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Original Study

Demographics, Presenting Conditions, and Treatment Options for the Homeless Population at a Student-Run Free Clinic in Norfolk, Virginia

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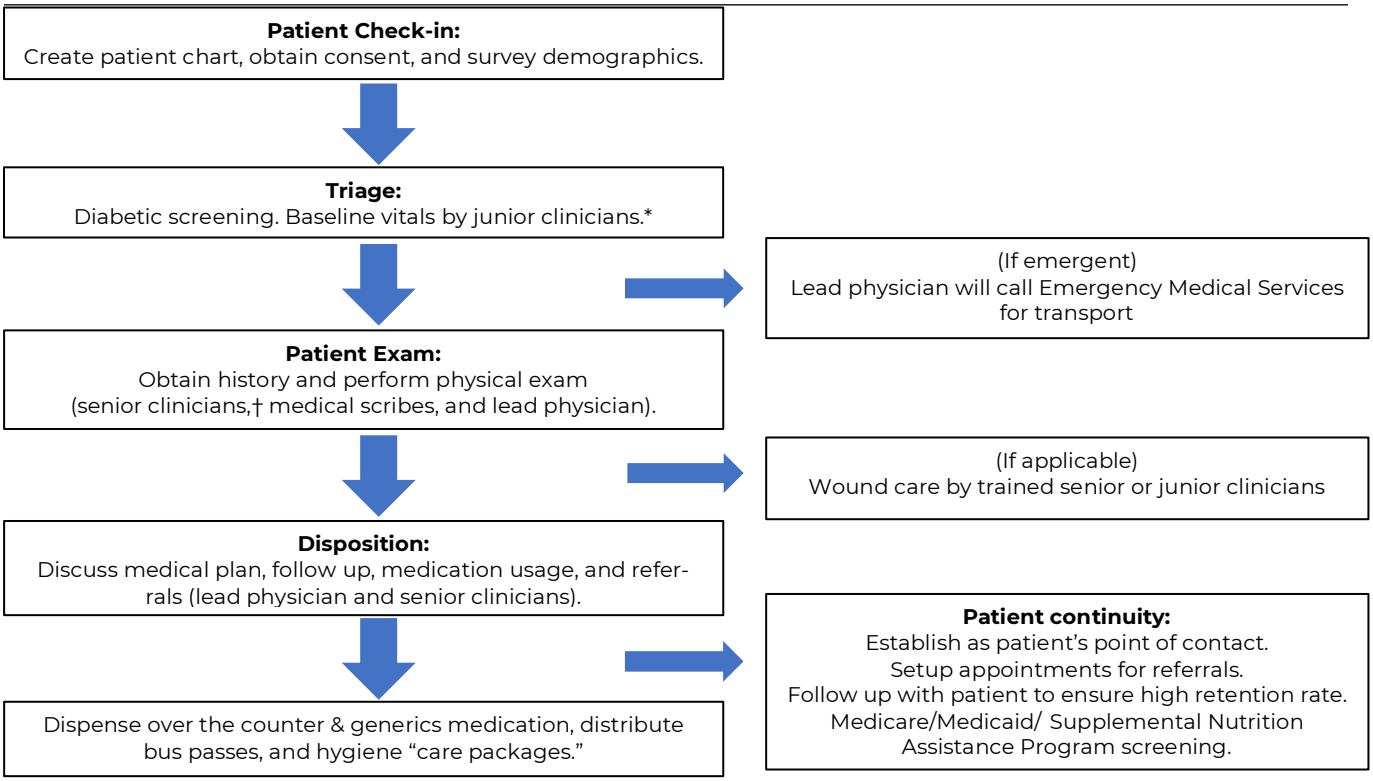
Abstract

