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TECHNICAL NOTE

Access to Primary Care for Homeless Veterans with Serious Mental Illness or Substance Abuse: A Follow-up Evaluation of Co-Located Primary Care and Homeless Social Services

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Abstract To examine the hypothesis that a demonstration clinic integrating homeless, primary care, and mental health services for homeless veterans with serious mental illness or substance abuse would improve medical health care access and physical health status. A quasi-experimental design comparing a 'usual VA care' group before the demonstration clinic opened ($N = 130$) and the 'integrated care' group ($N = 130$). Regression models indicated that the integrated care group was more rapidly enrolled in primary care, received more prevention services and primary care visits, and fewer emergency department visits, and was not different in inpatient utilization or in physical health status over 18 months. The demonstration clinic improved access to primary care services and reduced emergency services but did not improve perceived physical health status over 18 months. Further research is needed to determine generalizability and longer term effects.

Keywords Primary care access · Homelessness · Service co-location · Service integration

Introduction

Homeless people have high rates of a wide range of serious medical problems (Gelberg 1992; Institute of Medicine 1988) that should make them high priority consumers of primary medical care, defined by the Institute of Medicine (Institute of Medicine 1996) as accessible health care that meets the majority of an individual's health care needs. While the National Healthcare Disparities Report (Agency for Healthcare Research and Quality 2003) concluded that socioeconomic, racial, ethnic, and geographic differences can result in reduced access and quality of health care, the report did not address the special circumstance of homeless people.

Over the past 20 years, at least three studies have suggested that homeless people have low use of medical services relative to their needs (Padgett et al. 1990; O'Toole et al. 1999; Stein et al. 2007) and may not get adequate healthcare services even when their health places them at high risk of death (Hwang et al. 2001). A study by Desai and colleagues (Desai et al. 2003) found that, excluding

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psychiatric and emergency department services, the majority of homeless veterans contacted through the Department of Veterans Affairs (VA) Health Care for Homeless Veterans outreach program in 1999 received no outpatient medical services in the 6 months following entry to the program. Mental illness generally did not appear to pose a specific barrier to initiating medical care, but specific diagnoses of substance abuse or schizophrenia were related to a lower likelihood of receiving three or more medical visits. A more recent study of the quality of preventive medical care for homeless veterans with mental illness found that veterans who had most recently experienced homelessness received significantly fewer prevention services than other veterans (McGuire and Rosenheck 2005).

One major institutional barrier to use of health services by homeless people has been service system fragmentation, i.e., services provided without systematic coordination at different locations with separate admission procedures (Dennis et al. 1998; Drury 2003; Interagency Council on the Homeless 1992). Some initiatives addressing fragmentation have employed Assertive Community Treatment targeted to at risk or homeless populations to integrate services either through clinicians who coordinate care (for example, (Rosenheck and Neale 1998) or through combining clinician and systems level coordination and interagency partnerships (Rosenheck et al. 2002). A different approach is represented by placing services in a single location (co-location): Two examples for non-homeless populations include one which integrated substance abuse and primary care services (Weisner et al. 2001) and another which co-located primary care and mental health services for veterans with serious mental illnesses (Druss et al. 2001).

Although both mental and physical health services report directly to the Office of Patient Care Services in the US Department of Veterans Affairs Veterans Health Administration nationally and homeless veterans have access to medical services, at local VA Medical Centers there are significant geography and coordination challenges to medical and homeless service integration. The VA Greater Los Angeles Healthcare System exemplified such challenges. A review of general medical service utilization in 2000 found that homeless veterans enrolled at Greater Los Angeles had only one-third the number of medical visits of non-homeless veterans. About 22% of homeless veterans enrolled at Greater Los Angeles had never received a full physical or mental health exam.

In 2002, a Mental Health Outpatient Treatment Center (MHOTC) was funded through VA's Central Office to establish a demonstration primary care clinic that would be co-located in a newly renovated building with the offices of both the homeless social services programs and mental health programs.

