Colorectal Cancer Screening Among the Homeless Population of New York City Shelter-Based Clinics

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Objectives. We determined colorectal cancer (CRC) screening rates, predictors, and barriers in 2 major New York City shelter-based clinics.

Methods. We extracted screening rates, sociodemographic characteristics, and factors associated with homelessness from medical records of domiciled and homeless patients aged 50 years and older (n = 443) with at least 3 clinic visits between 2010 and 2012.

Results. The majority of patients were African American or Hispanic, 76% were male, and 60.7% were homeless (mean = 2.4 years; SD = 2.8 years). Domiciled patients were more likely than homeless patients to be screened (41.3% vs 19.7%; $P < .001$). Homeless and domiciled patients received equal provider counseling, but more homeless patients declined screening ($P < .001$). In logistic regression, gender, race, duration of homelessness, insurance status, substance and alcohol abuse, chronic diseases, and mental health were not associated with screening, but housing, provider counseling, and older age were.

Conclusions. Proposed interventions to improve CRC screening include respite shelter rooms for colonoscopy prepping, patient navigators to help navigate the health system and accompany patients to and from the procedure, counseling at all clinical encounters, and tailored patient education to address misconceptions. (*Am J Public Health.* 2014;104:1307–1313. doi:10.2105/AJPH.2013.301792)

Colorectal cancer (CRC) is the third most common cancer and the second leading cause of cancer death in the Unites States, with 53 000 largely preventable deaths annually.[1,2] CRC screening reduces morbidity and mortality by 60% and is considered the standard of care.[3] The US Preventive Services Task Force (USPSTF) recommends CRC screening for all adults aged 50 to 75 years and for high-risk adults until age 85 years: a fecal occult blood test (FOBT) once per year, flexible sigmoidoscopy every 5 years with an FOBT every 3 years, or screening colonoscopy every 10 years.[2] Despite recommendations, screening rates for CRC remain lower than for other types of cancer.[1]

Little is known about CRC screening practices in the homeless population,[4] but this population is expanding. An estimated 3.5 million Americans experience homelessness each year, and an estimated 633 782 people experience homelessness each night in the United States.[5,6] More than 15% of these individuals are chronically homeless, and more than 18% of the homeless are older than 50 years.[5,7] This population is aging and has a large component of persons born during the latter part of the baby boom era. Men aged 45 to 54 years are at the highest risk for homelessness, and many of them are veterans.[8] These individual are entering their 50s and are due for CRC screening.[2,9,10] New York State's homeless population surpasses the national average, and the rate of chronic homelessness is rising.[5] New York City is experiencing an all-time high of homelessness, with more than 28 000 adults sleeping each night in the municipal shelter system[11] and approximately 3000 living on the streets.[12]

Barriers to CRC screening include low rates of provider recommendation and patients' lack of CRC knowledge,[13–15] invasiveness, extensive preparation, discomfort, inability to pay for screening or follow-up care or lack of medical insurance,[13] lack of trust in physicians, embarrassment, absence of symptoms, and fatalistic views about cancer.[16] Screening rates are particularly low in minority and low-income populations, and these groups suffer higher rates of CRC mortality, in part because cancers are detected at a later stage.[1,4] Other risk factors for never having or not being up-to-date with screening recommendations are Hispanic ethnicity, low education level, low income, recent immigration status, lack of a primary care physician, and no visit to a physician in the past year.[17] Interventions implemented in primary care settings to improve CRC screening rates among racial and ethnic minorities have helped improve rates significantly.[18]

Homeless persons are especially vulnerable and suffer worse health than domiciled ethnic and minority populations. The homeless have high rates of physical illness, mental illness, and substance abuse and are at increased risk for premature death.[10,19] They are less likely to have a primary care provider and to adhere to medication regimens.[10] Subsistence needs often take priority over health care that is not seen as urgent, such as preventive care. Furthermore, past experiences of discrimination in the health care setting decrease their likelihood of seeking health care again.[16,19]

A considerable portion of nondomiciled Americans would likely benefit from CRC screening. We compared CRC screening rates among a New York City homeless population and an underserved population that used the same health facilities for adherence to USPSTF recommendations and identified predictors of and barriers to screening among the homeless population.