Background: Street Health is a student-run free clinic with the goal of serving people experiencing homelessness in Norfolk, Virginia and the surrounding area. The purpose of this quality improvement project was to assess the demographics, common medical conditions, and treatments provided to Street Health patients during the clinic's first 15 months.
Methods: Data was collected from the 136 patients seen at Street Health from 1/1/2019 to 3/15/2020 which included demographic information, vital signs, labs, reason for visit, diagnosis, and treatment plan. Additionally, Chi-squared analyses were performed to determine whether the demographics of Street Health patients differed from the population of Southeastern Virginia, with a p-value of less than 0.05 considered significant.
Results: The median age was 52 years and 70.5% of patients were male. The majority of patients were African American (71.5%) and many were uninsured (33.7%). The most common conditions that patients presented with were categorized as: musculoskeletal (47.4%), cardiovascular (19.8%), and skin (18.1%). Although 55 patients reported having a chronic medical condition, oftentimes, the primary reason for visit was for acute symptoms such as joint pain or skin lesions. Of the 55 patients who reported having a chronic medical condition, 18 of those were psychiatric.
Conclusion: By understanding what clinical conditions our patients are most in need of treatment for, Street Health hopes to provide targeted care and implement interventions specific to the needs of our population. This study highlights the need to treat the acute concerns that homeless patients seek care for in addition to thoroughly assessing for underlying chronic conditions. To adequately care for chronic conditions in the homeless population, Street Health must foster trust among its patients, and partnerships must be formed to provide longitudinal care.

Introduction

In the 2020 Annual Homeless Assessment Report to Congress, the Department of Housing and Urban Development found that on a single night in 2020, there were an estimated 580,000 people experiencing homelessness (PEH) across the United States, a 2% increase from the year prior. As of January 2020, it was estimated that 5,957 people experienced homelessness in Virginia alone.[1] The Southeastern Virginia Homeless Coalition (SVHC), which includes the city of Norfolk and five other jurisdictions, reported a total of 709 PEH, a rate of 10.9 individuals per 10,000 people, as of June 2020. Of those identified to be homeless within the six jurisdictions, 9.2% were unsheltered, 10.6% had a

Figure 1. Street Health clinic flow



**First- or second-year medical student volunteers. †Third- or fourth-year medical student volunteers.*
Each Street Health clinic typically has 2 volunteers at check-in, 3 junior clinicians, 3 senior clinicians, 3 volunteer medical scribes, 2 volunteers assisting with patient continuity, and 1 attending physician.

serious mental illness, 5.4% reported having substance use disorder, and 1.3% reported to be living with HIV/AIDS.[2]

Poor physical and mental health, including cardiovascular disease, metabolic disorders, infectious diseases, and substance use disorders, are associated with homelessness.[3-4] With increased health complications and barriers to healthcare access, homeless individuals oftentimes utilize emergency departments for their healthcare services. Compared to housed patients, PEH are more likely to be frequent users with four or more visits per year.[5] On average, hospitalized homeless patients stay 2.32 days longer and hospital costs are $2559 more when compared to non-homeless patients.[6] Alternative healthcare service delivery models, such as student-run free clinics (SRFCs), have become invaluable assets for healthcare provision in underserved and underinsured populations. SRFCs have been shown to improve healthcare outcomes, with studies finding positive patient outcomes with regards to cardiovascular disease and risk.[7-8]

Eastern Virginia Medical School (EVMS) Street Health is a student-run mobile free clinic, established in 2018 with its first clinic in 2019, that offers primary care services to PEH in Norfolk, Virginia. In addition, EVMS Street Health helps enroll eligible patients in Virginia's Medicaid and Supplemental Nutrition Assistance Program. To best serve our patient population within Norfolk, Street Health needs to assess patient demographics, social history, and disease prevalence. By better understanding our patients and their specific needs, we can provide targeted care for our community. This assessment took place during the first 15 months of Street Health's existence to help guide its future directions. The aim of our project is to characterize the unique health needs of the homeless population of Southeastern Virginia for the purpose of improving healthcare delivery and allocation of resources by EVMS Street Health. In order to reach this goal, we performed the following:

1. Categorized patient demographics and social history.

2. Evaluated the prevalence of health conditions within the patient population.
3. Compared the demographics of patients seen at Street Health to the demographics of Southeastern Virginia.

Additionally, we hope that the framework presented in assessing the healthcare needs of the Street Health clinic population will assist other new clinics in determining their next steps.

