An Evaluation of the University of Washington Health Sciences Mobile Health & Outreach Program

Shelby Kantner

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2022

Committee:

Clarence Spigner

Tracy Brazg

Program Authorized to Offer Degree:

Department of Health Systems and Population Health

University of Washington

Abstract

An Evaluation of the University of Washington Health Sciences Mobile Health & Outreach Program

Shelby Kantner

Chair of the Supervisory Committee:

Clarence Spigner

Department of Health Systems and Population Health

Objective: To evaluate if the University of Washington Mobile Health and Outreach (UW-MHO) Program is effectively meeting its goals and to identify areas for improvement. **Methods**: This program evaluation utilized an explanatory sequential mixed methods approach (quan → QUAL). The quantitative data were collected via a survey that used a retrospective pre-post design and the qualitative data were collected via semi-structured interviews. Purposive sampling was used to identify the interview participants. The quantitative analyses consisted of descriptive statistics and the qualitative analyses utilized a traditional approach to content analysis. After data were collected and analyzed, triangulation and integration were used to assess how the quantitative and qualitative data converged and/or diverged. **Results**: We distributed the survey to forty-six students who volunteered with the UW-MHO Program between its inception and December 31, 2021. In total, 9 students responded to the survey (20% response rate) and 7 students participated in the semi-structured interviews. Six key themes were developed from the qualitative data analyses: Knowledge, Skills, Attitude, Interprofessional Collaboration, Preceptors, and Improvements. Both the quantitative and qualitative data converged and suggested that students who volunteered with the van showed improvements in their self-perceived knowledge, skills, attitudes, and self-efficacy toward treating and working with people experiencing houselessness, as well as their interprofessional collaboration skills. **Conclusions**: The UW-MHO Program helps to develop a more collaborative and culturally sensitive healthcare workforce.

Contents

Background

The proportion of uninsured Americans has decreased over time due to increases in access to health insurance.[1] Despite this, barriers to receiving healthcare persist including family/work barriers (e.g. availability of childcare), provider-related barriers (e.g., providers do not speak the same language, lack of cultural competence, untrustworthy), discriminatory barriers (e.g., unfair treatment due to social identity), financial barriers (e.g., worried about cost), and access barriers (e.g., cannot get an appointment, do not know where to go, transportation problems).[2] The number and types of barriers faced depend on a person's race/ethnicity, sexual orientation, gender identity, intellectual and physical ability, geographic location, age, language and citizenship status, incarceration status, religion and beliefs, health literacy, and ability to access to information (i.e., social determinants of health).[3] As such, simply increasing access to health insurance is not merely enough to improve health outcomes. Ensuring equitable access to health for all requires a health system that ameliorates social factors that contribute to poor and inequitable health, overcomes barriers to care for vulnerable and underserved populations, and ensures that no person is discriminated against based on characteristics of personal identity.[3]

One population that faces additional and exacerbated barriers to care is people experiencing houselessness. As a result, this population often deals with multiple, unaddressed acute and chronic healthcare needs. People residing in damp, cold, or overcrowded living situations face greater physical hazards, while instability and financial insecurity put mental health at risk.[4] Compared to the general population, certain health conditions are especially prevalent among people experiencing houselessness including respiratory diseases (bronchitis, tuberculosis, pneumonia), skin infections, foot-related issues, lacerations/wounds, sexually transmitted diseases, mental health problems, and substance use disorder.[5] Data from Seattle and Denver suggest that the average age of people who died while homeless was 54 and 47 years, respectively – much lower compared to the life expectancy of 77 years for the general U.S. population.[6,7] Expansion of health insurance coverage may help increase healthcare access for this population but tackling the unique challenges inherent to living unhoused will also be required. One such healthcare delivery model aiming to achieve this end is the use of Mobile Health Clinics (MHCs).