METHODS

The Community Medicine Program of the Lutheran Family Health Centers provides medical services to low-income and homeless individuals at various New York City shelter-based clinics. We evaluated medical records assessing CRC screening at 2 of these clinics, located at the Barbara Kleinman Shelter in

Brooklyn and the Bowery Residence Committee's Safe Haven shelter in Manhattan, during the fall of 2012. Patients provided written consent for medical evaluation and provision of necessary care and treatment at the time of registration in the clinic. The research team had access to identifiable information on patients' medical records, but we did not have any contact with participants either at the time of or after the medical evaluation.

We identified and included all clinic patients that met inclusion and exclusion criteria by accessing their medical records. Inclusion criteria were that participants (1) were aged 50 years or older, (2) used medical care services at 1 of the 2 study facilities, and (3) had visited the clinic at least 3 times between September 2010 and December 2012. For participants who had more than 3 visits, we extracted data for all of their visits over a 2-year period. We included only these 2 health facilities because they already had electronic medical records. The incidence of CRC in the general population with average CRC risk factors increases with age[2]; therefore, we chose an age cutoff of 50 years to assess routine CRC screening. We set the upper age limit at 85 years; the USPSTF recommends against any CRC screening after this age because the benefits no longer outweigh the risks.[2] The sample population consisted of homeless and domiciled men and women.

Data Collection

We evaluated medical records in accordance with USPSTF recommendations.[2] We considered patients up-to-date for CRC screening if medical records documented (1) an FOBT within a year of the most recent visit, (2) flexible sigmoidoscopy within 5 years of the most recent visit plus an FOBT within 3 years of the most recent visit, or (3) colonoscopy within 10 years of the most recent visit. We extracted all information relating to cancer screening, including provider counseling, patient acceptance or refusal, reasons for refusal, and outcomes of CRC screening where available. We collected sociodemographic and medical data on age; race; gender; housing status; years of homelessness; health insurance status; personal history of diabetes, hypertension, hyperlipidemia, asthma or chronic obstructive pulmonary disease, or coronary artery disease; tobacco and alcohol use; history of mental illness, including depression, psychosis, and anxiety disorder; history of substance abuse; and HIV status. We noted barriers to screening where available. One research team member reviewed all medical records and extracted data.

We categorized patients as homeless if they indicated that they lived in a shelter or on the street. We extracted length of homelessness when indicated in the medical records. We defined history of chronic illnesses, mental illness, alcohol abuse, and substance abuse as indicated by the physician in the records as either current or past medical history.

The primary study outcome was the prevalence of up-to-date CRC screening consistent with USPSTF recommendations. Secondary outcomes were the point prevalence of homelessness and its associated factors, including alcohol and drug abuse and history of mental illness and chronic disease.

Analyses

We reported descriptive statistics and performed univariate and bivariate analyses with χ^2, t test, and analysis of variance, as well as multivariable logistic and linear regression, where indicated. We used logistic regression analysis to assess the presence and degree of association between independent variables (gender, age, homelessness, insurance status, and important clinical variables) with the main outcome of interest and to control for potential confounders. We incorporated variables into the models when bivariate analysis showed significance and when clinically sensible and plausible. We used SPSS version 20.0 (SPSS Inc, Chicago, IL) for the data analysis.

After considering the limited original literature, we hypothesized that the prevalence of CRC screening among our homeless population would be lower than that of minority and low-income populations and equal to that of previous studies in homeless populations.[4,20] We estimated that the prevalence of CRC screening in homeless adults aged 50 to 85 years would be at least 20%. We set $\alpha = 0.05$ and power = 0.8 and calculated a sample size of 246. We conducted a primary pilot analysis with our facilities and estimated that around two thirds of our patient population was homeless and calculated a sample size of 372. The total number of participants that met our inclusion–exclusion criteria was 443, which was around 20% above our calculated sample size. We decided to include all participants (20% more than needed for the sufficient sample size) to allow for potential missing data and to increase the power for other secondary outcomes of interest.