Methods

Clinic Flow

Street Health partnered with a local church that provided weekly meals to PEH. Street Health set up its mobile clinic at the church, including foldable examination tables and room dividers, thereby bringing the clinic to a convenient location. At Street Health, patients are checked in, with medical student volunteers obtaining patient consent for medical treatment and demographic information such as age, sex, sleep location, and insurance status. After check-in, vitals such as heart rate, blood pressure, temperature, and oxygen saturation are taken. Patients can choose to have point-of-care

Table 1. Demographics of Street Health patient participants (N=136)

Characteristic	%* (n)
Age, mean±standard deviation, n=136	51.4±12.43
Sex, n=132	
Male	70.5 (93)
Female	29.5 (39)
Insurance, n=101	
Medicaid	26.7 (27)
Medicare	11.9 (12)
Uninsured	33.7 (34)
Other	27.7 (28)
Race, n=130	
African American	71.5 (93)
Caucasian	19.2 (25)
Other	9.2 (12)
Sleep Location, n=105	
Indoors	32.4 (34)
Shelter	45.7 (48)
Street	30.0 (22)
Vehicle	1.0 (1)
Tobacco Use, n=109	
Yes	57.8 (63)
Former	8.3 (9)
No/Never	33.9 (37)
Alcohol Use, n=106	
Yes	50.9 (54)
Former	9.4 (10)
No/Never	40.0 (42)
Education, n=51	
Less than High School	11.8 (6)
High School/High School Equivalent	51.0 (26)
Some College	19.6 (10)
College and above	17.6 (9)

**Not all respondents completed all portions of each survey.*

Table 2. Health metrics (N=133)

Variable	Mean±Standard deviation
Blood Pressure, mm Hg, n=123	
Systolic	134.87±21.76
Diastolic	83.97±13.87
Pulse, beats/minute, n=106	84.07±14.77
Temperature, °F, n=51	97±1.34
Weight, pounds, n=97	188.73±41.97
Height, inches, n=89	68.79±12.70
Body mass index, kg/m^2, n=88	29.88±8.17
Peripheral oxygen saturation, %, n=81	96.97±1.75
Hemoglobin A1c, %, n=35	6.27±1.84
Blood glucose, mg/dL, n=97	142.09±62.71
Cholesterol, mg/dL, n=19	155.21±39.77
Triglycerides, mg/dL, n=20	161.35±100.43

testing and complete a medical visit. During the medical visit, the patients meet with the healthcare team, consisting of medical students and an attending physician (Figure 1).

Data Extraction

All patients seen at Street Health from January 1, 2019 to March 15, 2020 were included in this study. These dates were chosen because Street Health's first clinic took place in January 2019, and after March 2020, Street Health clinics were temporarily suspended due to the coronavirus disease 2019 (COVID-19) pandemic. A total of 136 patients were seen during the specified time frame. At the time of a patient's visit, their demographic and visit information was recorded using REDCap (2020, Vanderbilt University, Nashville, TN) a secure application for building and managing online surveys and databases. The information used for this project was taken as part of a routine patient's visit to Street Health. Data analysis was performed using the information in REDCap which included demographics, social history, medical history, vital signs, labs, reason for visit, diagnosis, and treatment.

Data Analysis

Analysis of continuous data, such as age, body mass index (BMI), and blood pressure are presented as mean and standard deviation. Categorical variables, such as insurance, race, and treatment plan are presented as percentages. Reason for encounter and diagnoses were categorized into systems-based categories such as cardiovascular and psychiatric. We performed Chi-squared analyses to determine differences in distribution of demographic variables between PEH at Street Health and the population of Southeastern Virginia. For all statistical tests, $p<0.05$ was considered statistically significant. The study was approved by the Institutional Review Board of Eastern Virginia Medical School.