A longitudinal outcome study implemented to evaluate the effectiveness of the MHOTC followed two groups of veterans with serious mental illness or substance abuse, one group receiving access to 'usual care' primary care services prior to the opening of the MHOTC (the pre-integration group) and a second group which had access to the co-located primary care services after the MHOTC was implemented (the post-integration group). The groups were compared on use of primary care services and on general physical health outcomes over an 18 month time period. The primary hypothesis of the study was that availability of primary care services that were co-located with homeless social services and mental health services would: (a) increase access to primary care treatment and prevention services, (b) reduce use of the emergency department and inpatient services, and (c) foster greater improvement in physical health status.

Methods

Pre- and post-integration groups were recruited from the waiting room of the Homeless Drop-In Center, the on-campus point of entry for homeless veterans following outreach in the community.

Pre-Integration Condition (PRI)

In 2001 case managers of the Greater Los Angeles Healthcare for Homeless Veterans Program (Homeless Program) increased efforts to link veterans in the Homeless Program with primary care medical services by: (a) calling the medical center primary care clinic in the presence of the veteran to make an appointment for them, and (b) giving the veteran an appointment card with this information. The Greater Los Angeles Medical Center's primary care clinic was located one-half mile from the Homeless Program, and the wait for the initial appointment in the primary care clinic was typically 2 months. Veterans who were enrolled in this program are considered the PRI group.

Post-Integration Condition (POI)

In June, 2002 the MHOTC was established. In this setting, homeless veterans were evaluated in a screening clinic and quickly referred to all needed services within the MHOTC building. The goal of the MHOTC was to have the initial primary care appointment occur the same day that the homeless veteran came to the screening clinic, i.e., the first day of arrival at the screening clinic. Policies, standard operating procedures, case conferences, and weekly

building operational meetings were used to facilitate inter-clinic coordination and communication.

Case managers from the Homeless Program provided short term case management upon entry to the MHOTC. This service was an addition to the standard practices of (a) the Homeless Program providing tokens for transportation to medical and mental health appointments as needed and (b) primary care appointment reminder letters sent out by both PRI and POI primary care clinics.

Providers in the co-located primary care clinic consisted of a lead primary care physician and three nurse practitioners, the same primary care model available in the Medical Center's general outpatient primary care medical clinic prior to and during the operation of the MHOTC. MHOTC primary care providers received consultation and training regarding Healthcare for the Homeless standards for engaging and treating homeless populations including training on infectious disease screening and treatment, chronic pain and hypertension management (O'Connell et al. 2004; National Health Care for the Homeless Council 2008).

After June 2002, all veterans newly entering the Homeless Program were referred to the MHOTC. Veterans enrolled in the study following the opening of the MHOTC are considered the POI group.

Subject Recruitment

Power analysis showed that with 260 veterans there would be an 89% chance of detecting a 2-visit difference between PRI and POI groups in primary care visits within an 18 month timeframe. Recruitment of 130 veterans for each arm of the study proceeded until recruitment was completed.

We identified all veterans whose initial contact with the Homeless Drop-In Center program occurred between May 2001 to March 2002 (PRI group) and February 2003 to April 2004 (POI group) and who reported that they had not been seen by either a community or VA primary care provider during the year prior to screening. While 86 comparison group veterans were still being followed when intervention group recruiting began, these comparison veterans were on average 15 months into the 18 month follow-up period. An 11 month lag between the end of recruitment of the PRI group and the beginning of recruitment for the POI group, coupled with an assigned clinic flag described below, resulted in no crossover of PRI patients to the MHOTC primary care clinic during their study involvement.

