



Implementing a Reproducible Foot and Vaccine Clinic Model to Address Healthcare Needs of People Experiencing Homelessness

Caitlin Wuebbolt, MD¹; Sarah Andres, MD¹; Ricki Chen, MD¹; Tess Pullano, MD¹; Alexandra Gilligan, MD¹; Alyssa Dzik, MD¹; Emilie Christie, MD¹; Allison Chowdhury, MD¹; David Milling, MD¹

¹University at Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, New York, USA

Corresponding Author: Caitlin Wuebbolt; email: wuebboltc@gmail.com

Published: June 24, 2024

Abstract

Background: Homeless Health, Education, Awareness and Leadership in Street Medicine (HEALS) is a nonprofit, medical student-run organization. The mission of HEALS is to address the medical and psychosocial needs of people experiencing homelessness (PEH). Through street medicine outreach initiatives, HEALS works to improve health outcomes associated with unstable housing and limited access to healthcare. The HEALS Foot and Vaccine Clinic was developed to screen for and treat vascular insufficiency, chronic and acute wounds, and foot-related pathologies, and provide vaccinations to prevent infectious illnesses. This clinic also aimed to prevent exposure-related injuries by providing proper footwear and direct access to care.

Aim: Our objective is to create a reproducible foot and vaccine clinic model for student-run clinics to address the needs of PEH through interprofessional collaboration and service learning.

Methods: The event was funded through a crowdfunding campaign and donations and was hosted at a local shelter. Medical students and physicians employed by the medical school partnered with five community outreach programs to provide medical care. The Department of Health (DoH) administered vaccinations against common viral diseases.

Results: Through crowdfunding campaigns, \$6,646.00 was raised to contribute to the cost of boots, hygiene kits for attendees, and cleaning supplies, budgeted at \$5,198.00. Forty-seven individuals experiencing homelessness were provided with foot care and twenty-six vaccines were administered. The DoH administered twelve hepatitis A, five coronavirus disease 2019 (COVID-19), and nine influenza vaccinations at this event. Successive members of HEALS have since replicated this model to replicate foot and vaccine clinics and expand outreach to the neighboring county, yielding increased event attendance and funding. Using this model, student-run free clinics may implement similar initiatives within their own communities to address the complex needs of PEH.

Introduction

The University at Buffalo's Homeless Health, Education, Awareness and Leadership in Street Medicine (UB HEALS) is a nonprofit, medical student-run organization at the University at Buffalo Jacobs School of Medicine and Biomedical Sciences (JSMBS). Unstable housing is associated with poor health, high stress, dangerous environments, poor healing, and an inability to control

food intake, resulting in more frequent visits to emergency rooms and hospitalizations with longer stays and higher rates of readmissions.¹⁻⁴ With this information, the importance of primary care services among people experiencing homelessness (PEH) cannot be ignored.

Created in 2017, UB HEALS aims to bridge gaps in healthcare and address unique medical and psychosocial needs of PEH in and around its surrounding counties. PEH are often faced with

increased barriers to primary care services, including but not limited to affordability of services, physical access, distrust of the healthcare system, and poor health.³

UB HEALS coordinates specialized initiative projects targeting the specific needs of PEH, such as the UB HEALS Foot and Vaccine Clinic detailed in this study. In addition to its special initiative projects, UB HEALS' volunteers engage in "street rounds" twice weekly. These street rounds involve teams comprising medical students, healthcare providers, social workers, and community leaders visiting local shelters, bus stations, and areas of need to provide medical care, social services, and facilitate connections with relevant resources. Through street medicine and special initiative projects, UB HEALS works to create trusting relationships and better serve the estimated 5,140 individuals in Western New York impacted by the loss of housing.⁵

PEH experience increased risk of physical injuries and repetitive minor trauma to their feet. The severity and high prevalence are largely attributable to factors related to social determinants of health, hygiene, and chronic medical conditions, lack of foot care resources, and absence of social and financial support.⁶⁻⁸ The UB HEALS Foot Clinic was originally developed by medical students in 2019 to screen and treat foot related pathologies. Further, this clinic aimed to prevent exposure-related injuries by providing proper footwear and connecting PEH to healthcare providers. With experienced physicians, healthcare providers, and social workers on site, the goal of the clinic is to treat or prevent injuries and provide resources for future care in an area that is free and accessible to PEH.