Results

Demographic Data

The mean age of the 136 survey respondents was 51.4 years old and median of 52 years old. The majority of the study population who disclosed their gender or race were male (n=93, 70.5%) and African American (n=93, 71.5%). Examining the patients (n=101) who acknowledged health insurance coverage, 26.7% (n=27) of respondents reported Medicaid coverage, 11.9% (n=12) Medicare, 33.7% (n=34) uninsured, and 27.7% (n=28) another form of health insurance. Patients' highest level of education attained was reported by 51 respondents. Of the responses, 11.6% (n=6) had less than a high school

level of education, 51% (n=26) completed high school or high school equivalent, 19.6% (n=10) completed some college, and 17.6% (n=9) completed college or higher (Table 1).

Out of the 136 patients seen at Street Health, 109 patients responded to the question on tobacco use. Of the 109 patients, 33.9% (n=37) reported having never used tobacco, 8.3% (n=9) reported past tobacco use, and 57.8% (n=63) reported current tobacco use. Of those who reported current tobacco use, the average number of years spent smoking was 23.75 years. One-hundred three patients out of 136 patients seen at Street Health responded to the question regarding alcohol use. Of those 103, 40% (n=42) reported having never used alcohol, 9.4% (n=10) reported past alcohol use, and 50.9% (n=54) reported current alcohol use. Of the 54 who reported current alcohol use, 22 patients reported drinking daily (40.7%). 105 patients disclosed their sleep location at the time of survey completion. Patients reported that they slept mostly indoors (n=34, 32.4%) or in a shelter (n=48, 45.7%). Twenty-two patients reported that their sleep location was the street (30.0%) and 1 individual (1.0%) reported sleeping in their vehicle.

Table 3. Past medical history (N=55)

Chronic Condition	**%* (n)**
Hypertension	49.1 (27)
Mental health	32.7 (18)
Bipolar	9.1 (5)
Post-traumatic stress disorder	7.2 (4)
Depression	16.4 (9)
Anxiety	12.7 (7)
Suicidal idealization	3.6 (2)
Schizoaffective	5.5 (3)
Dysthymia	1.8 (1)
Schizophrenia	9.1 (5)
Diabetes	21.8 (12)
Cancer	9.1 (5)
Chronic obstructive pulmonary disease	9.1 (5)
Peripheral Neuropathy	9.1 (5)
Asthma	7.2 (4)
Human immunodeficiency virus	7.2 (4)
Arthritis	7.2 (4)
Hypercholesterolemia	5.5 (3)
Scoliosis	5.5 (3)
Psoriasis	3.6 (2)
Glaucoma	3.6 (2)
Hyperlipidemia	1.8 (1)
Liver disease	1.8 (1)
Chronic kidney disease	1.8 (1)
Blindness	1.8 (1)
Sarcoidosis	1.8 (1)
Eczema	1.8 (1)
Graves disease	1.8 (1)
Lupus	1.8 (1)
Rheumatoid arthritis	1.8 (1)
Irritable bowel syndrome	1.8 (1)
Cystic fibrosis	1.8 (1)
Hepatitis C	1.8 (1)
Congestive heart failure	1.8 (1)

**Percentage calculated out of the 55 patients who responded with a positive history of a chronic medical history.*

Health Metrics Data

The mean systolic and diastolic blood pressures were 134.87mmHg and 83.97mmHg. Mean BMI equated to 29.88. The mean hemoglobin-A1C, blood glucose, cholesterol, and triglyceride values were 6.27%, 142.09 mg/dL, 155.21 mg/dL, and 161.35 mg/dL respectively (Table 2).

Past Medical History

Past medical history was assessed for 116 patients. Of these, 55 (47.4%) reported a chronic medical condition in their past medical history. The most commonly reported chronic conditions were hypertension (n=27, 49.1%), mental health conditions (n=18, 32.7%), and diabetes (n=12, 21.8%). Of the mental health conditions, depression (n=9, 16.4%), anxiety (n=7, 12.7%), bipolar disorder (n=5, 9.1%), and schizophrenia (n=5, 9.1%) were the most frequently reported (Table 3).

