


# Use of health care utilization as a metric of intervention success may perpetuate racial disparities: An outcome evaluation of a homeless transitional care program

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## Abstract

**Objective:** This study explored race-based differences in disease burden, health care utilization, and mortality for Black and White persons experiencing homelessness (PEH) who were referred to a transitional care program, and health care utilization and program outcomes for program participants.

**Design:** This was a quantitative program evaluation.

**Sample:** Black and White PEH referred to a transitional care program ( $n = 450$ ). We also analyzed data from the subgroup of program participants ( $N = 122$ ). Of the 450 referrals, 122 participants enrolled in the program.

**Measures:** We included chronic disease burden, mental illness, substance use, health care utilization, and mortality rates for all PEH referred. For program participants, we added 6-month pre/post health care utilization and program outcomes. All results were dichotomized by race.

**Results:** Black PEH who were referred to the program had higher rates of hypertension, diabetes, renal failure, and HIV and similar post-referral mortality rates compared to White PEH. Black and White PEH exhibited similar program outcomes; however, Black PEH revisited the emergency department (ED) less frequently than White PEH at 30 and 90 days after participating in the program.

**Conclusions:** Health care utilization may be a misleading indicator of medical complexity and morbidity among Black PEH. Interventions that rely on health care utilization as an outcome measure may unintentionally contribute to racial disparities.

## KEYWORDS

care transition, disparities, health care utilization, homelessness, medical respite, racism

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## 1 | BACKGROUND

Almost two decades ago, the Institute of Medicine (IOM) released *Unequal Treatment* (Institute of Medicine, 2003), a report that highlighted health care disparities between Black and White people and reinforced the need to examine racial inequity and bias within the context of health care. The literature base on transitional care and medical respite for persons experiencing homelessness (PEH) is growing (Biederman et al., 2019; Bring et al., 2020; Doran et al., 2013; Lin et al., 2015); however, few studies have examined the outcomes of such programs by race.

In an era of value-based care, interventions such as homeless medical respite are expected to justify their value by demonstrating cost savings via decreased health care utilization (e.g., decreased hospitalization, fewer inpatient days, and greater connection with outpatient services). Medical respite programs provide PEH transitional or short-term care in a safe and clean place to allow them an opportunity to recover from acute illness or injury. PEH who qualify for medical respite care are medically vulnerable and unable to recover on the street safely, yet they do not meet criteria to stay in the hospital (National Health Care for the Homeless Council, 2021). Data on the impact of medical respite programs on health care utilization and cost-savings have been mixed (Biederman et al., 2019; Bring et al., 2020; Doran et al., 2013; Lin et al., 2015). Studies demonstrating a net benefit of medical respite programs have correlated this benefit to decreased hospitalizations and fewer inpatient days (Biederman et al., 2019; Doran et al., 2013).

Such correlations are problematic given that Black people represent 40% of the homeless population, making Black people the largest racial group of PEH (HUD 2020 Continuum of Care Homeless Assistance Programs Homeless Populations & Subpopulations, 2020). Black PEH have higher rates of diabetes, kidney failure, and HIV compared to other PEH (Breland et al., 2015; Gao et al., 2021) and report lower satisfaction scores with outpatient care (Macnee & McCabe, 2004). Previous evidence suggests that Black patients, regardless of their housing status, are more likely to utilize the emergency department (ED) than White patients (Parast et al., 2021), although Black patients are admitted less frequently and have higher in-hospital mortality rates (Zhang et al., 2020). Given that (a) health care utilization is a core outcome measure for homeless intervention programs, and (b) research on utilization for Black PEH has not been well defined or extensively studied (Gelberg et al., 2009; Stergiopoulos et al., 2016; Treglia et al., 2019), this study explored the disease burden, programmatic outcomes, and health care utilization patterns of African American/Black people (here forward referred to as Black people who experience homelessness) and Caucasian people (here forward referred to as White PEH) who were referred to or participated in a transitional care program to discover whether there is a potential disparity in this measure.

To address the gap regarding utilization among Black PEH, our study examined differences in health care utilization between Black and White PEH who were referred to the Durham Homeless Care Transitions (DHCT) Program. We also analyzed the sub-group of program participants. Our research questions were the following:

1. What are the differences in chronic disease prevalence, health care utilization, and mortality rates for Black and White patients who were referred to DHCT?
2. What are the health care utilization patterns for Black and White patients who participated in DHCT? Did participation in DHCT affect these patterns?
3. What program outcomes were achieved for Black and White DHCT program participants? Did Black and White program participants achieve similar outcomes?