RESULTS

We evaluated the medical records of 443 men and women aged 50 to 85 years. The mean age of participants was 59.8 years (SD = 7.47 years); 12 patients were aged 76 to 84 years. Patients were mostly English speaking and suffered a range of chronic illnesses, with an average of 4 (range = 0–4). Sixty-one percent were currently homeless, with a mean duration of 2.39 years (SD = 2.8 years; range = 2 months–13 years).

Colorectal Cancer Screening

Overall, 125 of 443 participants (28.2%) were up-to-date for CRC screening; 123 (98.4%) had had a colonoscopy and 2 (1.6%) had used an FOBT. Outcomes of 123 colonoscopies were 75 (61%) normal, 18 (14.6%) abnormal, 3 (2.4%) poor preparation, and 27 (22%) unknown. Twenty patients (4.5%) had a previous CRC screening, with 2 (10%) normal, 7 (35%) abnormal, 2 (10%) poor preparation, and 9 (45%) unknown.

Homeless patients were less likely than domiciled patients who used the same health facilities to have up-to-date CRC screening (19.7% vs 41.3%; $P < .001$). Homeless participants were also significantly less likely to have had a previous colonoscopy, regardless of up-to-date status ($P < .05$). Sociodemographic characteristics, CRC screening and its associated factors, and results of bivariate analyses of the association of independent variables and important clinical indicators with CRC screening are presented in Table 1.

In bivariate analysis, older patients were more likely to be up-to-date for CRC screening ($P < .001$). Patients with chronic diseases were more likely to be up-to-date with CRC screening ($P < .05$). A history of chronic diseases was not associated with failure to follow through with screening after accepting counseling or having a previous CRC screening. Mental

TABLE 1—Sociodemographic Characteristics and Colorectal Cancer–Screening Rates Among Patients of Shelter-Based Clinics and Results of Bivariate Analysis: New York City, 2010–2012

Variable	All Participants (n = 443), No. (%) or Mean ±SD	Participants With Up-to-Date CRC Screening (n = 125), No. (%) or Mean ±SD	*P*
Housing status			.001
Homeless	269 (60.7)	53 (19.7)	
Domiciled	174 (39.3)	72 (41.3)	
Homelessness duration, y	2.39[a] ±2.8	2.2 y ±0.58	.75
Gender			.33
Male	337 (76.1)	99 (29.3)	
Female	106 (23.9)	26 (24.5)	
Age,[b] y	59.8 ±7.47	62	.001
Race/ethnicity			.2
White	89 (20.1)	32 (35.9)	
Black	165 (37.2)	47 (28.4)	
Hispanic	115 (26.0)	29 (25.2)	
Middle Eastern	8 (1.8)	4 (50.0)	
Asian	10 (2.3)	3 (30.0)	
Indian	2 (0.5)	0	
Unspecified	54 (12.2)	10 (18.5)	
Health insurance status			.19
Insured	398 (89.8)	116 (29.1)	
Not Insured	45 (10.2)	9 (20.0)	
Medicaid	89 (22.4)	15 (13.0)	
Medicare	100 (25.1)	43 (37.0)	
Other	209 (52.5)	58 (50.0)	
Medical history			
Chronic disease[c]	333 (75.2)	102 (30.6)	.05
No chronic disease	107 (24.8)	22 (20.5)	
Mental illness	212 (47.9)	62 (29.2)	.56
No mental illness		61 (26.7)	
Substance abuse	82 (18.5)	19 (23.1)	.27
No substance abuse	360 (81.5)	105 (29.1)	
Alcohol abuse	52 (11.7)	10 (19.2)	.12
No alcohol abuse	389 (88.3)	114 (29.3)	
HIV/ AIDS	20 (4.5)	6/20 (30.0)	.85
No HIV/AIDS	423 (95.5)	119 (28.1)	
Provider counseling			.001
Received	248 (56)	125 (50.4)	
Not received	33 (7)	0	
Status unknown	162 (37)	0	
Previous CRC screening			
All screening	20 (4.5)	6 (5.0)	.85
Abnormal results[d]	7 (35)	5 (83.0)	.05