Recognizing the heightened vulnerability of PEH to communicable diseases,^{9,10} the 2021 UB HEALS leadership board made the decision to broaden the foot clinic's scope to encompass vaccine administration alongside foot care services. In collaboration with the Erie County Department of Health (DOH), UB HEALS commenced simultaneous administration of vaccines targeting prevalent viral illnesses like coronavirus disease 2019 (COVID-19), Influenza, and Hepatitis A, all of which pose significant risks of morbidity and mortality within the homeless community.⁹

In this descriptive report, we outline the

considerations, outcomes, and challenges associated with hosting and promoting foot and vaccine clinics for PEH. Our objective is to present a reproducible model for foot and vaccine clinics, facilitating the delivery of basic medical and preventive care. Beyond merely establishing a clinic, we also illustrate how UB HEALS has utilized this model to broaden its outreach efforts.

Methods

Fundraising

A crowdfunding campaign was launched and advertised through the medical schools' listservs to raise funds for the foot and vaccine clinic. ScaleFunder automatically collected donations and generated an ongoing report of funds. Additionally, donation drives throughout the year were organized to collect supplies such as scarves, mittens, and winter coats.

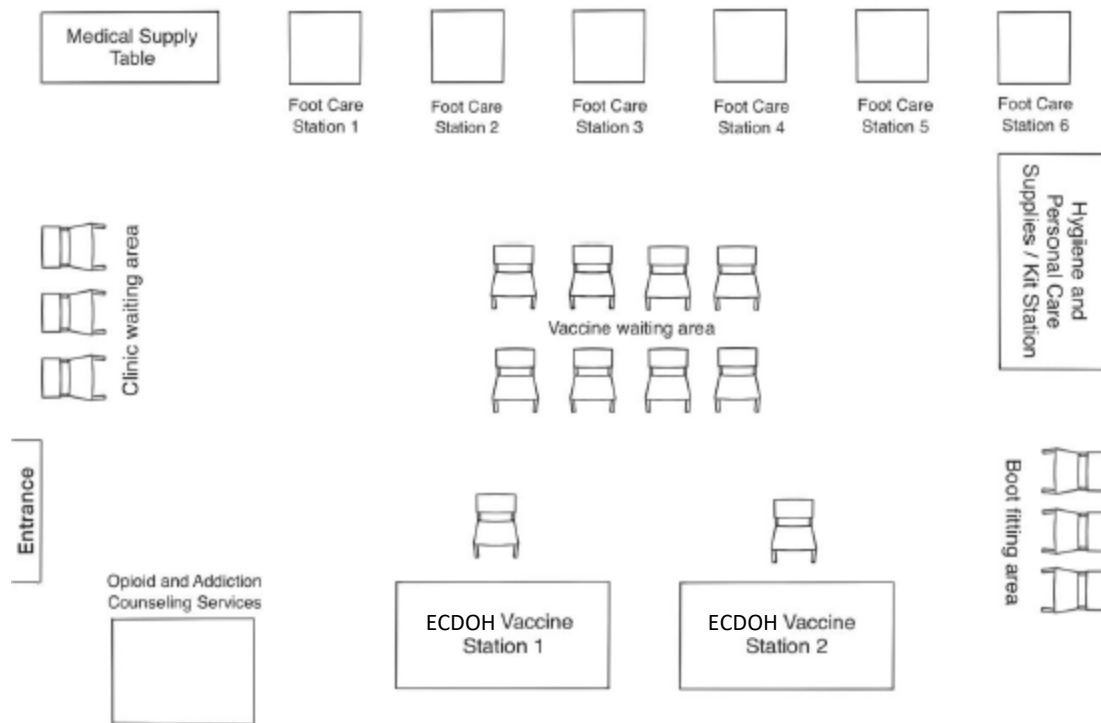
Event Location

The event location was chosen based on proximity and ease of access to the population of interest. As many patients relied on walking or taking public transport, several locations were ruled out due to being too far to utilize these methods. Ultimately, our clinic site was chosen to be a well-known shelter nearby several bus stations. Coordination with the city's Restoration Society, a peer-operated community agency that offers recovery-based mental health services in Western New York, allowed for assurance that the shelter would be open to clinic-goers. This location included one large central room, two bathrooms, and a utility closet with a sink.