## 2 | METHODS

### 2.1 | Study design

This study was part of a larger evaluation study of DHCT (Biederman et al., 2021). This study first compared Black and White PEH referred to DHCT to examine for differences in chronic disease burden, health care utilization, and post-referral mortality. Co-occurring disorders (i.e., substance use disorder [SUD] or mental illness coupled with one or more chronic illnesses), and trimorbidity (i.e., the combination of SUD, mental illness, and one or more chronic medical conditions) were also examined. This study then compared Black and White PEH who participated in DHCT (a sub-group of Black and White PEH who were referred to DHCT) to examine for racial differences in outcomes of DHCT and health care utilization before program enrollment and after program exit. This project was reviewed and approved by the Duke Health Institutional Review Board and was determined to be exempt because of minimal risk posed to human subjects.

### 2.2 | Setting and sample

We have provided a comprehensive description of the DHCT program elsewhere (Biederman et al., 2021). In brief, DHCT provides case management and medical respite care, when indicated, for persons experiencing housing insecurity, primarily upon discharge from acute care facilities (Durham Homeless Care Transitions – Project Access of Durham County, n.d.). DHCT inclusion criteria are that participants:

- must be experiencing homelessness
- are able to participate in and maintain a safe and harm free environment
- willing to participate in case management visits and treatment plan
- are competent in activities of daily living
- are psychiatrically stable (e.g., not expressing thought of harm to self or others)
- are cleared by physical therapy for home discharge (if applicable).

DHCT does not provide direct patient care but rather links participants to health care services (e.g., primary care, specialty care, mental health providers) and community supports (e.g., friends, family, vocational rehab).

We started by identifying PEH referred to the DHCT program between July 1, 2016 through June 30, 2020 whose racial identity (based on electronic health record [EHR] data) was either Black/African American or White ( $n = 450$ ). Next, we identified the sub-group of program participants ( $N = 122$ ) who were admitted to the program and discharged on or before January 1, 2020 to allow for 6 months of post-program health care service utilization data. Program participants are individuals who met program inclusion criteria including the desire to participate.

## 2.2.1 | Data collection and measures

DHCT utilizes two Research Electronic Data Capture (REDCap) databases: one specific to referrals and the other for participant tracking. All persons referred to DHCT were matched within the Duke University Health System (DUHS) EHR, which includes outpatient visit history from the local federally qualified health center, Lincoln Community Health Center. Data were abstracted for all referrals from January 1, 2014 (the EHR “go live” date) through June 30, 2020. We extracted sociodemographic data including age, gender, referral source to DHCT, and insurance type; chronic conditions; and health care utilization data 6 months post-referral including mortality rates, length of stay, and number of hospital admissions, ED visits, observation encounters, and outpatient visits. For program participants, we abstracted the above as well as pre/post ED revisits at 30, 60, and 90 days and program outcomes. Patient characteristics were operationalized as follows: race was dichotomized as Black or White; sex was dichotomized as male or female; referral source was dichotomized as Duke or other; insurance at referral was categorized as public, private, uninsured or mixed; and age was treated as a continuous variable. Outcome measures of encounters (admissions, ED visits, observation visits and outpatient visits) and bed days were treated as counts, while mortality (within 6 months post-referral, or during the entire follow up period) was dichotomized as yes or no. Program outcomes were designed to measure services offered by DHCT. We measured services obtained or maintained, which include: primary care medical home, specialty provider care, mental health care, SUD treatment, and income source. We also measured services received, which include: medication adherence assistance, medical insurance assistance, reconnection with family and friends, community support systems, improved housing arrangement, enhanced transportation accessibility, health insurance at discharge, and other community services.

## 2.3 | Analytic strategy

### 2.3.1 | Defining chronic conditions

We used the Elixhauser Comorbidity Index (ECI), which includes 30 comorbidities categorized by International Classification of Diseases, Tenth Revision (ICD-10) codes (Quan et al., 2005) and is widely used

in health services research (Austin et al., 2015). In addition to the comorbidities identified by the ECI, we assessed for myocardial infarction, cerebral vascular accident/transient ischemic attack (CVA/TIA), and dementia using the respective ICD-10 codes for those diagnoses. Previous literature suggests that there are differing rates of these diagnoses among homeless individuals by race (Breland et al., 2015).