Table 4. Reason for encounter (N=116)

Reason for Encounter	%* (n)	Reason for Encounter (continued)	%* (n)
Musculoskeletal	47.4 (55)	Acid Reflux	0.8 (1)
Knee Pain	8.6 (10)	Rectal Bleeding	0.8 (1)
Back Pain	12.1 (14)	Neurologic	9.5 (11)
Shoulder Pain	6.0 (7)	Headache	4.3 (5)
Chest Pain	2.6 (3)	Dizziness	1.7 (2)
Foot Pain	9.5 (11)	Neuropathy	1.7 (2)
Hand Pain	1.7 (2)	Weakness	0.8 (1)
Hip Pain	1.7 (2)	Numbness	0.8 (1)
Leg Pain	0.8 (1)	Respiratory	9.5 (11)
Elbow Pain	0.8 (1)	Cough	7.8 (9)
Toe Pain	1.7 (2)	Pneumonia (follow-up)	0.8 (1)
Physical Injury	0.8 (1)	Difficulty Breathing	0.8 (1)
Cardiovascular	19.8 (23)	Ears, Nose, Mouth, Throat	9.5 (11)
Chest Pain	6.0 (7)	Sore Throat	1.7 (2)
Hypertension	7.8 (9)	Congestion	7 (6.0)
Chest Tightness	1.7 (2)	Ear Congestion	1.7 (2)
Shortness of Breath	4.3 (5)	Constitutional	6.0 (7)
Miscellaneous	19.0 (22)	Fever	1.7 (2)
General Check-up	8.6 (10)	Fatigue	1.7 (2)
Vital/Lab Check	7.8 (9)	Chills	1.7 (2)
Swelling	0.8 (1)	Weight Loss	0.8 (1)
Homelessness	0.8 (1)	Eyes	5.2 (6)
Vaccination	0.8 (1)	Eye Redness	0.8 (1)
Skin	18.1 (21)	Vision Changes	4.3 (5)
Rash	2.6 (3)	Psychiatric	3.4 (4)
Skin Wound	2.6 (3)	Insomnia	0.8 (1)
Skin Lesion	8.6 (10)	Mental Health Concerns	1.7 (2)
In-Grown Toe Nail	1.7 (2)	Homicidal Ideation	0.8 (1)
Fungal Infection	2.6 (3)	Endocrine	1.7 (2)
Gastrointestinal	13.8 (16)	Diabetes	1.7 (2)
Abdominal Pain	4.3 (5)	Allergy/ Immunology	1.7 (2)
Nausea/vomiting	4.3 (5)	Allergies	1.7 (2)
Bloating	0.8 (1)	Genitourinary	1.7 (2)
Diarrhea	0.8 (1)	Vaginal Discharge	0.8 (1)
Constipation	1.7 (2)	Increased Urinary Frequency	0.8 (1)

**Percentage calculated out of the 116 patients seen for a visit. Patients who were evaluated could select multiple reasons for encounter.*

Reason for Encounter, Diagnoses, and Treatment

The most common reasons for encounter were musculoskeletal (n=55, 47.4%), cardiovascular (n=23, 19.8%), n=21, 18.1%), and miscellaneous (n=22, 19.0%). Musculoskeletal complaints relating to knee pain (n=10, 8.6%), back pain (n=14, 12.1%), and foot pain (n=11, 9.5%) were most common. Cardiovascular reasons included chest pain (n=7, 6.0%), hypertension (n=9, 7.8%), chest tightness (n=2, 1.7%), and shortness of breath (n=5, 4.3%). Skin complaints included rashes (rashes (n=3, 2.6%), skin wounds (n=3, 2.6%), skin lesions (n=10, 8.6%), in-grown toenails (n=2, 1.7%), and fungal skin infections (n=3, 2.6%). Miscellaneous reasons included general check-ups (n=10, 8.6%) and vital or lab checks (n=9, 7.8%) (Table 4). Medications were given to 67 patients, with acetaminophen (n=19) and ibuprofen (n=15) being the most commonly distributed. Lifestyle changes were recommended in the form of smoking cessation (n=11) and diet and nutrition recommendations (n=6).