Event Awareness

Due to the unique nature of this patient population, the implementation of the foot clinic required several methodologies to ensure its success. Utilizing connections with community partners, advertisement for the UB HEALS foot clinic occurred approximately three months before the clinic date. Our goal was to notify as many organizations and patients as possible. Patient flyers were printed and hung in locations frequently visited by our patients (bus stations, shelters, street corners, etc.) and given to many of the non-profit organizations who support them day to day

Figure 1. UB HEALS foot clinic map



UB HEALS: The University at Buffalo's Homeless Health, Education, Awareness and Leadership in Street Medicine; ECDOH: Erie County Department of Health.

(city missions, churches, medical clinics, etc.). Advertisements for this event occurred three to four months in advance and during every street round held by UB HEALS from the months of August 2021 to November 2021.

Volunteer Recruitment and Training

Ensuring the respect, dignity, and safety at the UB HEALS clinic ranked among the foremost priorities for this event. As such, care was taken to ensure that every staff member had appropriate credentialing for their task. All patient interactions were overseen by certified medical professionals in the respective fields of Emergency Medicine, Vascular Surgery, Podiatry, and nursing. Volunteers consisted of enrolled medical students. Training sessions for the foot clinic were held over a two-day span, in which topics included roles/responsibilities of the volunteers, appropriate and inclusive language for patient interactions, and proper hygiene for each foot care station. A total of seventeen medical student volunteers and four physicians were present for the events and training.

To protect the volunteers, safeguards were implemented across all UB HEALS' activities in 2021. All volunteers were required to complete the medical institution's Daily Health Check to attest to being asymptomatic. Each volunteer completed a Service Learning During Pandemic Waiver, agreeing to always wear masks and goggles. All volunteers were required to receive the COVID-19 vaccine once available. Volunteers and student leaders were mandated to report to one another any known COVID-19 exposures.

Organizational Layout of Clinic

To optimize patient utilization, the clinic consisted of several stations. This included six individual foot care stations staffed by one medical student volunteer and overseen by four doctors who specialized in Emergency Medicine, Vascular Surgery, or Podiatry. Four volunteers were assigned to manage sanitizing and re-stocking stations from the medical supply area in between use. A personal care and hygiene kit station set-up provided patients with pre-filled kits consisting of everyday personal care necessities. This station

also held the boot fitting area, in which patients were assisted with trying on free boots purchased for the clinic by our team. Finally, the DOH had two vaccine stations for patients to visit and an opioid and addiction counseling station that patients were encouraged to stop by at before exiting the clinic. The event layout can be viewed in Figure 1. Designated volunteers kept attendance of the event at a check-in and check-out station. To ensure patient anonymity, the services recorded were grouped by which service each person wanted- only footcare, only vaccine coverage, or both.

Foot Care Stations

Patients were directed to one of the six foot-care stations upon arrival, where a welcoming medical student provided an orientation to the clinic's setup and purpose. The patient was invited to share any specific concerns about their feet, which were then addressed during the session. A comprehensive foot care routine began with a foot soak using Epsom salt and soap, followed by thorough washing and rinsing. Subsequently, toenails were clipped and filed. The foot examination encompassed a meticulous search for calluses, ingrown nails, plantar warts, blisters, infections, and other potential pathology.

To enhance the diagnostic and treatment process, supervising faculty from Emergency Medicine, Vascular Surgery, or Podiatry were readily available as needed. Medical students received guidance from these faculty members to ensure effective communication with patients about diagnoses and treatment options. On-site resources, such as scalpels, wart removal kits, antifungal cream, and other supplies, were accessible to promptly address patient concerns.

Moreover, patients requiring additional supplies or medications (e.g., antifungal cream) were provided with detailed instructions on usage. Contact information for nearby clinics offering follow-up care was also shared to facilitate ongoing support beyond the clinic visit.