All veterans seen by Homeless Program during this time who were homeless, had either a mental illness or substance abuse diagnosis documented in their computerized electronic medical record, and who responded positively to an offer of access to a primary care provider were eligible for study recruitment and were screened for study involvement. Veterans were considered homeless if they had spent the night prior to study enrollment in an outdoor location (street, car, abandoned building), in an emergency homeless shelter, in a hotel or motel, in a jail or prison, in a homeless residential care program that they had entered within the prior 30 days, or if they were temporarily doubled up with a friend or family member. Three veterans refused participation in the study: None of the veterans who refused participation during the PRI recruitment period later became POI study participants.

Research assistants enrolled in masters programs in social work or public health administered a face-to-face structured screening interview prior to study entry to assess study eligibility. The study protocol required that each research subject had a flag placed in their electronic medical record indicating the clinic to which they had been assigned (usual primary care for the PRI group or MHOTC for the POI group).

Data Collection

After written informed consent approved by the Medical Center's Institutional Review Board was obtained and the participant agreed to be enrolled in the study, a 2 hour structured baseline interview was administered by the research assistants. Interviews were repeated at 6, 12, and 18 months after enrollment.

Study veterans were compensated $20 for each research interview. Research interviews were not linked to medical visits. In the case of the baseline interview, history and physical examinations were arranged for veterans when they arrived at the Drop-In Center independent of the study. Follow-up interviews were scheduled independently of primary care visits and were completed wherever convenient (VA or community locations) for the veteran within a 1 month ± window of the interview date.

Measures

Sociodemographic characteristics included age, sex, race/ethnicity, marital status, education, duration of homelessness during the past 30 days and in their lifetime, employment in the past year, income in the past 30 days, and VA service-connected disability status. 'Service-connected' refers to disability by injury or disease that was incurred or aggravated during active military service: Veterans with service-connected conditions are entitled to receive priority in scheduling of hospital or outpatient appointments (US Department of Veterans Affairs 2008).

Community functioning variables addressed social support and competing health and non health needs.

Social support for obtaining health care was assessed through four questions that addressed whether during the past year friends or professionals had encouraged the veteran to seek medical services for either infectious diseases or medical care in general. Competing needs during the past 30 days were measured using a 5-item scale developed by Koegel et al. (Gelberg et al. 1997) based on the theory that homeless people who have other more pressing basic needs may be less likely to utilize a regular source of medical care. The scale measures perceived need for food or clothing, for a place to sleep, or to wash up or to use a bathroom. A criminal justice status measure indicated whether the veteran was currently on parole or probation.

Clinical status measures addressed both physical and mental health. Physical health included measures of serious physical health problems, assessed by asking whether the study participant had ever been told by a doctor or nurse practitioner that he or she had any of twenty-two chronic health problems (National Center for Health Statistics 2000). Positive responses to these questions were summed to construct a summary measure of number of medical problems. Past month global perceived physical health status was assessed at baseline and 6, 12, and 18 months through the physical health component summary of the 36-item Short Form Health Survey (SF-36), a widely used, reliable and valid measure (Ware et al. 1993; McHorney et al. 1993, 1994), that has been found to be valid for homeless people (Wood et al. 1997; Riley et al. 2003).

Mental health measures included past 30 days perceived mental health status as assessed by the SF-36 mental component score. Further, veterans were asked to report whether a doctor had ever given them a psychiatric or substance abuse diagnosis. Lifetime and past 30 days alcohol and illicit drug use problems were assessed using the composite scoring on the Addiction Severity Index (McClellan et al. 1980). Simultaneous reports of alcohol or drug abuse and any serious psychiatric disorder indicated dual diagnosis.

Use of preventive health services during the year following study enrollment was assessed as follows. Data abstracted from Medical Center's electronic medical records were used to identify receipt of each of ten age and gender appropriate preventive measures which VA guidelines require and—with the exception of prostate cancer screening—which follow recommendations from the US Preventive Services Task Force (1996). A summary prevention services ratio was created which calculated the proportion of 10 preventive measures actually received out of those for which a person was eligible. As described by Druss et al. (2002) these included two measures of immunization (pneumonia and influenza), three cancer screening measures (for colorectal, breast, and prostate cancer), two tobacco use screening measures, and three measures that addressed alcohol abuse screening, hepatitis C risk assessment, and screening for major depressive disorder.