MHCs are customized automobiles (e.g., bus, van) that travel to communities to provide healthcare. Mobile Health Map, a collaborative research network out of Harvard Medical that aims to monitor and evaluate mobile health programs, provides a comprehensive database of MHCs in the United States. To date, 890 MHCs have registered with Mobile Health Map's publicly available database and epidemiological modeling completed by Mobile Health Map estimates the existence of 2,000 MHCs nationwide.[8] A recent study analyzed data from 811 MHCs that participated in Mobile Health Map between 2007 and 2017. Concerning organizational affiliations, they varied from independent (33%) to university-affiliated (24%), while others indicated being part of a hospital or healthcare system (29%). Funding sources included philanthropy (52%), federal (45%), public insurance (37%), private insurance (36%), patients self-pay (32%), state (27%), parent organization (15%), and other (14%). Most MHCs aimed to serve the uninsured (56%), low-income (55%), homeless (38%), and rural (36%) populations. They may be staffed by a combination of physicians, nurses, social workers, students, and other health professionals who provide a wide range of health services including preventative (47%), primary care (41%), dental (28%), mammography (13%), pediatrics (11%), mental health (8%), asthma (3%), maternal/infant care (2%), disaster relief (2%), and other specialties (13%).[8] These data indicate that mobile healthcare presents an innovative healthcare delivery strategy that offers a wide range of treatments to underserved communities. By acting as a key link between the community and clinical facilities, MHCs can improve access to care for vulnerable populations.

MHCs help underserved communities overcome common barriers to accessing healthcare including financial, logistical, geographical, and lack of trust. By traveling directly to communities and offering (oftentimes) free services, MHCs remove logistical obstacles such as transportation issues, troubles making appointments, long wait times, complex administrative processes, and financial burdens such as health insurance requirements and copayments (Table 1).[9-13]

Table 1. Common barriers to healthcare in vulnerable populations and methods MHCs use to overcome these barriers

	Common Barriers	Typical MHCs
Logistical	• Lack of transportation • Distance to clinic is too far	• Travels directly to the community
	• Difficulty getting an appointment	• No appointment necessary • Navigator support provided
Financial	• Insurance required	• Intended to serve individuals without insurance
	• Copayments required	• No copayments required
Trust	• Poor patient-provider communication	• In community spaces
	• Low linguistic and cultural competence	• Often run by or in conjunction with people from the community and/or community health workers • Culturally and linguistically appropriate services

Adapted from: Hill CF, Powers BW, Jain SH, Bennet J, Vavasis A, Oriol NE. Mobile health clinics in the era of reform. *Am J Manag Care.* 2014;20(3):261-264.

MHCs affiliated with universities also present a unique opportunity to provide health sciences students with a chance for service learning. Service-learning and community engagement are excellent ways to develop collaborative skills while also bridging the gap between classroom learning and real-world experiences. Many student-run free clinics use an interdisciplinary approach that brings together disciplines such as medicine, social work, and public health.[14] Student-run free clinics provide student volunteers with a sense of ownership by allowing them to collaboratively organize and handle clinic logistics, helping them to develop sociocultural awareness and professional leadership abilities.[15] Working directly with underprivileged groups also allows health science students to dismantle unfavorable assumptions about individuals living unhoused. As such, student-run free clinics have the potential to build a more collaborative and culturally sensitive healthcare workforce, which helps to ensure that no person is discriminated against based on characteristics of personal identity and that all persons receive the high-quality care they deserve.

Review of the literature

Literature Review Methods

A literature review was conducted to better understand the landscape surrounding university-affiliated, student-run MHCs that aim to serve individuals experiencing homelessness. PubMed and Embase were searched from database inception to October 10, 2021. Search strategies can be found in the accompanying Appendix. The combined search strategy resulted in 214 unique publications and an additional 5 publications were identified via hand-searching. After reviewing titles, abstracts, and full-text publications, a total of 6 studies met the general inclusion criteria as displayed in Table 2 below.[14,16-20]

Table 2. Summary of inclusion criteria

Domain	Criteria
Population	• People experiencing houselessness • People living in tiny house villages • People residing within shelters • People not served by the traditional healthcare system (for various reasons such as lack of transportation, lack of insurance, or lack of trust)
Intervention	Mobile health clinics affiliated with a university
Comparator	Any or none
Outcomes	• Receipt of care that client would not have otherwise sought • Reduction in barriers to care • Number of community members served by the van and population characteristics • Number of times community accessed with the van each academic year
Setting	• Street medicine • Homeless shelters • Tiny house villages

Literature Review Results

It should be noted that there are other university-affiliated MHC programs in existence that are not mentioned in the peer-reviewed literature – those have not been accounted for here. Of the MHC programs identified by the literature, university affiliations included the University of California Los Angeles (UCLA), the University of California San Diego (UCSD), Touro University Nevada, Yale University, and the University of Iowa. The MHCs made visits to street corners, community centers, non-profit organizations, Catholic charities, Veteran's associations, homeless shelters, tiny house villages, soup kitchens, and needle exchange sites. Most vans operated two times per week, rotating between various locations.