The ECI was used to assess chronic illness status that preceded the DHCT referral date. Each of the 30 Elixhauser items was also categorized as “Yes” or “No” based on whether associated ICD-10 codes were documented in the EHR prior to the referral date. The following additional six umbrella categories of chronic conditions were constructed if the patient’s record showed a “Yes” to any of the individual Elixhauser items: (1) Hypertension included both complicated and uncomplicated hypertension; (2) Diabetes included both complicated and uncomplicated diabetes; (3) Cancer included lymphoma, metastatic cancer, and solid tumor without metastasis; (4) SUD included alcohol or drug abuse (5) Mental Illness included psychoses and depression; and (6) Trimorbidity was defined as “Yes” if the patient’s record showed a “Yes” to mental illness, SUD, and one or more Elixhauser-defined chronic conditions.

Racial group 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. For DHCT participants, analysis of utilization of outpatient visits and hospital resources (ED visits, inpatient admissions, total bed days, and observation encounters) pre-DHCT enrollment compared to post-DHCT discharge were conducted as change scores, and those group differences in change scores were normally distributed and analyzed using *t*-tests. For other analyses, variables such as number of admissions and ED visits that were counts in nature were assessed using Poisson (either regular Poisson or Zero-inflated Poisson) regression to compare the racial groups. Mortality rates, ED visits pre and post program, and comorbid conditions were compared using Chi-square tests. All analyses were conducted using SAS 9.4 (SAS, Inc., Cary, NC). Significance was assessed at  $p = .05$ .

## 3 | RESULTS

In the 4-year period beginning on July 1, 2016 through June 30, 2020, the DHCT program had 304 referrals for Black PEH, 146 referrals for White PEH, and 122 participants. Table 1 presents characteristics for all referrals and participants. The mean age of persons referred was  $50.4 \pm 10.8$  years. The majority were male (69.2%). Individuals were either uninsured (33.5%), or had public (43.0%), private (2.5%), or mixed insurance (21%). No race-based statistically significant differences were observed between Black and White PEH in these baseline characteristics.

Table 2 shows a comparison of chronic conditions between Black and White individuals who were referred to DHCT. The most prevalent diagnoses were hypertension, SUD, and mental illness. Black PEH had a higher prevalence of paralysis (8.6% vs. 2.7%), diabetes (42.2% vs. 30.1%), renal failure (27% vs. 17.8%), and HIV (7.6% vs. 1.4%). White

**TABLE 1** Sample characteristics of referred individuals by race and of dhct participants

	All referrals		p-Value*	DHCT participants
	N = 450			Subgroup of all referrals
	Black (N = 304)	White (N = 146)		(N = 122)
Sex - n, (%)			.63	
Female	91 (30)	47 (32)		30 (25)
Male	213 (70)	99 (68)		92 (75)
Age in years - mean, SD	50 (11)	51 (10)	.84	51 (10)
Referral Source - n, (%)			.36	
DUHS	178 (58)	92 (63)		67 (55)
Other	126 (42)	54 (37)		55 (45)
Insurance Status <sup>a</sup> - n, (%)			.95	
Public	133 (44)	61 (42)		62 (51)
Private	8 (3)	3 (2)		1 (1)
Uninsured	101 (33)	50 (34)		27 (22)
Mixed	62 (20)	32 (22)		32 (26)

<sup>a</sup>Insurance status reported at referral.

\*Black versus White characteristics.

PEH, in contrast, had a higher prevalence of liver disease (34.3% vs. 23%). The prevalence of co-occurring disorders and trimorbidity was high for the entire sample; however, no race-based differences were observed.

Black and White PEH referred to DHCT demonstrated no statistically significant differences in number of admissions, bed days, ED visits, observation encounters, outpatient visits, or mortality at 6 months post referral (Table 3).