Data on VA outpatient primary care service use (coded in stop codes 323 and 531 for physician and nursing visits) in the 18 months after study enrollment were obtained from the VA's national computerized workload files at the Austin Automation Center. VA emergency department use (coded in stop codes 101 and 102) and VA medical inpatient service use in the 18 months after study enrollment were also obtained from the Austin data.

Analyses

First, bivariate analyses were used to compare baseline characteristics and follow-up interview completion rates for the PRI and POI groups. Categorical data were compared by using chi-square tests, and continuous variables were compared by using *t*-tests.

Next, controlling for baseline differences, regression analyses compared the groups on the following outcomes: (1) initial timeliness of access to primary care (i.e., number of days to first primary care visit following study enrollment), (2) 12 month receipt of prevention services following study enrollment, and (3) 18 month use and number of VA primary care outpatient visits, VA emergency department visits, and VA inpatient medical/surgical hospital days. For these analyses, univariate analysis of variance was used to calculate grand and adjusted means and standard errors.

Finally, a mixed regression model was used to compare outcomes for 30 day physical health status at baseline, 6, 12, and 18 months. The model included terms representing time, treatment group (PRI vs. POI), and an interaction term representing time by treatment group. Time was treated as a categorical variable. Data was available for all variables for study subjects for analyses with the exception of four baseline physical health status scores: Mean substitution of missing data was employed for this analysis. The analyses were conducted using the mixed models analysis procedure in SPSS statistical software version 16.0 which adjusts standard errors for the correlatedness of outcomes from the same individual at different time points. The significance for all analyses was set at .05.

Results

Sample Characteristics and Follow-up Rates

Table 1 presents the characteristics of the total sample and PRI and POI comparison groups. Veterans were middle-

Table 1 Baseline characteristics of homeless veterans referred for primary care, by enrollment status

	Total sample $N = 260$		Pre-integration group (PRI) $N = 130$		Post-integration group (POI) $N = 130$		P value
	Mean ± SD	%	Mean ± SD	%	Mean ± SD	%	
Demographic							
Age	45.8 ± 7.0		45.9 ± 7.0		45.8 ± 7.1		.91
Sex (male)		99		99		100	.16
Black (race/ethnicity)		50		51		49	.80
Married		9		11		8	.51
Education (years)	13.0 ± 1.8		13.0 ± 1.8		13.0 ± 1.9		.89
Housing							
Days homeless, past 30 days	13.2 ± 11.4		13.8 ± 11.0		12.6 ± 11.8		.39
Length of homelessness at intake (two or more years)		38		39		37	.76
Income, past 30 days	$651 ± 1,111		$696 ± 1,088		$602 ± 1,137		.50
VA service-connected disability status		19		25		14	.03
Unemployed		22		19		25	.28
Community functioning							
Social support for infectious disease testing or medical care, past year[a]	1.1 ± 1.2		1.1 ± 1.1		1.2 ± 1.2		.57
Competing needs, past month[b]	5.3 ± 4.5		4.5 ± 4.4		6.1 ± 4.5		.00
Currently on parole or probation		38		35		41	.39
Clinical							
Physical health							
Number of serious physical health problems, past year (0–22) [was told by physician or nurse practitioner, ever]	2.0 ± 1.8		2.1 ± 1.8		1.9 ± 1.8		.53
High blood pressure or hypertension		24		21		26	.31
Lung trouble or breathing problem		9		6		11	.18
Asthma		10		12		7	.14
Tuberculosis		3		4		2	.25
Chronic obstructive pulmonary disease		2		1		2	.31
Hearing condition or problem of ear, nose and throat condition		17		18		16	.74
Eye or vision problem or problem seeing except for needing glasses		10		9		12	.41
Cancer		1		1		1	.99
Heart trouble or heart problem that might include coronary artery disease, heart attack, congestive heart failure		7		9		5	.33
Stroke		2		2		3	.41
Kidney or bladder trouble		4		6		1	.02
Arthritis or rheumatism		20		24		16	.12
HIV positive test or AIDS		1		1		1	.99
Problem with liver or hepatitis A, hepatitis B or hepatitis C		21		20		22	.76
Diabetes		3		2		4	.47
Stomach or digestive disorder		11		13		9	.33
Anemia		4		5		2	.20
Pancreatitis		3		5		1	.06
Thyroid disease		.4		0		1	.32
Skin disorder		10		10		9	.83
Seizure		5		5		5	.78
Back or neck problem		34		33		36	.54
Physical health status, past 4 weeks (PCS)[c]	50.7 ± 10.1		51.8 ± 10.4		50.5 ± 10.3		.35
Mental health							