Populations Served by the MHCs

Each MHC aimed to serve predominantly low-income individuals and individuals experiencing homelessness. Between 2012 and 2015, the UCLA MHC served 1,062 unique clients.[16] Between November 1991 and June 1993, the MHC at Yale University served 764 unique clients.[17] In 2017, the MHC at Touro University had 813 patient encounters.[20] And, finally, the University of Iowa MHC saw more than 2,275 patients from 2012 to 2019.[19] Based on these studies, student-run MHCs deliver a significant level of healthcare and other needed services to people experiencing houselessness, the uninsured, and other vulnerable populations.

Services Provided by the MHCs

The MHCs provided a broad range of services, though the majority focused on providing primary care, preventive care, health education, and connecting clients with resources and/or other health services. Some of the services provided included on-site urgent care, HIV-related care, pregnancy testing, blood pressure screening, immunizations, condom distribution, glucometer screening, and hepatitis C screening.[14,17,19,20] Only two of the MHCs explicitly mentioned prescribing medications to clients during the visit.[14,16] One of the MHCs provided a specialty clinic each month – including a hepatitis clinic, dermatology clinic, dental clinic, diabetes clinic, neurology clinic, cardiology clinic, and a mental healthcare clinic.[14] Almost all of the MHCs made referrals to appropriate and necessary health facilities for services that could not be provided on-site.[14,16,17,19] Only one of the MHCs mentioned providing a form of case management.[14] Commonly made diagnoses on the Yale MHC included upper respiratory

infections, cellulitis, abscesses, skin rashes, hypertension, lacerations, HIV-related illness, dental problems, and musculoskeletal complaints.[17]

Student Volunteers on MHCs

The type of student volunteers and their roles ranged widely across the identified studies, though most MHCs were interprofessional. The UCLA MHC staffed their van with medical students, undergraduate students, and graduate public health students.[16] At Yale University, the MHC is staffed by second-year internal medicine residents and public health students, in addition to non-student nurses, physicians, social workers, and substance abuse counselors.[17] The University of Iowa Mobile Clinic included student volunteers across eight health professional schools and the undergraduate campus. Similarly, students volunteering with the Student-Run Free Clinic Project at the University of California San Diego included medical students, pharmacy students, nurse practitioner students, predental students, acupuncture students, public health students, social work interns, and other pre-health professional students.[14] Unique to this program was the inclusion of a formerly homeless street-wise guide (non-student position). The MHC at Touro University Nevada was distinctive in that it only staffed its van with Physician Assistant students.[20]

Each MHC differed in terms of how students became involved with the van. Some programs were volunteer-based only, while others integrated the MHC directly into the curriculum. For example, rotation on the MHC is a mandatory part of the internal medicine residency rotation at Yale University.[17] At the University of California San Diego, any student who volunteers with their Student-Run Free Clinic Project is required to take an elective entitled Community Advocacy, which comprises a weekly reflective component, a series of didactic and experiential sessions, and the students' first five sessions at the clinic.[14] Other programs that did not integrate the MHC into the formal curriculum, did mention that student volunteers partake in a formal training program or orientation.

Role of Preceptors on MHCs

The role of the preceptor and their accreditations were poorly described across studies. Among those studies that provided this information, preceptors included attending physicians, faculty from pharmacy and medicine, nurse practitioners, and physician assistants. In most cases, clinical students would assess the patient, make a treatment plan, and then present the case to their preceptor. At this point, the preceptor and the student would then interact with the patient and discuss a treatment plan jointly, while the preceptor provided relevant teaching points to the student.