For DHCT program participants, a comparison of health care utilization in the 6 months before program enrollment ("pre") and 6 months after program exit ("post") demonstrated that both Black (B) and White (W) PEH had decreased mean hospital admissions (B: 1.47 vs. .58,  $p < .0001$ ; W: 2.08 vs. .74,  $p < .0001$ ), bed days (B: 16.2 vs. 6.2,  $p < .000$ ; W: 16.5 vs. 3.7,  $p < .0001$ ), and ED visits (B: 2.9 vs. 1.6,  $p < .0001$ ; W: 3.8 vs. 1.9,  $p < .0001$ ). Prior to program enrollment, there were no statistically significant differences between Black and White participants' ED revisitation. Comparing health care utilization prior to enrollment with utilization during the program revealed that both Black and White PEH demonstrated an increase in outpatient encounters (B: 6.1 vs. 15.8,  $p < .001$ ; W: 8.5 vs. 22.5,  $p < .002$ ). There were no statistically significant differences for observation encounters. Also, there were no statistically significant differences between Black and White PEH on any of these utilization metrics. ED revisits (the percentage of individuals with ED visits during the defined time period of 30, 60, and 90 days) after program completion revealed that the Black DHCT participant revisitation rate was 10.6% in 30 days, 20% in 60 days, and 24.7% in 90 days. In comparison, the White DHCT participant revisitation rate was 24.3% in 30 days, 32.4% in 60 days, and 43.2% in 90 days. The difference in ED revisitation rate between Black and White participants after program completion was

statistically significant at 30 days ( $p = .05$ ) and 90 days ( $p = .04$ ). It should be noted that seven of the 122 participants (four Black, three White) had missing/unknown post-program data (Table 4).

Greater than 90% of DHCT participants obtained or maintained a primary care home, obtained or maintained a connection to specialty care, and received medication assistance. More than 75% had enhanced accessibility to transportation, improved their housing arrangement, and reconnected with family and/or friends. There were no statistically significant differences between Black and White PEH in regard to achieving post-program outcomes (Table 5).

## 4 | DISCUSSION

This study examined differences in health care utilization between Black and White PEH referred to a homeless transitional care program, some of whom participated in the program. We found that Black people who participated in DHCT and completed the program revisited the ED at lower rates at 30 and 90 days compared to their White counterparts. This finding is in direct contrast to that of other studies focused on ED utilization by the general Black population, in which Black people, regardless of their housing security, were more likely to utilize the ED compared to White people (Parast et al., 2021; Zhang et al., 2020). Additionally, this is the first study to our knowledge to consider whether there are race-based differences for PEH in health care utilization measures beyond ED visits and hospitalizations (e.g., hospital length of stay, observation encounters, and outpatient visits). Unlike prior work (Gelberg et al., 2009; Stergiopoulos et al., 2016; Treglia et al., 2019), our study highlights that although Black and White PEH do not have significant differences in length of stay, observation encounters,

**TABLE 2** Select diagnoses of all referrals

Medical condition n, (%)	Black (N = 304)	White (N = 146)	Total (N = 450)	p-Value
Myocardial infarction	59 (19.4)	38 (26.0)	97 (21.6)	.11
Congestive heart failure	79 (26.0)	37 (25.3)	116 (25.8)	.88
Cardiac arrhythmia	197 (64.8)	85 (58.2)	282 (62.7)	.18
Valvular disease	38 (12.5)	14 (9.6)	52 (11.6)	.37
Peripheral vascular disease	55 (18.1)	23 (15.8)	78 (17.3)	.54
Hypertension <sup>a</sup>	222 (73.0)	94 (64.4)	316 (70.2)	.06
Chronic pulmonary disease	115 (37.8)	66 (45.2)	181 (40.2)	.14
CVA or TIA	53 (17.4)	16 (11.0)	69 (15.3)	.07
Dementia	14 (4.6)	12 (8.2)	26 (5.8)	.12
Paralysis	26 (8.6)	4 (2.7)	30 (6.7)	.02
Other neurological disorders	89 (29.3)	43 (29.5)	132 (29.3)	.97
Diabetes <sup>b</sup>	129 (42.4)	44 (30.1)	173 (38.4)	.01
Renal failure	82 (27.0)	26 (17.8)	108 (24.0)	.03
Liver disease	70 (23.0)	50 (34.3)	120 (26.7)	.02
AIDS/HIV	23 (7.6)	2 (1.4)	25 (5.6)	.007
Cancer <sup>c</sup>	24 (7.9)	18 (12.3)	42 (9.3)	.13
Substance use disorder (SUD) <sup>d</sup>	213 (70.0)	104 (71.2)	317 (70.4)	.75
Alcohol abuse	132 (43.4)	70 (48.0)	202 (44.9)	.37
Drug abuse	195 (64.1)	86 (58.9)	281 (62.4)	.28
Mental illness <sup>e</sup>	198 (65.1)	101 (69.2)	299 (66.4)	.39
Psychoses	51 (16.8)	29 (19.9)	80 (17.8)	.42
Depression	182 (59.9)	97 (66.4)	279 (62.0)	.18
Mental illness and $\geq 1$ medical condition	188 (61.8)	98 (67.1)	287 (63.8)	.22
SUD and $\geq 1$ medical condition	198 (65.1)	99 (67.8)	297 (66.0)	.57
Trimorbidity <sup>f</sup>	155 (51.0)	73 (50.7)	230 (51.1)	.93