Table 1 continued

	Total sample $N = 260$		Pre-integration group (PRI) $N = 130$		Post-integration group (POI) $N = 130$		P value
	Mean ± SD	%	Mean ± SD	%	Mean ± SD	%	
Total serious psychiatric problems (0–6) [was told by physician, ever]	1.9 ± 1.5		1.8 ± 1.5		1.9 ± 1.5		.74
Schizophrenia		13		13		12	.45
Bipolar disorder		20		18		21	.72
Depression		42		43		42	.58
PTSD		17		22		12	.10
Alcohol abuse		45		39		52	.03
Drug abuse		48		45		49	.23
Dual diagnosis		36		35		36	.90
Alcohol problem, past 30 days[d]	.23 ± .2		.24 ± .2		.23 ± .3		.73
Illicit drug problem, past 30 days[d]	.13 ± .1		.13 ± .1		.13 ± .1		.58
Mental health status, past 4 weeks (MCS)[c]	41.2 ± 14.1		40.3 ± 14.0		42.1 ± 14.1		.24

[a] Social support for health care: Possible scores range from 0 to 4, with higher scores indicating more social support

[b] Competing needs (Gelberg et al. 1997): Possible scores range from 0 to 15, with higher scores indicating higher levels of competing needs

[c] Short Form 36 (Ware et al. 1993) PCS and MCS scores are standardized to a scale of 0–100 (mean of 50, standard deviation of 10), with higher scores indicating favorable health status

[d] Assessed with the Addiction Severity Index (McClellan et al. 1980) with range of 0–1, with higher scores indicating higher levels of psychiatric symptoms, or greater drug or alcohol use, respectively

aged on average, half were African American, and they were almost all male. Significantly more of the PRI group was service-connected.

Both groups of veterans reported being literally homeless almost one-half of the month prior to study enrollment, and more than one-third reported being homeless for more than 2 years. The POI group reported a higher level of competing needs.

While the veterans reported an average of two serious medical problems, baseline physical health status was approximately equal to the US population average for this age group (Ware et al. 1994). Reflecting high levels of all six psychiatric diagnoses queried, baseline mental health status was 10 points lower (one standard deviation) than the US population average for the age group. Almost half reported diagnosed alcohol or drug abuse, with a higher percentage of the POI group diagnosed with alcohol abuse.

The overall availability for follow-up across follow-up interview points was 72%. The rates were not significantly different for the two groups: the PRI rate was 67% and the POI rate was 76% ($t = 1.945$, $P > .05$). Characteristics of veterans interviewed at 18 months did not differ from those only interviewed at baseline with the exception of being told by a doctor or nurse that the veteran had anemia (10% at baseline vs. 2% at 18 months, $\chi^2 = 8.81$, $P < .05$).

Outcomes

Group Comparisons: Service Use

Table 2 reports group outcome differences in primary care access, use of medical services, and receipt of primary care prevention services, controlling for the baseline differences between the two groups in VA service-connected disability status, competing needs, and alcohol abuse.