Effectiveness of Student-run MHCs

Evaluations of these MHCs have demonstrated that these programs are beneficial to both students and clientele. In a study of the UCLA MHC, 50% of the evaluated clients indicated that the van served as their primary source of care.[16] Similarly, 44% of users of the University of Iowa MHC specified that they did not receive any care outside of the MHC itself.[19] These data indicate that student-run MHCs serve as a primary source of safety-net clinics, providing care to individuals who might not otherwise receive it. Generally, clients also indicated a high level of satisfaction with the care they received. Clients using the UCLA MHC on average rated their satisfaction from 3.5 to 3.9 (across 8 indicators) on a scale of 1 to 4, with higher scores indicating greater satisfaction.[16] Additionally, 97% of the clients at the University of Iowa MHC rated their satisfaction with services as good or excellent, and 90% indicated that the students and faculty at the MHC were completely able to answer their questions and meet their needs.[19]

In a pre-post evaluation, students who participated in the free clinic elective at UCSD were more likely to have gained more favorable attitudes toward working with the underserved and people experiencing houselessness compared with students who had not taken the elective.[21,22] A study of student

reflections found that volunteering with the Touro University Nevada MHC improved students' understanding of patients experiencing homelessness, their medical needs, and treatment complexities.[20] While these studies demonstrate the effectiveness of student-run MHCs, it should be noted that there exists a paucity of peer-reviewed literature evaluating the impacts that these programs have on communities and students.

Description of UW Mobile Health and Outreach (UW-MHO) Program

Creation of the UW-MHO Program

In 2020, using funds from an anonymous donor, the University of Washington (UW) School of Medicine Service Learning Program purchased a basic sprinter van. After a collaborative effort between the UW School of Medicine Service Learning Program, the Center for Health Sciences Interprofessional Education, Research, and Practice (CHSIE), and other UW schools and programs within the Health Sciences, these groups garnered additional funds from a grant and fundraising efforts to retrofit the basic sprinter van into a fully operational MHC.[23] After this concerted effort, the UW-MHO Program finally came to fruition. The program has been in operation since Spring 2020 and is still considered to be in its pilot phase.

UW-MHO Program Goals

The UW-MHO Program is a collaborative endeavor housed within the UW Interprofessional Service Learning Program. The mission of the Interprofessional Service Learning Program is to "learn, teach, and collaborate alongside the next generation of healthcare professionals and communities, promoting health equity and justice for our neighbors with unmet health needs". In line with this mission are the three program objectives related to the UW-MHO Program.

1. To overcome barriers that prevent historically marginalized and underserved populations from accessing health services they have identified they need, mobile health van users will ensure at least 50% of clients served endorse that they received care they would not have otherwise sought.
2. To enrich health science students' classroom learning by offering experiences that give a broader context of patients' lives so they will provide more holistic and patient-centered care.
3. To ensure the building of health sciences students' skills in working collaboratively with interprofessional colleagues, participation in a Mobile Health Van project will result in a 20% improvement in post-experience team readiness scores.

The UW-MHO Program is part of a greater effort at the UW to offer students real-life experience while serving communities in need. The project provides interprofessional learning opportunities for health sciences students to engage with professionals and students from other disciplines and to connect what they are learning in the classroom to a community setting.[24]

Van Description

The UW-MHO Program van is furnished like a tiny clinic. It includes a clinical space with an exam table, privacy curtain, a sink, warm water, good lighting, counter space, and shelving.[23] There is a rooftop solar panel for supplemental electricity and an awning for extra protection from inclement weather. Supplies on the van include but are not limited to, a blood pressure cuff, wound care supplies, hand sanitizer, wipes, hygiene supplies, over-the-counter medications, and snacks.[25] All the features needed to provide adequate care to clients are included in the van.

Services Provided

The UW-MHO Program currently offers services such as examining a skin condition, checking blood pressure, assessing a wound, screening for diabetes, eye exams, foot care, and distribution of over-the-counter medication. At present, the UW-MHO Program does not currently provide scripts for prescription medications. Referrals are made for medical services that cannot be performed on the spot. As such, the van operates using more of a *screen and refer* model of care rather than the standard *diagnose and treat* model. Student volunteers provide health education and clients can select hygiene supplies, water, and/or snacks, among other items to take with them upon their departure.[25]

