basis of data available in the chart review. Study participants who were clearly in an apartment or house that they owned or rented and who had been homeless in the more distant past were excluded; however, we were unable to determine the housing history for 15% of the control group. This limitation would likely bias toward more favorable outcomes in the control group, making the Homeless-Oriented Primary Care Clinic outcomes more notable. Furthermore, the chart abstractors were not blinded to study condition or hypothesis, and interpretation of ambiguous documentation might have biased the results.

Finally, as noted in the Results section, there were more emergency-sheltered homeless veterans in the Homeless-Oriented Primary Care Clinic group, and these individuals were more likely to be new to care in the VA health care system. This shelter subgroup has previously been shown to utilize more acute-level services and to have more difficulties engaging in care.[2] Most participants in the control group were already established in primary care when enrolled in this study and did not have the same delayed and deferred care needs; this limitation would tend to bias our findings against positive outcomes among the HOPC group.

Tailoring primary care delivery to homeless veterans can decrease inappropriate ED use and improve chronic disease management. Urban health centers should consider this model as a means for reducing ED crowding and the overall disease burden among this vulnerable population. ■

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## Contributors

T.P. O'Toole conceptualized the project and oversaw data abstracting analysis and manuscript preparation. L. Buckel conducted data abstracting and assisted in the analysis. C. Bourgault helped conceptualize the project and conducted data abstracting. J. Blumen conducted data abstracting and assisted in the analysis. S.G. Redihan assisted in data management and completed the analyses. L. Jiang assisted in data analyses. P. Friedmann assisted in the analyses and manuscript preparation.

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## Human Participant Protection

This project was approved by the Department of Veterans Affairs human subject institutional review board.

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