<sup>a</sup>Hypertension = complicated and uncomplicated hypertension.

<sup>b</sup>Diabetes = complicated and uncomplicated diabetes.

<sup>c</sup>Cancer = lymphoma, metastatic cancer, solid tumor without metastasis.

<sup>d</sup>Substance Use Disorder = alcohol OR drug abuse.

<sup>e</sup>Mental Illness = psychoses and depression.

<sup>f</sup>Trimorbidity = mental illness and SUD and one or more chronic condition.

outpatient visits, and hospitalizations, Black PEH revisit the ED less than White PEH.

We do not suspect that Black PEH revisit the ED less than White PEH because Black PEH are healthier or have fewer health needs. The Black PEH in our study, like those in other studies (Breland et al., 2015; Gao et al., 2021), had a higher prevalence of chronic medical conditions (e.g., diabetes, renal failure, HIV), suggesting the need for chronic care. Our study did not find a higher outpatient utilization among Black PEH to account for the need for health care.

We cannot directly infer the cause of lower ED revisitation among Black PEH relative to White PEH, but we can offer some informed

hypotheses. One potential explanation is that Black PEH may be less inclined to return for health care services due to experiences of racism in health care. Black PEH have reported experiencing institutionalized racism, including implicit and explicit bias, throughout the health care system (Ross et al., 2020; Soares et al., 2019). Black patients are given lower severity scores in the ED (Zhang et al., 2020), less likely to be admitted to the hospital (Zhang et al., 2020), less likely to have diagnostic imaging ordered in EDs (Ross et al., 2020), and more likely to die in the ED or hospital (Ross et al., 2020). Among PEH seeking outpatient care, Black PEH have reported decreased care satisfaction (Macnee & McCabe, 2004).

**TABLE 3** All patients referred to the DHCT program health care utilization 6 months post referral

Variable	Black (N = 304)	White (N = 146)	Total (N = 450)	p-Value*
Admissions, mean (SD)	0.7 (1.4)	0.9 (1.4)	0.76 (1.39)	.12
Bed days, mean (SD)	5.7 (15.5)	5.4 (10.2)	5.57 (14.01)	.81
ED visits, mean (SD)	2.0 (4.5)	1.8 (2.7)	1.95 (3.97)	.44
Observation encounters, mean (SD)	1.0 (2.8)	1.0 (3.7)	1.00 (3.12)	.93
Outpatient visits, mean (SD)	6.9 (8.5)	8.0 (11.4)	7.26 (9.55)	.31
6-month mortality, n (%)	9 (3.0%)	7 (4.8%)	16 (3.56)	.33
Post referral mortality, n (%)	29 (9.5%)	19 (13.0%)	48 (10.67)	.26

\*used Poisson regression to get the *p*-values for continuous, Chi-square for yes/no.

To account for the difference in ED utilization by Black PEH in our study and the general Black population in other studies (Parast et al., 2021; Zhang et al., 2020), we propose that, compared to the general Black population, Black PEH may experience a “double-disadvantage” phenomenon (Verissimo et al., 2021; Wrighting et al., 2019) involving both racial discrimination and discrimination associated with being homeless. Future research is necessary to develop a greater understanding of this phenomenon.