Population Served

During the time of this study, the UW-MHO Program primarily aimed to serve individuals experiencing houselessness in the University District (U-District) neighborhood of Seattle, Washington. Health sciences students bring the van to one of several outreach sites in the U-District on the 1st and 3rd Fridays of each month (from approximately 6:00 pm to 8:30 pm). Service location covers specific street zones and community sites within the U-District community. Historically, some commonly visited community sites included the Low Income Housing Institute's Tiny House Villages and ROOTS Young Adult Shelter. Formerly, the van also made weekly visits on Mondays to Tent City 3 when it was located in the U-District. Tent Cities are portable, self-managed communities of up to 100 homeless men and women, which are needed because there is not enough indoor shelter for all who need it in King County.[26] Although less common, the van may also make ad hoc visits to local health fairs and other community-based organizations. All services provided on the van are free of charge.

Students

The UW-MHO van is available for use to any interprofessional student group in UW health sciences, including those from medicine (including MEDEX students, UW's Physician Assistant Program), social work, public health, pharmacy, nursing, dentistry, physical therapy, and dietetics. Volunteers learn with, from, and about each other, while working side by side as they talk with patients — much in the way they will work together in their future careers.[25] While medical, pharmacy, physical therapy, and undergraduate nursing students volunteer to practice their clinical skills, the van also presents unique opportunities for non-clinical students as well. For example, social work and public health students worked on a project in conjunction with the van to develop improved approaches to resource navigation, and a dietetics student assisted with the creation of a scope of practice document to better understand what each profession does clinically at each stage of their training.[23]

Funding

Program operations are currently supported primarily through donations and supplies that are purchased with funds from the School of Medicine, CHSIE's Interprofessional Service Learning Program, and student group funds. University District Street Medicine (UDSM), a student-run, interprofessional, volunteer organization at the UW, holds an annual Supply Drive to accept item donations from the public and is presently (as of November 2021) holding a fundraiser to raise $20,000 for the van's medical supplies.[27] Student volunteers with UDSM are also currently in the process of applying for a grant that would be used to implement an electronic health record system into the van's operations. Ultimately, the hope is for the UW-MHO Program to be grant-funded and to expand the reach of the van, its equipment, and its crew as more funding becomes available.[23]

Key Stakeholders

In light of the present sociopolitical climate and diminishing levels of public confidence, stakeholder involvement has become an increasingly crucial channel for cultivating transparency. The Centers for Diseases Control and Prevention (CDC) describes stakeholders as people or organizations invested in the program, interested in the results of the evaluation, and/or having a stake in what will be done with the results of the evaluation.[28] Stakeholders can take varied forms to include individuals (e.g., target participants, policymakers, project managers, project staff, public officials), institutions (e.g., universities, faith institutions, media), federal and nonfederal agencies and sponsors (e.g., foundations, funders), organized groups (e.g., citizens' groups, think tanks, research organizations), and clients or other intended individuals/groups who would benefit from the project.[29] The following includes a list of stakeholders relevant to the UW-MHO Program:

- Health Sciences students
- People experiencing houselessness (clients)
- Residents of the University District neighborhood
- Community partners and their staff
    - Low Income Housing Institute
    - ROOTS Adult Shelter
    - SHARE / WHEEL
- University District Street Medicine (UDSM) (student-led interprofessional service-learning program)
    - UDSM leadership team
- UW Community Health Advancement Program (student-led service-learning program)
- UW Health Sciences Schools
    - School of Medicine, School of Public Health, School of Nursing, School of Pharmacy, School of Social Work, MEDEX, Physical Therapy
- Health Sciences faculty
- University of Washington Institutional Leaders
    - Deans of Health Sciences Schools
    - UW School of Medicine Leadership
- Center for Health Sciences Interprofessional Education, Research, and Practice (CHSIE)
    - Director of Interprofessional Education
    - Interprofessional Service Learning Manager
- UW School of Medicine Service Learning Program
    - Service Learning Manager
    - IPE Service-Learning Faculty Lead
- Members of the Interprofessional Service Learning Advisory Committee (IP-SLAC)
- Funders

Logic Model

To gain a better understanding of shared relationships between the UW-MHO program's resources, activities, outputs, outcomes, and impacts, a logic model was developed by gathering all information available on the program. Sources included the Mission and Visions Statements, goals and objectives, current program descriptions from websites, and news articles published about the UW-MHO Program. Stakeholders (described above) were also included in this process to ensure that the activities and outputs listed were classified appropriately, there was no major redundancy in the list of activities or outcomes, and no major outcomes or activities were missing.[24] Engaging stakeholders in this process

was important because a logic model that is relevant and useful for its intended purpose can only be produced via collaboration with important stakeholders.[29] Finally, logic models developed for other similar programs were also considered.[30] A working draft of the logic model is presented in the Appendix and a final version will be generated pending additional feedback and input from key stakeholders.