Note. CRC = colorectal cancer.
[a]Range = 2 mo–13 y.
[b]Oldest participant was aged 84 years.
[c]Diabetes, hypertension, asthma, chronic obstructive pulmonary disease, hyperlipidemia, and others.
[d]The "Abnormal previous CRC screening" is a subgroup of "Previous CRC screening". Therefore, the respective percentages are based on the "Previous CRC screening" denominator as 7/20 = 35% and 5/6 = 83%.

illness and history of substance or alcohol abuse were not associated with having had a previous CRC screening. Having HIV or AIDS was not associated with an abnormal result of CRC screening ($P = .09$) or with having a previous CRC screening.

In patients with known information on provider counseling about CRC screening (281/443), counseling was associated with up-to-date CRC screening ($P < .001$). Overall, 248 patients received counseling and 33 did not; no information about counseling was available for 162 other patients. Of 248 counseled patients, 125 accepted and had screening, 55 accepted but did not undergo screening, 20 deferred screening, 40 declined, and 8 had no information on counseling in their records. Of 55 who accepted but did not undergo screening, only 8 gave their reasons, which were missed appointment (4), not passing clearance for colonoscopy (1), and not being able to return an FOBT (3). Among patients counseled about CRC screening, homeless patients were less likely than domiciled patients to be up-to-date with CRC screening (odds ratio [OR] = 0.56; 95% confidence interval [CI] = 0.45, 0.74; $P < .01$). We found no association between provider counseling and participants' race, insurance status, type of insurance, homelessness, any chronic diseases, substance abuse, alcohol abuse, HIV status, any past screening or result of past screening, age, years of homelessness, or number of chronic diseases. Providers, however, were less likely to counsel participants with a history of mental illness ($P < .05$). Among patients receiving provider counseling, we found no association between CRC screening and participants' race, insurance status, type of insurance, substance abuse, alcohol abuse, HIV status, any past screening or result of past screening, years of homelessness, or number of chronic diseases. History of a chronic disease was associated with an increased chance of CRC screening (OR = 1.12; 95% CI = 1.01, 1.25; $P < .05$).

Homelessness and Secondary Outcomes

Homeless patients were less likely than the domiciled to be insured ($P < .001$). We found no association of race, gender, health insurance, history of chronic disease or mental health problem, substance abuse, alcohol abuse, or HIV/AIDS with years of

homelessness. Results of bivariate analyses of association of independent variables and other important clinical indicators with homelessness are presented in Table 2.

Female and older patients, as well as insured patients, were more likely than others to have chronic diseases ($P<.001$). Chronic disease was associated with history of mental illness ($P<.05$) but not with substance abuse or alcohol abuse. Patients with mental illness were more likely than those without to be female ($P<.001$), younger ($P<.05$), and insured ($P<.001$). Hispanic patients were significantly less likely than members of other racial/ethnic groups to have a history of mental illness ($P<.05$). Mental illness was not associated with history of substance abuse, alcohol abuse, or HIV/AIDS. Substance abuse was more common in men ($P<.05$), younger patients ($P<.01$), and individuals with a history of alcohol abuse ($P<.05$) than in other patients. Men were more likely than women to abuse alcohol ($P<.05$). HIV/AIDS was associated with female gender and older age ($P<.05$) but not with alcohol abuse or substance abuse. White patients were more likely than Blacks to be uninsured ($P<.05$). Being insured was not associated with gender or age. Gender and race were not associated.

When we included homelessness and gender in our stepwise regression model, both maintained an association with CRC screening, but when we added age, gender lost its significant association. When we included homelessness, gender, age, race, provider counseling, and health insurance, only homelessness, provider counseling, and age were associated with up-to-date CRC screening. When the model incorporated homelessness, age, provider counseling, gender, history of mental illness, history of chronic illness, and history of substance abuse, the associations of homelessness, provider counseling, and age with up-to-date CRC screening remained. When the model included homelessness and age, both were associated with up-to-date CRC screening. Results are presented in Table 3.

