

**Program Outcomes and Health Care Utilization of People Experiencing
Homelessness and Substance Use Disorder after Transitional Care Program
Engagement**

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Abstract: People experiencing homelessness (PEH) have a high prevalence of mental illness and substance use disorder (SUD) and substantial acute and chronic disease burden. Transitional care and medical respite programs facilitate a safe transfer for PEH from the acute care to community setting. Many medical respite programs practice harm reduction strategies that can increase the opportunity for positive program outcomes for PEH with SUD. This transitional care and medical respite program evaluation explored program outcomes, health care utilization patterns, and comorbid conditions of persons with and without SUD. People experiencing homelessness with SUD had similar program outcomes and both groups had decreased acute care utilization after program engagement. A high prevalence of trimorbidity, which is associated with early mortality, was noted. Opportunities for harm reduction strategies to promote both social and clinical outcomes are offered.

Key words: Homelessness, substance use disorders, health care utilization, medical respite, program evaluation, program outcomes, Elixhauser, trimorbidity, comorbidity.

People experiencing homelessness (PEH) have a high rate of premature death; a high prevalence of serious mental illness, acute and chronic diseases, and substance use disorders (SUD);¹ and a standardized mortality ratio two to five times higher than that of the general population.¹ Comorbid conditions are common in the population and the incidence of tri-morbidity (i.e., the combination of mental illness, SUD, and chronic medical illnesses), which is associated with premature mortality, is increasing.² These poor health outcomes are hampered by multiple barriers to accessing health care³ and are reflected in high-cost health service utilization rates.¹ Compared with those who do not experience homelessness, PEH have 30-day emergency department (ED) revisit rates that are 5.7 times higher, and 30-day hospital readmission rates that are 1.9 times higher.⁴

There is a strong association between homelessness and SUD,^{5,6} and a significant number of PEH who are patients in the ED setting report alcohol and substance use.⁷ Despite this linkage, there is limited evidence regarding interventions and programs that address problematic substance use for PEH.^{5,7} PEH report that their needs are not well met when accessing health or SUD treatment services.^{5,7} Because PEH frequently require health care services as well as SUD treatment, there is an impetus for the development and assessment of innovative care models to meet these needs.^{5,7}

Medical respite is a promising model to address the health care and social needs of PEH with SUD.⁸ Medical respite programs offer short-term residential stays for PEH who are too ill to recover safely from illness or injury while unhoused.⁹ Medical respite programs vary in organizational models, services provided, and patient populations served.⁹ The variety of services provided include case management, clinical care, aftercare planning, referrals, transportation to medical services, facilitating meals, and more.⁹ Patient-centered care is a cornerstone of medical respite programs.¹⁰ A medical respite stay that meets basic needs (e.g.,

shelter, food, clothing, access to care) allows PEH to arrange plans for the future,¹¹ including SUD treatment. Because SUD may be a barrier to engagement in medical respite programs for PEH¹² and is associated with premature program exit,¹³ programs operate with harm reduction strategies not requiring abstinence from substances.^{14,15}

In response to the rising number of PEH being discharged from area hospitals with ongoing medical needs, members of our team developed and implemented a two-year medical respite pilot program. Program participants demonstrated several positive outcomes including connection to primary care, mental health care, SUD treatment, and improved housing. A pre-post comparison of health service outcomes demonstrated decreased hospital admissions and inpatient days and increased outpatient visits.¹⁶ These data supported funding for an expansion of the pilot program, which is now known as Durham Homeless Care Transitions (DHCT).

Durham Homeless Care Transitions was begun five years ago, and a robust program evaluation is underway. The present study compares the comorbidity profile of a patient cohort who participated in DHCT with those who did not, evaluates DHCT program outcomes for PEH with and without SUD, and reports health care utilization patterns for DHCT program enrollees with and without SUD before program enrollment and after program discharge.