Differences in how Black and White PEH utilize DHCT program services may provide another explanation for the difference in ED revisitation between Black and White participants. Although DHCT provides the same services to all participants, several program services offered by DHCT (e.g., established social supports and reestablished contact with family and friends, residence in permanent housing) which have been examined in prior studies (Spector et al., 2020; Wenzel et al., 2019) provide particularly strong benefits for Black PEH. Benefits such as established social supports and reestablished contact with family and friends may foster resilience by improving quality of life and creating a sense of community (Spector et al., 2020). Additionally, residence in permanent housing may reduce the perception of being discriminated against due to being homeless and poor (Wenzel et al., 2019) in addition to being a Black person. Furthermore, it is possible that Black PEH may use program services as a mechanism to reduce reliance on the health system, and White PEH may use program services to complement health care utilization. DHCT may have been highly effective in serving Black participants if we consider that DHCT included services for Black PEH that are known to have benefits catered to Black participants and Black PEH may have used DHCT as a primary health care resource.

Given our findings and the potential biases stated above, we are concerned that homeless interventions that use health care utilization as a proxy for cost savings may unintentionally funnel resources away from Black PEH to other PEH who use health care more frequently. There is a danger that in doing so, these interventions could (a) ignore the substantial complexity of and comorbidity among Black PEH, (b) exacerbate or contribute to treatment disparities, and (c) unintentionally reinforce experiences of institutionalized racism within the system. We suggest that homelessness interventions must identify other measures

that align with a mission of achieving racial equity, such as addressing the percentage of Black individuals served, gaps in their care, and their unmet needs.

To identify measures that align with racial equity, researchers and program evaluators must further their understanding of differences in how and why Black and White people experience homelessness (Jones, 2016; Paul et al., 2020; Soares et al., 2019; Verissimo et al., 2021; Wenzel et al., 2019; Wrighting et al., 2019). As homelessness among Black people is perpetuated by structural factors including incarceration, poverty, and discrimination (Jones, 2016; Paul et al., 2020), interventions designed for Black PEH must account for differences in context.

Although we found no statistically significant difference in the mortality rates between Black and White homeless individuals who were referred to the program, studies suggest that measured mortality rates may be skewed towards mental illness and SUD, which are largely over-represented for White PEH and serve as their specific portal of entry into homelessness in contrast to how Black individuals typically enter homelessness (Baggett et al., 2013; Roncarati et al., 2018). Future research is necessary to understand which intervention components are critical to decreasing Black PEH disease burden and mortality, and which components address the specific challenges facing Black PEH.

## 5 | IMPLICATIONS FOR PUBLIC HEALTH NURSES

Our study demonstrated that Black PEH who participated in DHCT were less likely to return to the ED at 30 and 90 days compared to White PEH; thus, this study highlights the need to consider how outcome measures assigned to homelessness interventions are aligned with a mission to achieve health equity. Our work suggests that homelessness interventions with a narrow reliance on reduction in health care utilization as a metric of success may divert resources away from Black PEH, who are over-represented in the homeless population and have a prevalence of medical complexity underrecognized by the health care system. Such a focus could perpetuate racial inequities in care. Future work must identify other measures that align with a mission of achieving racial equity. Outcomes worth consider include:



**TABLE 4** DHCT program participant health care utilization pre, during, and post program (Aim 3) ± 6 months

Variable Mean (SD)	Black (N = 85)			White (N = 37)			Total (N = 122)			p-Value Race	
	Pre	During	Post <sup>a</sup>	Pre	During	Post <sup>a</sup>	Pre	During	Post <sup>a</sup>		p-Values <sup>b</sup>
Admissions	1.47 (1.40)	0.82 (1.71)	0.58 (1.24)	2.08 (1.57)	1.43 (2.06)	0.74 (1.05)	1.66 (1.48)	1.01 (1.80)	0.63 (1.19)	.0001/ <.0001	.38 <sup>c</sup>
Bed days	16.2 (21.9)	8.1 (23.5)	6.2 (19.9)	16.5 (13.0)	11.0 (24.9)	3.7 (6.2)	16.3 (19.6)	9.0 (23.9)	5.5 (17.0)	0.05/0.005/ <.0001	16 <sup>c</sup>
ED visits	2.9 (2.8)	2.6 (3.6)	1.6 (3.7)	3.8 (3.3)	3.5 (4.3)	1.9 (2.6)	3.2 (3.0)	2.9 (3.8)	1.7 (3.4)	36/ <.0001	.82 <sup>c</sup>
Observation encounters	1.0 (4.3)	1.5 (2.8)	.9 (2.5)	1.1 (3.6)	1.3 (2.0)	.4 (8)	1.1 (4.1)	1.5 (2.6)	7 (2.2)	.31/.35	.38 <sup>c</sup>
Outpatient visits	6.1 (6.7)	15.8 (15.7)	5.1 (7.0)	8.5 (12.4)	22.4 (22.5)	7.8 (10.3)	6.8 (8.9)	17.8 (18.2)	5.9 (8.2)	<.0001/.39	.23 <sup>c</sup>
ED revisit	32.9%		10.6%	32.4%		24.3%	32.8%		14.8%		.95/.05 <sup>d</sup>
60-day	44.7%		20.0%	56.8%		32.4%	48.4%		23.8%		.22/.14 <sup>d</sup>
90-day	49.4%		24.7%	56.8%		43.2%	51.6%		30.3%		.45/.04 <sup>d</sup>