TABLE 2—Results of Bivariate Analysis of Homelessness Among Patients of Shelter-Based Clinics: New York City, 2010–2012

Variable	Homeless (n = 269)	Domiciled (n = 174)	*P*
Gender, no.			.001
Male	223	114	
Female	46	60	
Age, y, mean	58	62	.001
Race/ethnicity, no.			.3
White	47	42	
Black	109	56	
Hispanic	65	50	
Middle Eastern	4	4	
Asian	6	4	
Indian	1	1	
Unspecified	37	17	
Insured, no.	226	172	.001
Chronic illness,[a] no.	170	163	.001
History of mental illness, no.	115	97	.01
History of substance abuse, no.	50	32	.98
History of alcohol abuse, no.	43	9	.001
History of HIV/ AIDS, no.	2	18	.001
Provider counseling, no.	131	117	.055
Previous CRC screening, no.	7	13	.05
Abnormal previous CRC screening, no.	3	4	.44

Note. CRC = colorectal cancer.
[a]Diabetes, hypertension, asthma, chronic obstructive pulmonary disease, hyperlipidemia, and others.

DISCUSSION

We directly compared homeless and underserved domiciled patients of the same health facilities. The rate of CRC screening among our homeless participants was significantly lower (19.7%) than the rate in our domiciled participants (41.3%). The significant difference was consistent with a 2009 national primary care survey of patients in federally funded community health clinics, the only other study comparing CRC screening in these 2 groups who used the same health facilities.[20] The rate was similar to our sample of domiciled patients but considerably higher (40.5%) than that of our homeless patients.[20] Our screening rates among the homeless were also lower than the 23% found by a 2002 study of a homeless population in Los Angeles.[4] Our sample population was mostly male, 60.7% homeless, and ethnically diverse. Our homeless population and the homeless populations in the other studies shared risk factors for being homeless, including mental illness and alcohol abuse.[4,20] Populations in all these studies comprised individuals of both genders and diverse ethnicities.

In our study, patients who had housing, received counseling, and were older were more likely than other patients to have CRC screening, regardless of other sociodemographic and clinical factors. Homelessness was a major risk factor for not being up-to-date for CRC screening. We found significant differences between homeless and domiciled patients in gender, medical insurance, chronic diseases, history of mental illness, history of alcohol abuse, HIV/AIDS status, and rate of previous CRC screening. None of these factors were independently associated with lower CRC screening, likely because they were directly associated with homeless status.

Many participants were insured: 56% of homeless persons and an overall 89.8%, with close to half having Medicaid or Medicare. Although having medical insurance has been shown to be an important factor in getting screened in the general population,[17] insurance status affected neither domiciled nor homeless patients' likelihood of getting CRC screening in our study.

Our homeless population had lower rates of CRC screening, regardless of years of

TABLE 3—Results of Multivariate Analysis Among Patients of Shelter-Based Clinics: New York City, 2010–2012

Variable	Participants With Up-to-Date CRC Screening (n = 125), AOR (95% CI)	*P*
Age	1.06 (1.02, 1.10)	.01
Gender	0.54 (0.28, 1.06)	.07
Housing status	1.77 (1.05, 3.00)	.03
Insurance	0.58 (0.21, 1.62)	.3
Mental health	1.16 (0.67, 2.00)	.58
Substance abuse	0.62 (0.31, 1.24)	.18
Provider counseling	95.52 (22.89, 398.5)	.001
Chronic disease	1.49 (0.75, 2.95)	.3

Note. AOR = adjusted odds ratio; CI = confidence interval; CRC = colorectal cancer.

homelessness, which is likely attributable to the significant social issues that increase someone's risk of losing housing in the first place. Lack of housing by itself becomes a strong factor in limiting access to health resources, including preventive care. Thus, other risk factors may not be as important as the fundamental social issues related to being homeless. Furthermore, common risk factors seen in the general population, such as race and insurance, are perhaps masked by the gravity of homelessness.[17]