Methods

Study design. This program evaluation used (a) retrospective chart review data to explore patient comorbid conditions and determine health care utilization patterns of people with and without SUD before, during, and after DHCT program engagement and (b) DHCT program data to assess program outcomes. Our primary goals were (1) to describe patients referred to and enrolled in DHCT; (2) to report program outcomes of DHCT participants including health care utilization before program enrollment and after program discharge; and (3) to report the

differential effect of the program for patients with diagnosed SUD. The research questions that guided this study were:

1. What is the prevalence of SUD in patients referred to and enrolled in DHCT?
2. What is the chronic illness, mental health, and SUD burden of patients referred to and enrolled into DHCT including co-occurring disorders and trimorbidity?
3. Do patients with SUD have program outcomes the same or similar to those of patients without SUD?
4. What are the health care utilization patterns of DHCT patients pre-, during-, and post-program and how do they vary for patients with SUD?
5. Does a SUD diagnosis predict enrollment in the DHCT program?

This project was reviewed and approved by the Duke Health Institutional Review Board.

Setting and participants. All patients who were referred to DHCT from July 1, 2016 through June 30, 2020 ($n = 497$) were included in the study. Health care utilization patterns and program outcomes are presented for all people who were admitted to the program and discharged on or before January 1, 2020 ($n = 125$) to allow for six months of post-program health care service utilization data.

The Durham Homeless Care Transitions (DHCT) Program. The Durham Homeless Care Transition Program provides case consultation, medical respite services (a safe place to rest and recover upon hospital or medical discharge), and care management to PEH with acute or chronic medical issues. It began in 2016 as a nine-month intensive case management program with the goal of connecting PEH with ongoing medical needs to existing services (e.g., primary care, SUD services, mental health care) and supports (e.g., housing, income, family or friends, community groups). In time, we realized that not all patients required, or desired, this level of case management; therefore, we developed and piloted a novel triage system to

determine patient medical vulnerability and anticipated program case management needs. The Durham Homeless Care Transition Program does not provide direct medical care but connects clients to existing community and health care services. The Durham Homeless Care Transition Program uses a scattered-sites model for patients, providing housing in either double- or single-room occupancy sober houses or hotel rooms.

The Durham Homeless Care Transition Program is administered by Project Access of Durham County (PADC) and was primarily funded during the study period through programmatic grants, along with lesser amounts of funding from Durham County, Duke University Health System (DUHS), and the Duke Outpatient Clinic. All DHCT referrals and enrollees were on the SUD spectrum (i.e., at risk for SUD to active addiction) and may have had mental illness. The Durham Homeless Care Transition Program is grounded in a harm reduction approach that facilitates helping individuals connect to resources tailored to their needs such as strict sobriety or reduced intake, or medication-assisted therapy (e.g., for alcohol use disorder or opiate use disorder). The team maintains connections with local mental health and substance use systems in our community and we make referrals as individuals become ready. We provide clients with Narcan kits and can connect individuals to needle exchange opportunities.

In line with our harm reduction philosophy, we do not require sobriety for medical respite placement or housing placement. The majority of our medical respite placements are in scattered site sober housing settings where we can provide room and board for individuals who were recently discharged from the hospital. For individuals who are unable to or uninterested in maintaining sobriety, we have provided higher-cost hotel-based respite. As we work towards housing plans for our homeless clients, we do not require sobriety from individuals who may have SUD in addition to primary medical issues; rather, our philosophy mirrors the Housing First

approach with a goal of stabilizing individuals' housing as a first step towards stabilizing their broader health.¹⁷

At the time of this evaluation, program staff included an operations director (10% effort), a nurse practitioner clinical director (25% effort), a program evaluator (5% effort), a program or case manager (1.0 FTE), and a housing specialist (1.0 FTE). The majority of DHCT clients were referred by complex care coordinators within the local academic health system through an electronic portal. The clinical director, who works within the health system, reviewed the referral information and clinical information housed in the electronic health record (EHR) and determined whether the client met DHCT program admission criteria (Box 1). If the patient met DHCT program criteria, the patient was eligible for the program with care management planning for a safe discharge back into a community setting. If the patient was experiencing homelessness and did not have a safe place to recover from their illness or injury, DHCT provided medical respite housing. If the patient chose not to engage with or was ineligible for DHCT, the clinical director served as an expert consultant to the referring agency to facilitate a safe discharge plan for the patient, which included skilled nursing or assisted living facilities.

BOX 1.