<sup>a</sup>Note Post-Program N as follows: Black = 81, White = 34, Total = 115.

<sup>b</sup>Pre to during change/Pre to post change.

<sup>c</sup>Black versus White pre to post change.

<sup>d</sup>Black versus White.

<sup>e</sup>pre/Black versus White post.

**TABLE 5** DHCT program services received and participant outcomes

Program outcomes n, (%)	Total (N = 122)	Black (N = 85)	White (N = 37)	p-Value
Services obtained/maintained				
Primary care medical home	117 (96)	83 (98)	34 (92)	.10
Specialty provider care	110 (90)	75 (88)	35 (95)	.27
Mental health care	74 (61)	51 (60)	23 (62)	.82
Substance use disorder treatment	66 (54)	45 (53)	21 (57)	.70
Income source	75 (62)	51 (60)	24 (65)	.62
Other services received				
Medication adherence assistance	116 (95)	81 (95)	35 (95)	.87
Medical insurance assistance	56 (46)	38 (45)	18 (49)	.69
Reconnect with family/friends	93 (76)	65 (76)	28 (76)	.93
Community support systems	76 (62)	51 (60)	25 (68)	.43
Improve housing arrangement	95 (78)	65 (76)	30 (81)	.57
Enhance transportation accessibility	108 (88)	75 (88)	33 (89)	.82
Health insurance at discharge <sup>a</sup>	82 (67)	56 (66)	26 (70)	.64
Other community services	83 (68)	55 (65)	28 (76)	.23

<sup>a</sup>Includes Medicaid and/or other form of health insurance.

addressing the percentage of Black individuals served, eliminating gaps in care, and reducing Black individuals' unmet needs.

Effective interventions require awareness and acknowledgement that experiences and needs of Black PEH may differ from those of other PEH. Public health nurses who provide direct clinical care to PEH are well-positioned to study, support, and promote an increased understanding of which elements of transitional care and medical respite programs for PEH are (a) associated with improved health outcomes among Black PEH, and (b) address the challenges of their experiences. DHCT included services for Black PEH that are known to have benefits for Black participants and may serve as a model for public health nurses in efforts to achieve health equity for transitional care and medical respite interventions.

## 6 | LIMITATIONS

We acknowledge that our study has several limitations. First, it did not include direct interaction with participants, thus we are unsure of which elements of the DHCT program led to participant success or why Black PEH had less ED utilization compared to White PEH. Future research should utilize qualitative methods (e.g., questionnaires, participant interviews) to explore (a) which program components impact participant success, and (b) what factors lead to less ED utilization by Black PEH compared to White PEH. Second, it is possible that the individuals in our study utilized health care outside of DUHS and the FQHC that was not captured in our health care utilization data. Third, our study focused on adults; disease burden, homeless transitional care program participation, and health care utilization may be different for younger people. Fourth, our study focused on

Black and White PEH; future research should study disease burden, program participation, and health care utilization among PEH of other minority groups (e.g., Latinx) compared to Black and White PEH. Fifth, our study did not assess the prevalence of comorbid conditions in Black and White participants due to the small sample size. Sixth, our data does not differentiate between planned and avoidable ED visits/hospital admissions. Seventh, our sample size was small and may limit confidence in interpreting our results. Finally, our data was obtained from one city's homeless transitional care program, thus limiting generalizability to other programs and cities.

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## DATA AVAILABILITY STATEMENT

Authors elect to not share data. Research data are not shared.

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