Demographic Comparison

The demographics of our homeless patients closely resemble the demographics of those reported in the Southeastern Virginia Homeless Coalition (SVHC). Of Southeastern Virginia PEH in 2020, 71.1% identified as 'African American/Black' and 17.9% 'White', while 72.5% of our patients identified as 'African American' and 19.2% as 'Caucasian'.[2,32] SVHC also showed 66.9% male and 33.1% female; our medical records indicated that our homeless cohort makes up 70.5% male and 29.5% female (Table 5).[2,32] A Chi-squared test was used to determine whether there was a difference in distribution in the data from SVHC vs patients at Street Health, with both race ($p>0.8$) and gender ($p>0.4$) distributions being similar. In contrast, the demographics of our clinic differ from the general population data of Southeastern Virginia which was determined using publicly available United States Census Data. In 2020, 36.4% of those living in Southeastern Virginia identified as 'African American/Black' and 53.1% identified as 'White'.

Additionally, 47.7% of the general population of Southeastern Virginia were male and 52.3% reported being female (Table 5).[33] PEH treated at Street Health differed from the general population of Southeastern Virginia in regards to both race ($p<0.01$ and gender ($p<0.01$).

The most common level of education obtained is high school equivalent (n=26, 51.0%), followed by completion of some college (n=10, 19.6%). Sixty-seven (66.3%) patients at Street Health had health insurance. The level of educational attainment in Southeastern Virginia is 25.3% at the high school equivalent and 33.7% at the completion of some college. Additionally, 91.6% of adults had health insurance (Table 6).[33] When compared to the general population, patients seen at Street Health have different levels of educational attainment ($p<0.01$) and health insurance ($p<0.01$).

Table 5. Sex and race of Street Health versus Southeastern Virginia Homeless Coalition[2,32] versus Southeastern Virginia[33]

Characteristics	Street Health, %* (n)	Southeastern Virginia Homeless Coalition, % (n)	Southeastern Virginia, % (n)
Sex	N=136	N=709†	N=593,496
Male	70.5% (93)	66.9% (474)	47.7% (282,864)
Female	29.5% (39)	33.1% (235)	52.3% (310,632)
Race	N=136	N=5,591‡	N=593,496
African American	71.5% (93)	71.1% (3,975)	36.4% (216,254)
Caucasian	19.2% (25)	17.9% (1,003)	53.1% (315,230)
Other	9.2% (12)	11.0% (613)	10.4% (62,012)

**Percentage within each characteristic. Not all respondents completed all portions of each survey.*
†Data obtained from the Southeastern Virginia Homeless Coalition Annual Report 2020.[2]
‡Data obtained from Southeastern Virginia Homeless Coalition Racial Disparities Report 2020[32]

Table 6. Insurance and educational attainment of Street Health patients versus Southeastern Virginia[33]

Characteristics	Street Health, %* (N=136)	Southeastern Virginia, % (N=593,496)
Insurance		
Yes	66.3 (67)	91.6 (543,433)
No	33.7 (34)	8.4 (50,063)
Education		
<High School	11.8 (6)	9.8 (37,605)
High School/High School Equivalent	51.0 (26)	25.3 (97,340)
Some College	19.6 (10)	33.7 (129,661)
College and Above	17.6 (9)	31.3 (120,426)

**Percentage within each characteristic. Not all respondents completed all portions of each survey.*

Discussion

Knowing the needs of the patient population is vital for improving efficiency, determining the allocation of resources, and shaping future directions, especially in free clinic settings where funding is limited.[18] Several free clinics have reviewed the demographics and presenting conditions of their patients.[9,19-31] Patients who utilize free clinics have higher rates of obesity,[26,28-29] hypertension, asthma, diabetes,[26] and mental health conditions[26,28,30] when compared to local or national data. However, there are fewer studies focusing on the demographics and specific healthcare needs of the homeless population in the free clinic setting.[9,24,31]

Although the most common reason for visit of our patients is musculoskeletal problems (47.4%), our records show that their past medical history includes chronic problems such as hypertension (49.1%) followed by mental health issues (32.7%); however, these chronic illnesses were not the top reasons that brought the patients to our clinics. Hypertension made up 7.8% and psychiatric etiologies made up only 3.8% of reasons for visit. This data suggest that patients are foregoing management of chronic problems for more acute. While acute concerns affect homeless patients on a day-to-day basis in terms of functionality and comfort, their chronic conditions are not a priority given that they may be asymptomatic. This increases the risk for worsening health outcomes because preventative medical treatments for chronic issues are underutilized.