DHCT PROGRAM ELIGIBILITY CRITERIA

Patient would be discharged to home if a home were available

Is able to participate in and maintain a safe and harm-free environment

Is expected to follow rules of housing setting which may include abstinence from drugs and/or alcohol

Is willing to participate in case management visits and treatment plan

Is competent in activities of daily living (e.g., able to self-toilet, able to prepare simple meals)

Is psychiatrically stable (e.g., no active threats of harm to self or others)

Is cleared by physical therapy for home discharge when/if applicable

Note:

DHCT: Durham Homeless Care Transitions

Once enrolled into the program, the DHCT case manager or clinical director met with the patient to complete intake information and added them to the DHCT program electronic informatics platform. Intake information included:

1. a Has / Needs form to document items and services that the client already had as well as those for which they might qualify,
2. a health survey,
3. a self-efficacy tool,
4. the Vulnerability Index Service Prioritization Decision Assistance Tool (VI-SPDAT, Version 1)¹⁸ which was included in housing prioritization metrics in Durham, NC, and
5. the Montreal Cognitive Assessment (MoCA)¹⁹ to assess cognitive function.

The team resurveyed items 1-3 at three-month intervals during program engagement.

Service frequency and intensity were tailored to individual patient situations and the complexity of medical conditions. Services included referrals to medical and social service agencies, appointment and transportation arrangements, and accompaniment to appointments. Housing needs were assessed upon enrollment and, if needed, a housing specialist was engaged to submit housing applications based on patient qualifications and preferences. The Durham Homeless Care Transition Program was designed to help patients make the transition from the hospital setting back into community care. Once clients were medically stable and reliably established with community care providers and social service agencies as determined by the clinical director, they were discharged from the program.

Data collection. The Durham Homeless Care Transition Program programmatic data are housed within two Research Electronic Data Capture (REDCap)²⁰ databases: one for

referrals and one for participant tracking. Everyone has a medical record number from the local academic health system that allows linkage of data between the databases. To access EHR data, identifiers for all referrals, including full name, date of birth, and health system medical record number were downloaded into an Excel spreadsheet and shared with the Duke Health Technology Solutions Analytics Center of Excellence (DHTS ACE) for matching within the DUHS EHR, which includes outpatient information from Lincoln Community Health Center (the local federally qualified health center). Data were abstracted for all matched referrals from the EHR go live date of January 1, 2014 through June 30, 2020. Multiple variables at both the patient and encounter level as well as diagnoses and financial data were included. The cleaned dataset was delivered into a protected computing environment for storage and analysis. The Durham Homeless Care Transition Program programmatic data were downloaded into an Excel spreadsheet from their individual REDCap databases.

Measures. *Elixhauser comorbidity index.* The Elixhauser comorbidity index was developed to define clinical comorbidities associated with hospital length of stay, hospital charges, and in-hospital death.²¹ The final algorithm included 30 distinct comorbidities classified by International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes. In 2005, the algorithm was updated to reflect changes brought about by implementation of ICD, Tenth Revision (ICD-10).²² The Elixhauser Comorbidity Index is widely used in health services research.²³

Defining SUD and chronic conditions. Chronic illness status was assessed by using the Elixhauser comorbidity index to determine medical conditions documented in the EHR data that preceded the DHCT referral date. Among the Elixhauser comorbidity items are *Drug Abuse* and *Alcohol Abuse*; participants whose EHR reflected the ICD-10 codes for either of those conditions were categorized as Yes for SUD. In a similar manner, each of the 30 Elixhauser items were

also categorized as Yes or No based on whether their ICD-10 code was documented in the EHR prior to the referral date. The following additional six umbrella categories of chronic conditions were constructed if the subject had a Yes to any of the individual Elixhauser items: (1) Heart Disease included congestive heart failure, valvular disease, and cardiac arrhythmia; (2) Hypertension included both complicated and uncomplicated hypertension; (3) Diabetes included both complicated and uncomplicated diabetes; (4) Cancer included lymphoma, metastatic cancer, and solid tumor without metastasis; (5) Mental Illness included psychoses and depression (i.e., the Elixhauser descriptive terms) (6) Trimorbidity was defined as Yes if the subject was Yes to mental illness, SUD, and one or more Elixhauser-defined chronic conditions. (More information on the Elixhauser Comorbidity Index, including the ICD-10 codes specific to each diagnoses category, is available at: <https://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp>.)