Our population likely shared other common risk factors for not being up-to-date with CRC screening, such as low education level, low income, and recent immigration status.[17] We did not have access to these indicators in the medical records to assess their effects. Many participants lacked a stable primary care physician. However, not visiting a physician's office in the past year was not a risk factor; our sample had at least 3 visits in the past 2 years.[17] Although we observed a great discrepancy between the domiciled and homeless patients, the CRC screening rate in the domiciled patients was still only 41%. The rates we observed were considerably lower than the national overall rate of 65% and the national rates for for Hispanics (51.7%) and for Blacks (60.3%).[21] The CRC screening rate we found was not much lower than the 49.8% among the bottom quartile for income in national data. Therefore, strategies to improve screening rates must be targeted to both homeless and domiciled patients in the health facilities that serve low-income populations. Interventions implemented in primary care settings that significantly improve CRC screening rates among racial and ethnic minorities would likely help improve rates among our population (e.g., constant reminders, tailored education, and patient navigators).[18,22,23]

Although only 63% of reviewed electronic medical records documented provider counseling for CRC screening, providers were not discriminatory. Patients were counseled regardless of their sociodemographic characteristics and medical conditions, aside from history of mental illness. This might be attributable to providers' specific sensitizations arising from their work in clinics for the homeless and low-income populations. The lower rate of counseling for patients with a history of mental illness in our study population needs to be further addressed, along with the significantly reduced effectiveness of counseling for homeless patients. Although the homeless patients had less CRC screening than the domiciled patients, the overall rate of CRC screening counseling should be improved. Targeted provider education and training should be implemented in health facilities that provide services to low-income and homeless patients. Office reminders embedded in electronic medical records may promote provider–patient discussions on screening. A study by Loo et al. found that reminders were effective in a primary care setting and increased the rates of elderly patients receiving recommended preventive services.[24] Counseling should cover specific barriers and direct patients to resources to overcome those barriers.

In our low-income population, patients with chronic diseases were more likely to be up-to-date, even though in regression analysis this association did not hold. This is consistent with data in the general population: national statistics indicate that those with 2 or more chronic conditions are 20% more likely than those without chronic conditions to be screened.[21] Although providers generally provided equivalent counseling to patient subgroups in our study, it is possible that patients who had more exposure to health centers because of chronic illnesses were counseled repeatedly and were better educated. Patients suffering chronic diseases may also be more concerned with their health and more inclined to participate in preventive care.

Homelessness is a fundamental social issue that has implications for health.[10,25] The homeless and low-income populations experience great instability, and many lack primary care providers[19] or continuity of care. Under these circumstances, records are easily lost; 22% of CRC screening results for our participants were unknown. In addition, subsistence needs often take priority over preventive health care, such as cancer screening.[16,19] Educating homeless and low-income patients on the importance of CRC screening may encourage screening. Studies have shown that educational interventions help low-income and minority patients form a test preference and improve readiness to receive CRC screening.[26] Distribution of targeted reading materials in shelters and health facilities, as well as 1-to-1 education from health providers, patient health educators, and case managers that is tailored to the needs and barriers of homeless and low-income patients, may increase awareness and reinforce acceptance of screening. Educational information should be tailored to the demographic of clinic patients, accounting for health literacy, health beliefs, and social support.[27]

The structure of shelters is a barrier to screening. Shelter bathrooms are not private, making it difficult to prepare for a colonoscopy or sigmoidoscopy or to complete an FOBT. A colonoscopy requires extensive prep. The night before the procedure, the colon must be cleansed. Several medical records indicated that patients' colonoscopies were compromised by poor prep. It could be both reasonable and feasible to design a more private room, such as a subacute care area, within shelters to ensure that patients appropriately prep the night before colonoscopy. Subacute care units in shelters for homeless patients after they have been discharged from a hospital are a form of respite that has shown promising results in providing targeted and more specialized services in shelters.[28] A respite room could be expanded for the purpose of prepping for CRC screening.