Primary care appointment, prevention, use and visits. On average, POI group patients had less than a day lapse before their initial scheduled primary care visit, while PRI group veterans waited almost 2 months for their first visit. Levels of prevention services after 1 year were significantly higher for the POI group, with the average for the POI group of the proportion of 12 month eligible prevention services received being thirteen percentage points higher than the PRI group.

Austin administrative data indicated no differences across groups in the percentage of veterans using primary care. However, the POI group had a significantly higher number of primary care visits, on average 2.3 visits more over the 18 months of follow-up.

Use of other VA healthcare services. Two-thirds of veterans in both groups reported some emergency department use, with an average of three visits during the follow-

Table 2 Regression analyses of timeliness of access to primary care, 1 year prevention services received, and 18 month VA Austin service use* of homeless veterans, by study group

Outcome	Total sample $N = 260$		Pre-integration group (PRI) $N = 130$		Post-integration group (POI) $N = 130$		P value
	Grand mean ± SE	%	Adjusted mean ± SE	%	Adjusted mean ± SE	%	
Days to primary care enrollment	26.7 ± 1.4		53.2 ± 1.7		.3 ± 1.8		.00
Prevention service receipt ratio (no. of 10 services received/no. of services eligible for)[a]	.51 ± .1		.44 ± .1		.57 ± .1		.01
Primary care service use		90		90		90	.98
Visits (population)	5.4 ± .4		4.3 ± .6		6.6 ± .6		.01[b]
Visits (users)	6.1 ± .5		4.7 ± .6		7.4 ± .6		.00[b]
Emergency care service use		67		80		54	.00
Visits (population)	3.2 ± .4		4.0 ± .5		2.4 ± .5		.00[b]
Visits (users)	4.7 ± .5		5.0 ± .6		4.3 ± .7		.10[b]
Inpatient medical/surgical hospital days		92		96		89	.09
Days (population)	14.5 ± 1.2		14.2 ± 1.5		14.7 ± 1.6		.06[b]
Days (users)	15.5 ± 1.2		14.8 ± 1.5		16.2 ± 1.7		.26[b]

* Final VA service use data was obtained from VA's central data repository, the Austin Automation Center (AAC) in Austin, Texas

[a] Possible scores range from 0 to 1, with higher scores indicating higher percentage of appropriate prevention services received

[b] Test statistic from log transformed dependent variable analyses

up period. Emergency use and levels of use were significantly lower for the POI group. Nine out of ten veterans from both groups reported VA inpatient hospital stays, with an average of fifteen and one-half days per admitted veteran. Group differences were not statistically significant.

Group Comparison: Physical Health Status

Controlling for baseline physical health status, baseline differences between the two groups in VA service-connected disability status, competing needs, alcohol abuse, and days to first primary care visit, the main effect of group in the mixed model analysis was not significant ($F = .29$, $P > .05$). While there were no group differences, overall physical health status for both groups declined slightly but significantly over the 18 month period from 50.1 at baseline to 47.2 at 18 months ($F = 12.14$, $P < .001$). It is not clear how clinically significant this difference of three points is as the "minimum important difference" threshold on physical health status scores is unsettled (Kertesz et al. 2005; Bayliss et al. 2004). No group-time interaction was found for physical health status.

Discussion

This study sought to compare access to primary care and health status in two cohorts of homeless veterans with serious mental illness or substance abuse, the first with access to geographically separate homeless and primary care services, the second with access to co-located and coordinated homeless, mental health, and primary care services. Veterans in both groups were similarly disadvantaged in levels of social, psychiatric, and medical problems, and had a profile of current physical health status that was similar to other males of their age group but lower in mental health status. During the 18 month study period, veterans in the group that received co-located and actively coordinated services received primary care appointments more quickly than veterans in the standard care group, received more visits, had higher levels of preventive services, and lower levels of emergency department use. Perceived physical health status declined slightly over the 18 month period, with no significant group difference.