Statistical analyses. We used descriptive statistics to categorize the health care utilization and demographic variables. Substance use disorder group (Yes and No) characteristics were compared using t-tests for continuous variables and chi-square tests for categorical variables. Normality of continuous variables was assessed to satisfy parametric analytic assumptions. With the binary outcome variable of acceptance into the DHCT program (Yes or No), logistic regression was used to evaluate a set of candidate predictors. For DHCT participants, analysis of utilization of hospital resources (ED visits, inpatient admissions, total bed days, and observation encounters) pre-DHCT enrollment compared with post-DHCT discharge were conducted as change scores. For variables such as number of admissions that were counts in nature, Poisson regression was used to compare the SUD groups. All analyses were conducted using SAS 9.4 (SAS Inc., Cary, NC). Significance was assessed at $p = .05$.

Results

In the four-year period beginning July 1, 2016 through June 30, 2020, the DHCT program had 576 referrals of 497 unique individuals. Table 1 presents participant characteristics of (a) all referrals, (b) participants with and without diagnosed SUD, and (c) DHCT program participants. The mean age of people referred to the program was 50.5 ± 11 . The majority were men (68.6%), non-Hispanic Black (61.2%), had diagnosed SUD (66.3%), had public insurance (42.4%), and were referred from the academic health system (61%) (Table 1). Of referrals who were not accepted into the program, 290 had documentation regarding the reason. The top five reasons for program exclusion included: 1) unable to contact (22%), 2) the person refused (17%), 3) no medical need (12%), 4) higher level of care required (11%), and 5) not experiencing homelessness.

TABLE 1.

PARTICIPANT CHARACTERISTICS

Characteristic n, (%)	All referrals (n=497)	With SUD (n=330)	Without SUD (n=167)	p-value	Accepted into DHCT (n=125)
Sex				.03	
Female	156 (31.4)	93 (28.2)	63 (37.7)		31 (24.8)
Male	341 (68.6)	237 (71.8)	104 (62.3)		94 (75.2)
Age in years, M(\pm) ^a	50.5 (11.0)	49.3 (10.2)	52.7 (12.2)	.001	51.1 (9.8)
Race/Ethnicity				<.0001	
Non-Hispanic Black	304 (61.2)	212 (64.2)	92 (55.1)		85 (68.0)
Non-Hispanic White	146 (29.4)	104 (31.5)	42 (25.2)		37 (29.6)
Other/Missing	47 (9.5)	14 (4.2)	33 (19.8)		3 (2.4)
Referral Source				.58	
DUHS	303 (61.0)	204 (61.8)	99 (59.3)		69 (55.2)
Other	194 (39.0)	126 (38.2)	68 (40.7)		56 (44.8)
Insurance Status ^a				.22	

Public	202 (40.6)	140 (42.4)	62 (37.1)	62 (49.6)
Private	12 (2.4)	5 (1.5)	7 (4.2)	1 (0.8)
Uninsured	183 (36.8)	118 (35.8)	65 (38.9)	30 (24.0)
Mixed ^b	100 (20.2)	67 (20.3)	33 (19.8)	32 (25.6)

Note:

^aAt referral

^bOf the 100 mixed, average proportion private=13.3%; public=44.6%; uninsured=42.1%

DHCT: Durham Homeless Care Transitions

DUHS: Duke University Health System

SUD: Substance use disorder

On average, PEH referred to DHCT had high comorbid chronic illness, particularly heart disease, hypertension, chronic pulmonary disease, and diabetes. The Durham Homeless Care Transitions program participants had greater prevalence of these and other chronic illnesses compared with the cohort not enrolled in the program. Additionally, almost three quarters of DHCT program participants had SUD, 73% had SUD co-occurring with at least one chronic illness, and more than half had trimorbidity (Table 2).