Another barrier to CRC screening is lack of patient companions at the time of colonoscopy or sigmoidoscopy. Previous studies have demonstrated the benefits of patient navigator

programs for CRC screening in low-income, urban minority populations.[16,29,30] Patient navigator programs significantly increased the volume of colonoscopies, improved the quality of preparation, and increased the quality of results.[16,18,22,29,30] Patient navigators, or, alternatively, case managers working with homeless individuals, can help ensure that patients keep their scheduled appointments, accompany patients to and from the procedure, provide social and emotional support, and assist with language barriers.[16,18,22,29,30] Therefore, we recommend the expansion of patient navigator programs and hypothesize that they could significantly improve the prevalence of CRC screening among homeless patients of shelter-based clinics. In addition, coordinated and scheduled mobile clinics for CRC screening could be offered at the shelters where homeless persons reside or other places they frequent. The added convenience might encourage them to get screened and help patients who have trouble keeping multiple appointments.

Health outcomes of the homeless population could be improved if the fundamental issue of housing is addressed.[25] Along with specific strategies targeted at promoting preventive care and cancer screening, societal and structural approaches are important. A focus on preventing homelessness is essential[31]; the Housing First intervention for chronically homeless individuals has been shown to improve health.[32,33] Programs to prevent tenant evictions, address family conflict, and pay to keep people in housing have been explored at the national level.[32,33] New models aim to reduce homelessness to a maximum of 30 days.[34]

Limitations

Our study was retrospective, so some important information may not have been documented. It was difficult to define and gain a comprehensive perspective on such factors as the nature, duration, and severity of patients' substance or alcohol abuse or mental illness. Because of the instability of the homeless population, past medical records may have been lost. Data were self-reported for years of homelessness, CRC screening status, and outcomes of screening performed in outside institutions.

We looked at individuals with at least 3 visits to either of 2 clinics. Experience from previous studies led us to specify 3 visits to ensure some form of continuity of medical care and exposure. Many of our patients had more than 3 visits, which offered us the opportunity to better examine their medical history. These visits occurred between September 2010 and December 2012, after our electronic medical record system was established in 2010. The paper charts used previously were difficult to access, so their data were not included. We excluded from analysis the specific women's shelter clinics and temporary drop-in centers in our network that still do not use EMRs. However, most of these sites only provide initial medical assessments and refer most patients with medical and psychiatric needs to our larger centers.

Our facilities work closely with the Bowery Residence Committee and other groups that provide housing services to the homeless population in downtown Manhattan. These groups have outreach systems that actively identify and follow homeless New Yorkers, bring them into the system, and match them with health facilities, including our shelter-based clinics. The clinical sites in our study are the largest and most widely used clinics in our shelter system. The majority of homeless persons residing in New York City homeless shelters visit a shelter-based clinic at least once to pass initial health clearance. Continued services at the clinics are available for all shelter residents and homeless individuals living on the street or elsewhere. Therefore, the clinics serve a large portion of homeless persons who previously did not have a primary care provider, in addition to following long-term patients. Still, it is possible that our health facilities do not encounter portions of the homeless population. We have no information on individuals who chose not to continue receiving medical care at our clinics and those who never visited our shelter-based health facilities, such as residents of other shelters and those outside the shelter system.

Conclusions

Complementary approaches are needed to address low rates of CRC screening among the homeless. Providing CRC screening during a shelter stay is an opportunity that should not be overlooked. Misconceptions among patients and providers should be addressed through targeted training, and provider counseling at any clinical encounter should be encouraged. An adapted patient navigator strategy for CRC screening could help address multiple-level barriers that the homeless experience, with future implementation research to evaluate its effectiveness. Societal and structural approaches are important, and specific interventions targeted at promoting cancer screening should be coupled with strategies to address fundamental social issues the homeless face, including improved housing. ■

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Contributors

R. Asgary, B. Sckell, and A. Jakubowski originated and designed the study. R. Asgary performed the statistical analysis. R. Asgary and B. Sckell provided technical and material support and supervision and interpreted the data. R. Asgary and V. Garland drafted the article and critically revised it with B. Sckell. V. Garland acquired the data.

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Human Participant Protection

The study received the institutional review board approval from the Lutheran Family Health Centers, New York City. We complied with the principles of the ethical practices of public health of the American Public Health Association.

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