Hygiene and Personal Care

At this station, each patient was given a new pair of winter boots. A foot measurement device was utilized to ensure that each patient received properly fitting boots to prevent any future foot-

Table 1. Supplies taken from inventory and not included in total cost

Item	Quantity
Epsom Salt (16 ounces)	5 containers
Diabetic foot cream	1 tube
Foot exfoliator	7 devices
Clotrimazole	6 tubes
Socks	200 pairs
Foot soap	7 bars
Lotion	70 bottles
Gloves	1 box
Nail files	70 files

related conditions that could be caused by improperly sized shoes. Waterproof boots were the footwear we chose to supply to patients to provide adequate protection from the winter weather and prevention of cold temperature-related conditions such as frostbite and trench foot. This station also had winter weather gear and other clothing donated by community partners that patients could choose from based on their needs and clothing preferences. Patients were given a kit that included lotion, petroleum jelly, nail clippers, a nail file, and socks to assist in maintaining their foot health while away from a clinical setting. See Table 1 for supplies taken from inventory.

In total, UB HEALS purchased fifty-one pairs of boots for this event. To determine which sizes to purchase, we asked our community partners for an estimation of shoe sizes most requested at their respected organizations and for an estimated number of clients they thought would need them. The descriptions of boots purchased, their sizes, and total cost can be found in Table 2.

Vaccine Clinic

UB HEALS partnered with the local Department of Health to provide free vaccinations. The DOH administered COVID-19, Influenza, and Hepatitis A vaccinations at the Foot and Vaccine Clinic. They shared their records of which vaccines they administered at the clinic with UB HEALS but kept individual health records private. Their trained professionals administered the vaccines, addressed questions, and discussed potential side effects. Patients were instructed to wait

Table 2. Foot clinic supplies

Item	Quantity	Price (\$USD)
Boots	60 pairs	5,198.00
Topical pain reliever	20 tubes	200.00
Nail clippers	67 clippers	76.00
Foot measurement device	1 device	66.00
Vaseline	70 containers	66.00
Wash bins	7 bins	27.00
Wart remover kit	1 kit	25.00
Foot repair cream	3 tubes	24.00
Towels	6 towels	20.00
Tub liners	80 liners	15.00
Trash bags	18 bags	15.00
Buckets	8 buckets	8.00
Spray bottles	3 bottles	3.00
Measuring cups	2 cups	3.00
Bleach/disinfectant	1 bottle	1.00
Total		5,747.00

USD: United States Dollars.

fifteen minutes after receiving vaccinations and were supervised in the waiting area by DOH staff.

Results

Regarding funding, a total of \$6,646.00 was raised through various fundraising initiatives, including a crowdfunding campaign. These funds contributed to covering the costs of boots, hygiene kits for attendees, and cleaning supplies, with a budget allocation of \$5,198.00. In 2021, sixty boots and hygiene kits were collected and distributed. Additionally, clothing drives successfully accumulated a supply of socks, scarves, gloves, and hats. Each attendee received at least two pairs of socks, making socks the most distributed item, with over one hundred pairs distributed during the event.

The foot and vaccine clinic, held between 12:00 P.M. and 4:00 P.M., served forty-seven attendees. Six foot-washing stations were consistently staffed by two to three medical student and physician volunteers, ensuring continuous attention to patients. With seventeen volunteer medical students managing each station, additional staffing was not required. In case of extended wait times, patients were directed to other designated stations for vaccination administration by the

DOH or to collect clothing or hygiene supplies donated for this purpose.

These simultaneous stations allowed us to address specific individual needs, provide timely care, and minimize the workload for volunteers. Importantly, neither patients nor volunteers expressed concerns about wait times or workload, and all attending patients received on-site care from volunteer medical providers.

During the event, the Erie County DOH administered a total of twenty-six vaccines. This included five single-dose Johnson & Johnson's Janssen COVID-19 vaccines (10% of attendees), nine influenza vaccines (19% of attendees), and twelve hepatitis A vaccines (25% of attendees). Patients had the flexibility to receive any combination of the three vaccines offered.