TABLE 2.
ELIXHAUSER SCALE DIAGNOSES OF PARTICIPANTS, % WITH CONDITION*

Elixhauser Chronic Condition	DHCT non- participants N=375	DHCT participants N=125	p-value
Heart Disease ^a	63.9	73.6	.045
Pulmonary circulation disorders	10.9	18.4	.02
Peripheral vascular disease	15.6	20.8	.21
Hypertension ^b	67.0	77.6	.01
Paralysis	6.6	6.4	.71

Other neurological disorders	31.8	32.8	.48
Chronic pulmonary disease	40.4	45.6	.06
Diabetes ^c	33.4	47.2	.005
Renal failure	21.2	28.8	.08
Liver disease	26.2	27.2	.71
AIDS / HIV	5.1	5.6	.79
Cancer ^d	8.4	12.0	.19
Rheumatoid arthritis	5.1	5.4	.79
Coagulopathy	15.9	15.2	.77
Obesity	28.3	28.8	.94
Substance Use Disorder ^e	64.8	74.4	.02
Mental Illness ^f	64.4	68.8	.37
Mental Illness + one or more chronic condition	62.0	66.4	.38
SUD + one or more chronic condition	61.2	73.0	.02
Trimorbidity ^g	47.7	54.1	.22

Note:

*3 of the 122 unique Subjects in DHCT were in the program 2 times

^aHeart Disease = congestive heart failure, valvular disease, and cardiac arrhythmia

^bHypertension = complicated and uncomplicated hypertension

^cDiabetes = complicated and uncomplicated diabetes

^dCancer = lymphoma, metastatic cancer, solid tumor without metastasis

^eSubstance Use Disorder = alcohol and drug abuse

^fMental Illness = psychoses and depression

^gTrimorbidity = mental illness and SUD and one or more chronic condition

DHCT: Durham Homeless Care Transitions

SUD: Substance use disorder

Greater than 90% of DHCT program participants obtained or maintained a primary care medical home, obtained or maintained connection with a medical specialty care provider, and received medication assistance (Table 3). More than 75% had facilitated access to transportation, improved their housing arrangement, and reconnected with family or friends. Program participants with SUD were more likely than those without SUD to obtain or maintain SUD treatment (61.1% vs 36.7%; $p = .019$) and obtain or maintain mental health care (66.3% vs 46.7%; $p = .054$). There were no other statistically significant differences in program outcomes between groups. Patients who were uninsured were less likely than those with public insurance to be enrolled into the DHCT program (OR = .466; .276 to .787), and those with SUD were more likely to be enrolled (OR = 1.662; 1.021 to 2.704).

TABLE 3.

DHCT PROGRAM SERVICES RECEIVED FOR PATIENTS WITH AND WITHOUT SUD

Program Outcome n (%)	All participants (n=125)	With SUD (n=95)	Without SUD (n=30)	p-value
Obtain / maintain primary medical care home	120 (96.0)	91 (95.8)	29 (96.7)	.83
Obtain / maintain specialty care provider	112 (89.6)	83 (87.4)	29 (96.7)	.19
Receive medication compliance assistance	119 (95.2)	90 (94.7)	29 (96.7)	.67
Receive medical insurance assistance	57 (45.6)	40 (42.1)	17 (56.7)	.16
Obtain / maintain mental health care	77 (61.6)	63 (66.3)	14 (46.7)	.054
Obtain / maintain substance use disorder treatment	69 (55.2)	58 (61.1)	11 (36.7)	.019

Reconnect with family / friends	96 (76.8)	70 (73.7)	26 (86.7)	.14
Establish support systems in the community	77 (61.6)	57 (60.0)	20 (66.7)	.51
Establish or maintain an income source	77 (61.6)	56 (59.0)	21 (70.0)	.27
Improve housing arrangement	98 (78.4)	73 (76.8)	25 (83.3)	.45
Enhance accessibility to transportation	111 (88.8)	84 (88.4)	27 (90.0)	.81
At discharge had Medicaid or other health care insurance ^a	83 (66.4)	64 (67.4)	19 (63.3)	.68
Receive other community services	85 (68.0)	68 (71.6)	17 (56.7)	.12

Note:

^aOf all program participants, 36 had insurance at program entry and 47 acquired insurance during the program

DHCT: Durham Homeless Care Transitions

SUD: Substance use disorder

A comparison of health care utilization in the six months before program enrollment and six months after program exit demonstrated that DHCT participants had lower average counts of hospital admissions (1.63 vs .62; $p < .0001$), bed days (16.37 vs 5.41; $p < .0001$), and ED visits (3.25 vs 1.71; $p < .0001$) (Table 4). Comparing health care utilization six months prior to enrollment with utilization during the program revealed a decrease in mean admissions (1.63 vs 1.00; $p = .0002$), bed days (16.37 vs 8.87; $p = .004$) and an increase in outpatient visits (6.78 vs 17.63; $p < .0001$). Patients without SUD had higher mean observation encounters than patients with SUD (.47 vs 1.27; $p = .007$).