Of the patients seen at Street Health with at least one chronic medical condition, 21.8% reported having been diagnosed with diabetes, 49.1% with hypertension, and 16.3% with depression. The prevalence of diabetes, hypertension, and depression in Southeastern Virginia is 11.2%, 34.0%, and 18.8% respectively.[33] Although the prevalence of depression is similar between Street Health and Southeastern Virginia, the rates of diabetes and hypertension are higher for Street Health patients when compared to the local population. The number of patients with chronic medical conditions at Street Health may be underreported because many patients receive treatment for acute conditions and may not disclose their past medical history.

Current and Future Directions

The results from this project will guide EVMS Street Health's future directions in caring for Norfolk's homeless population. Anecdotally, our patients mentioned having a difficult time keeping their medical appointments because they do not have access to transportation and must walk or bike instead. Given that the most common chief complaint is musculoskeletal pain, this prevents many patients from traveling long distances. To offset this difficulty and increase appointment retention rate, we provide one free all-day bus voucher that is to be used on the day of their medical appointment.
In 2020, our clinic established a "Medicaid Enrollment Team" to address the lack of health insurance among the homeless population. With about one-third of the homeless patients in our study reporting a lack of insurance, there is strong support for the continuation of our current Medicaid/Medicaid

enrollment program. Furthermore, our results reveal the need for substance use programs for tobacco and alcohol, as well as, initiatives to improve sleeping accommodations for the unsheltered. In the future, our plans include forming partnerships and referral processes to local programs to assist with substance abuse and further improve the sleeping conditions of the homeless population.

Given that coordinating medical appointments and learning the complexities of insurance is daunting, Street Health connects patients with a student representative known as the "Patient Navigator." This student discusses the treatment plan with patients to ensure they understand their diagnoses, screens the patient for Supplemental Nutrition Assistance Program eligibility, calls and confirms appointments, disseminates community resources, and distributes bus passes. The role of the Patient Navigator removes possible obstacles in order to improve patient continuity.

To provide Street Health volunteers with the knowledge to support patients with mental health conditions, a workshop on common psychiatric diagnoses has been created. In addition, another telehealth channel is being established to provide patients with free counseling sessions. Given the prevalence of musculoskeletal pain in our population, Street Health should form partnerships with physiatrists and physical therapists. This study provides supportive evidence to continue Street Health interventions such as Medicaid enrollment and Patient Navigators. With over 30% of our patients reporting lack of insurance, there is a need to screen patients for Medicaid eligibility. Additionally, many of our patients have chronic medical conditions and limited access to healthcare, resulting in a need for Patient Navigators to assist patients in receiving regular medical care.

Limitations

One limitation to this study is that the medical and demographic information are self-reported; therefore, they may be incomplete. Additionally, the medical student and physician volunteers change from clinic to clinic; thus, each medical team that sees a patient may have different charting preferences, leading to variability in what information is collected. This inconsistency is being addressed through documentation training for medical scribes and an emphasis on attending physicians to check the chart for completeness. Another limitation is our data size is relatively small and the charts were reviewed before our in-person clinic services abruptly shut down due to Virginia's COVID-19 restrictions.

Conclusions

Compared to the general population of Southeastern Virginia, patients seen at Street Health are predominately African American, have lower levels of educational attainment, and are less likely to have health insurance. Common concerns include musculoskeletal, cardiovascular, and skin. Common chronic medical conditions include hypertension, psychiatric concerns, and diabetes. This study highlights a disparity in a homeless patient population where acute complaints drive clinic visits, while highly prevalent chronic diseases remain under-managed. The findings validate the necessity of integrated free clinic models that address both immediate needs and long-term health through sustained support services, insurance navigation, and targeted chronic disease programs to mitigate worsening health outcomes in this vulnerable group.

Disclosures

The authors have no conflicts of interest to disclose.

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