Discussion

UB HEALS has been steadfast in building trust and fostering relationships with underserved individuals, particularly those in the homeless community. This commitment is crucial, given the barriers to care related to access, cost, and trust that many of these individuals face. The establishment of such relationships with groups experiencing these challenges forms the foundation for ongoing partnerships that can significantly contribute to improved long-term outcomes.

By focusing on populations with poor access to healthcare, UB HEALS aims to forge lasting partnerships that can positively impact health outcomes over time. Crowdfunding has proven to be an effective and cost-efficient method for raising funds, enabling outreach to a broad audience.

Successive UB HEALS organizations have since implemented this model to successfully replicate the foot and vaccine clinic and successfully expanded outreach outside of Buffalo to Niagara Falls. In 2022, UB HEALS was granted \$250,000 over one year through the Outreach and Engagement Services Street Outreach Model from the New York State Office of Addiction Services and Supports for future initiatives.

Collaborating with the DOH allowed UB HEALS to provide vaccines for communicable diseases with high rates of transmission among people experiencing homelessness.⁹ The involvement of DOH staff was crucial to addressing

patient questions and hesitations in a nonjudgmental manner. Some patients were ready for vaccination immediately, while others appreciated having their questions addressed before making a final decision. Engaging in conversations with underserved community members enables UB HEALS to identify gaps in healthcare and work collaboratively with the DOH to address these crucial health inequities.

Through the connection made with the DOH at this event, the DOH staff began accompanying UB HEALS on the weekly street medicine rounds seven times throughout 2022 to provide COVID-19 vaccinations, using portable coolers to transport vaccinations across locations. Between April 2022 and December 2022, a total of thirty-four COVID-19 vaccinations were administered by the DOH while on street rounds with UB HEALS. UB HEALS members introduced the DOH staff to the community members experiencing homelessness, helping to foster trust between the two. The DOH also expanded data collection regarding the demographics of PEH assisted, enabling UB HEALS to better understand and meet the needs of given populations.

Limitations

In March 2020, UB HEALS suspended its regular operations due to COVID-19 safety concerns. In January 2021, the medical school resumed student activities under safe operating conditions. The medical students serving on the 2021 UB HEALS leadership board encountered the task of reestablishing and enhancing the severed connections with community partners, local physicians, and PEH.

Although we established a check-in station to log incoming and outgoing traffic, we failed to document the specific services rendered. Patients were categorized into general groups: those requiring foot care only, vaccine coverage only, or both, primarily to streamline clinic flow and reduce wait times. The DOH recorded vaccines administered. Regrettably, this approach did not capture detailed information about the services each individual received. Notably, data on which patients accessed supplies from the donation station, beyond the total number of boots distributed, was not recorded. While volunteers at each foot washing station provided basic foot

care, based on training sessions conducted prior to the event, some patients required specialized care due to various pathologies. Detailed records from each station could have provided insights into the unique services delivered and identified the need for follow-up care, as well as evaluating the clinic's overall impact.

Promoting the foot and vaccine clinic to a population without homes and limited access to technology presents unique challenges. The most effective means for the organization to disseminate information about the event proved to be through word of mouth and distributing flyers at local shelters, bus stations, and soup kitchens. We relied heavily on word of mouth to raise awareness, and we did not measure which method proved most effective to advertise. Future clinics may want to survey incoming patients and ask how they heard about the clinic.

Future Directions

Future directions for UB HEALS foot and vaccine clinics include strengthening partnerships with the DOH to expand vaccine outreach and include vaccines against future strains of COVID-19, hepatitis screening and vaccination, and providing Tetanus-Diphtheria-Pertussis (TDaP) vaccines. Due to the scarcity of literature surrounding similar clinics, comparisons for total costs and funds for this event is limited. However, as organizations continue to evolve similar events, future cost analysis and comparison may prove to be insightful.

In addition to expanding foot and vaccine care, this organization is involved with other public health initiatives. UB HEALS is currently working on partnering with local organizations to provide human immunodeficiency virus (HIV) and Hepatitis B testing free of charge during various clinics to reduce the spread of sexually transmitted diseases.