The study hypothesis was thus partially confirmed with increased access to primary care and preventive services and reductions in emergency but not inpatient service use and no improvement in physical health status. It is noteworthy that the study found increased access to primary care in an intervention group with significantly more competing needs, a higher rate of alcohol abuse, and a lower rate of service-connected disability, factors which would tend to bias positively results for the pre-intervention group. Improvements found in this study with the co-located/integrated model are consistent with the belief that medical treatment and prevention received in one location with a multi-need population can be provided in

a more timely and effective manner than in disconnected clinics.

While the lack of improvement in health status is likely not a surprising finding, one of the central assumptions of primary care is that providing access to medical care affects health status. Yet, results of studies of low income and poor populations have been mixed regarding a direct relationship between access to health care and health (Lurie et al. 1984; Newhouse and the Health Insurance Group 1993; Samet et al. 2003). Only one of the two studies (Druss et al. 2001; Weisner et al. 2001) integrating primary care into mental health or substance abuse programs found positive outcome for health status. Other experimental studies which co-located mental health services within primary care clinics also report mixed findings in relation to intervention effect on long term health status (Katon et al. 1995; Sherbourne et al. 2001; Oslin et al. 2006). Our study found that health status declined for both groups over the 18 months of the study, a finding for which there may be a number of explanations: an accelerated aging process in a middle-aged homeless sample, perception of health problems worsening following identification and/or labeling of those problems as they access medical care, lifestyle and social conditions so desperate that primary care could not overcome the negative impact that environment has upon health, or groups not studied (or treated) long enough to detect a difference in health status (Ciaranello et al. 2006; Gelberg et al. 2000; Jackson 2003). However, a second central assumption of primary care is that receipt of preventive services affects future health (US Preventive Services Task Force 1996), and the POI group did receive more prevention services which could forestall future problems.

The study has some important limitations. There were measurement limitations: Some outcome and predictor variables were assessed by self report and service utilization was only assessed for VA services, thus not including services utilized outside of the VA. However, where available, objective measures (for example, visits) were used, and self-reported non-VA utilization was very low as nine of ten study veterans indicated that they received most of their medical care at the VA. Further, the study was unable to differentiate ambulatory care sensitive conditions that if treated in a timely and appropriate manner in an ambulatory care setting would not usually require inpatient admission and which might have indicated a negative association between inpatient admissions and access to primary care (Millman 1993; Bindman et al. 1995).

Other study design limitations included lack of random assignment to treatment groups, patient cohorts recruited at different periods in the evolution of the health care system's primary care services, and lack of generalizability beyond the site studied. The effect of selection bias was minimized by inclusion of baseline differences in the analyses. Regarding cohort recruitment, the pre-integration group was recruited and followed during 2001 and 2002, a time during which VA had begun to place emphasis upon enrollment of veterans in primary care which would, if anything, have worked to reduce differences in primary care access between the groups. While the time overlap between comparison group follow-up and intervention group recruitment may have introduced resentful demoralization in the comparison group, the time interval was small (3 months), the study received no complaints from veterans about this issue, and veterans were free to enroll in the co-located clinic following the completion of the follow-up period. Finally, with respect to generalizability, it will be important to determine whether this model can be replicated in other locations at other medical centers, especially medical centers with small homeless populations. Future research on outcomes of service integration for this population would also be strengthened by inclusion of diagnoses provided directly by clinicians and measures of implementation and maintenance of the service integration process that assess the impact of process on patient outcome.

Despite these limitations, this study provides evidence that integrating medical treatment with homeless and mental health services can improve the quality of medical care for homeless people with serious mental illness or substance abuse. The positive findings from this study should encourage further research that examines applicability to a wider variety of health care clinics serving homeless people, assesses the impact on patient health status over longer periods of time, and evaluates the cost-benefit of such interventions.

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