TABLE 4.
DHCT PROGRAM PARTICIPANT HEALTH CARE UTILIZATION PRE, DURING, AND POST PROGRAM AT +/- 6 MONTHS

Variable	SUD (+)				SUD (-)				Total				p value
	Pre	During	Post	P	Pre	During	Post	P	Pre	During	Post	p	
M(±)	N=95	N=95	N=90	values ^a	N=30	N=30	N=27	values ^a	N=125	N=125	N=117 ³	values ^a	SUD ^b
Admissions	1.82 (1.58)	1.22 (2.01)	.73 (1.25)	<.0001 / .005	1.03 (.76)	.30 (.60)	.26 (.81)	.0007 / <.0001	1.63 (1.47)	1.00 (1.82)	.62 (1.18)	<.0001/ .0002	.24
Bed days	17.11 (19.3)	10.69 (26.54)	6.67 (19.03)	.0002 / .043	14.02 (20.93)	3.11 (7.50)	1.23 (3.29)	.004/ .004	16.37 (19.72)	8.87 (23.62)	5.41 (16.90)	<.0001/ .004	.56
ED visits	3.71 (3.34)	3.37 (4.15)	2.03 (3.78)	.0006 / .46	1.80 (1.58)	1.23 (1.45)	.63 (1.24)	.005/ .08	3.25 (3.12)	2.86 (3.80)	1.71 (3.42)	<.0001/ .27	.35
Observation Encounters	1.22 (4.57)	1.57 (2.82)	.79 (2.40)	.34 / .49	.47 (.86)	1.27 (1.62)	.48 (.89)	.84/ .007	1.04 (4.01)	1.50 (2.58)	.72 (2.14)	.35/ .24	.92
Outpatient Visits	7.19 (9.57)	18.73 (18.92)	5.54 (7.90)	.19 / <.0001	5.50 (5.88)	14.17 (14.60)	6.63 (9.05)	.44/ .004	6.78 (8.84)	17.63 (18.02)	5.79 (8.15)	.32/ <.0001	.30
ED Revisit													
30-Day			16.7%				11.1%				15.4%		.76
60-Day			27.8%				14.8%				24.8%		.21
90-Day			35.6%				18.5%				29.6%		.09

Note:

^a Pre to post change / Pre to during change

^b SUD (+) versus SUD (-) pre to post change

^c Participants who were no longer in the area to receive care or had died during or within six months of program exit were not included.

DHCT: Durham Homeless Care Transitions

SUD: Substance use disorder

EC: Emergency department

Discussion

This study explored health conditions at referral and programmatic outcomes and health care utilization patterns of PEH before and after engagement with a homeless medical respite and transitional care program. Considering the program’s use of harm reduction strategies, we

found it notable that there was a lack of difference in outcome for participants with and without SUD. All DHCT program participants, both with and without SUD, demonstrated increased access to social services including exiting the program with an improved housing arrangement, income source, health care insurance, and established support system including reconnection with family and friends. These findings are like those in the few studies that report social outcomes of medical respite.^{16,24-25}

Although we cannot directly attribute these outcomes to harm reduction strategies, prior research has demonstrated that PEH with SUD have had positive clinical outcomes in harm reduction environments. For example, Beielser et al.¹⁴ demonstrated successful outpatient parenteral antimicrobial therapy for 64% of patients with a history of injection drug use treated in a medical respite program. Harm reduction strategies in their program included information on needle exchange, Narcan kits, safer injection practices, and opiate replacement therapy for patients who were interested.¹⁴ More recently, Beielser et al.²⁶ demonstrated that patients who had a bundle of interventions that included medications for opioid use disorder begun in the inpatient setting had increased odds for clinical cure of serious infections during their medical respite stay. Risteau and colleagues¹⁵ implemented a managed alcohol program to decrease the potential for alcohol withdrawal and increase compliance with COVID-19-related isolation and quarantine orders for PEH and those who could not shelter in place. Early program outcomes showed that patients were able to adhere to isolation and quarantine orders and noted no serious adverse events or deaths during the two-month program implementation phase.¹⁵