Conclusion

UB HEALS special initiative projects aim to address poor health outcomes associated with limited access to healthcare and unstable housing. Interprofessional collaboration with community partners, health clinics, shelters, local physicians, and the Erie County DOH was essential to this

event's execution. Successive members of UB HEALS have since implemented this model to replicate foot and vaccine clinics and expand outreach to the neighboring county, yielding increased event attendance. Using this model, student-run free clinics may implement similar initiatives within their own communities to address the complex needs of PEH.

Acknowledgements

We would like to thank the Office of Medical Education at the Jacobs School of Medicine and Biomedical Sciences at the University at Buffalo for supporting our endeavors as an organization. Special acknowledgments to Dr. David Milling, the program supervisor, and Mary Schaus, our financial liaison, without whom the financial independence necessary to the organization's success would not have been possible. Additionally, we'd like to recognize the importance of the Matt Urban Center, Jericho Road Community Health Center, Neighborhood Health Center, and the Erie County Department of Health for spreading awareness regarding UB HEALS mission, treating patients, and for helping foster a relationship with the community in Buffalo.

Disclosures

The authors have no conflicts of interest to disclose.

References

1. Yue D, Pourat N, Essien EA, et al. Differential associations of homelessness with emergency department visits and hospitalizations by race, ethnicity, and gender. *Health Serv Res.* 2022;57(S2):249-62. <https://doi.org/10.1111/1475-6773.14009> [LINK](#)
2. Nelson RE, Suo Y, Pettay W, et al. Costs associated with health care services accessed through VA and in the community through Medicare for Veterans Experiencing Homelessness. *Health Serv Res.* 2018;53(6):5352-74. <https://doi.org/10.1111/1475-6773.13054> [LINK](#)
3. Salit SA, Kuhn EM, Hartz AJ, Vu JM, Mosso AL. Hospitalization costs associated with homelessness in New York City. *N Engl J Med.* 1998;338(24):1734-40. <https://doi.org/10.1056/nejm199806113382406> [LINK](#)
4. Wang A, Pridham KF, Nisenbaum R, et al. Factors associated with readmission among general internal medicine patients experiencing homelessness. *J Gen Intern Med.* 2021;36(7):1944-50. <https://doi.org/10.1007/s11606-020-06483-w> [LINK](#)
5. Homeless Alliance of Western New York. Local Report on Homelessness NY-508 2021 Homelessness Summary Brief [Internet]. Buffalo (NY): Homeless Alliance of Western New York; 2021. [Accessed YMD]. Available from: <https://wnyhomeless.org/app/uploads/NY-508-2021-Annual-Report-FINAL.pdf> [LINK](#)
6. Ballard AM, Cooper HLF, Young AM, Caruso BA. 'You feel how you look': Exploring the impacts of unmet water, sanitation, and hygiene needs among rural people experiencing homelessness and their intersection with drug use. *PLoS Water.* 2022;1(5):e0000019. <https://doi.org/10.1371/journal.pwat.0000019> [LINK](#)
7. D'Souza MS, O'Mahony J, Achoba A. Exploring foot care conditions for people experiencing homelessness: a community participatory approach. *J Prim Care Community Health.* 2022;13:21501319211065247. <https://doi.org/10.1177/21501319211065247> [LINK](#)
8. To MJ, Brothers TD, Van Zoost C. Foot conditions among homeless persons: a systematic review. *PloS One.* 2016;11(12):e0167463. <https://doi.org/10.1371/journal.pone.0167463> [LINK](#)
9. Fazel SP, Geddes JRP, Kushel MP. The health of homeless people in high-income countries: descriptive epidemiology, health consequences, and clinical and policy recommendations. *Lancet.* 2014;384(9953):1529-40. [https://doi.org/10.1016/s0140-6736\(14\)61132-6](https://doi.org/10.1016/s0140-6736(14)61132-6) [LINK](#)
10. Yanagihara, D, Hwang, A. Investing in Primary Care: Why It Matters for Californians with Commercial Coverage. California Health Care Foundation. 2022. Available from <https://www.chcf.org/wp-content> [LINK](#)