The National Health Care for the Homeless Council (NHCHC), the preeminent authority on homeless medical respite, has published medical respite standards.²⁷ Outcomes associated with Standard 5 (Medical Respite Program Assists in Health Care Coordination and Provides Wrap-Around Support Services) include facilitating connection to primary, mental health, SUD

care, transportation, housing, and benefit programs, as well as access to social support groups including family and caregivers. Future medical respite research and program evaluation should highlight these important outcomes as well as the more frequently reported findings of changes in health care utilization and associated cost savings. An important contribution of the current study is that both PEH with and without SUD attained these outcomes. Although not designed as SUD treatment, medical respite serves as an important connection to medical and mental health care as well as SUD treatment for PEH.

Health care utilization is a metric frequently used to demonstrate medical respite program value. Consistent with prior studies, following a transitional care or medical respite program, patients had decreased hospital admissions,^{16,28,29} fewer bed days,^{16,29} and less ED utilization.²⁹ The current study demonstrates these decreases in PEH with and without diagnosed SUD. Our study did not evaluate hospital readmission rates, however others that did showed promising results.^{4,30,31} Future medical respite program research and evaluations can work to replicate these findings, which may help with medical respite program initiation in new areas and sustainability for existing programs as well as attract the attention of funders and insurers.

Expanding Medicaid in the remaining 12 states that have yet to extend single adult coverage and including medical respite as a Medicaid-reimbursable service may assist with establishing and maintaining medical respite programs as well as achieving more positive outcomes for PEH (a highly marginalized group). It is important to note that PEH, especially those who had little to no contact with the health care system prior to an injury or illness, may not achieve decreased utilization. Exploring other metrics is warranted, such as hospital risk mitigation for safely discharging PEH, increased provider and discharge planner satisfaction,

increased patient satisfaction, improved health system public image, and alignment of health system priorities and values with the larger community.

Like previous studies, PEH in our study exhibited a high prevalence of chronic illness, SUD, and mental illness; co-occurring disorders (i.e., mental illness or SUD with one or more chronic conditions) and trimorbidity were also particularly high. While not a new classification, reports of trimorbidity among PEH are increasing in the literature. Trimorbidity is a complex multimorbid condition as the associated illnesses often potentiate one another³² and, for PEH, are associated with risk for unplanned hospital admissions³³ and death.³⁴ Vickery and colleagues² demonstrated a substantial increase in trimorbidity of PEH in Minnesota with rates increasing from 7.9% in 2000 to 16.3% in 2018.² In a study by Stringfellow et al.³⁵ 39% of current or formerly PEH who were engaged in primary care met trimorbidity criteria. In the current study, almost half of PEH referred and not accepted into DHCT and more than half of DHCT program participants had trimorbidity as evidenced by EHR documentation. People experiencing homelessness with trimorbidity have different needs and care considerations from PEH without trimorbidity.^{35,36} Further research to determine the prevalence of trimorbidity in larger cohorts of PEH, including initial EHR review or validating self-reports of trimorbidity in the EHR, is warranted.

To our knowledge, this is the first study to explore medical respite program outcomes and health service utilization before and after medical respite engagement by PEH with and without SUD. The study has several limitations. First, the small sample size, particularly for program participants, limits statistical analyses and generalizability. Second, participants had varying lengths of time and levels of engagement with the program, and it is unclear if there is a dose response relative to medical respite care. Third, the study used a pre / post design rather than a comparison or control group, which limits the strength of the associations and

outcomes reported. Fourth, the indicator of SUD comes from codes assigned to participants by practitioners in the medical setting, not a formal SUD evaluation. Because of this, participants may be mislabeled as having SUD without undergoing proper evaluation that would indicate SUD. Alternatively, other participants who actually have SUD may be underrepresented because they were not coded as having SUD in the clinical setting. This could explain why the evaluation shows that participants who were not categorized as having SUD still utilized SUD services. These limitations notwithstanding, the study contributes to the existing knowledge base on medical respite outcomes and demonstrates how these outcomes are attainable by PEH with and without SUD.

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