Program Evaluation

Evaluation Framework

This assessment utilized the CDC Framework for Program Evaluation in Public Health to guide the evaluation of the UW-MHO Program. The CDC Framework for Program Evaluation is a practical, nonprescriptive tool, designed to summarize and organize essential elements of program evaluation. The emphasis is on sensible, ongoing evaluation strategies that involve all program stakeholders, not just evaluation experts. This framework includes six steps: 1. Engage stakeholders, 2. Describe the program, 3. Focus the evaluation design, 4. Gather credible evidence, 5. Justify conclusions, 6. Ensure use and share lessons learned. Additionally, it lays out four standards for high quality and effective evaluations: Utility, Feasibility, Propriety, and Accuracy. Adhering to these steps and standards helped provide an understanding of the program's context and improved how the evaluation was conceived and conducted.[28,31]

Purpose and Use

The purpose of this study is to evaluate if the UW-MHO Program is effectively meeting its goals and to identify areas for improvement. A program's stage of development plays a crucial role in establishing a realistic evaluation focus. According to the CDC, there are three broad stages of program development: planning, implementation, and maintenance.[28] Seeing as the UW-MHO Program is still in its pilot phase, it lies somewhere between the implementation and maintenance phases; some small changes to its operations are still occurring. This bodes well with the CDC's view of evaluation as an ongoing activity over the life of a program.[28] Having a clear purpose for conducting an evaluation is crucial as it serves as the basis for the evaluation questions, design, and methods. The main motivations for evaluating the UW-MHO Program included:

- To determine the effects of the UW-MHO Program by providing evidence concerning the program's contributions to its long-term goals
- To generate new knowledge
- To improve and/or fine-tune existing program operations

The intended users of the results of this evaluation include the UDSM leadership team, the UW School of Medicine Service Learning Manger, and the CHSIE Director of IPE and Interprofessional Service Learning Manager. They will use the findings from this evaluation to:

- Monitor progress toward program goals
- Identify areas of the program that need improvement
- Solicit more funds and/or additional partners

Evaluation Questions

This study focused on evaluating the second and third objectives of the UW-MHO Program. Through collaboration with stakeholders, the following outcome-related, student learning key evaluation questions were developed:

1. Did volunteering with the UW-MHO Program improve student volunteers' self-perception of knowledge, skills, attitudes, and self-efficacy toward treating and working with people experiencing houselessness?
2. Did volunteering with the UW-MHO Program improve student volunteers' self-perception of interprofessional collaboration skills?

Evaluation Population

The population of interest for this evaluation included any student who volunteered with the UW-MHO Program at least once between its inception and December 31, 2021. University District Street Medicine maintains a database of past volunteers, which we used to identify the study population. We distributed the survey to 46 students (graduated or current) who had volunteered with the program at least once.

Evaluation Methods and Study Design

To answer the above key evaluation questions, this evaluation used an explanatory sequential (quan → QUAL) mixed-methods approach. As such, researchers first collected the quantitative data, followed by the qualitative data. The quantitative data and their ensuing analysis provided a general understanding of if a change occurred and to what extent, while the qualitative data provided context for the statistical results by exploring how and why the change did or did not happen. We emphasized the qualitative data and the quantitative data served to provide descriptive statistics. The UW Human Subjects Division determined that the proposed evaluation was not research, as defined by federal and state regulations. Therefore, review and approval by the UW Institutional Review Board were not required.

Quantitative Data

Data Collection

The quantitative data were collected via a student survey that researchers administered to 46 students who volunteered with the van at least once between its inception and December 31, 2021 (including students who had since graduated). We used a retrospective pre-post study design in which data were collected just once after participation in the program. At that time, individuals were asked to reflect on their previous level of knowledge/attitudes/skills/self-efficacy *before* volunteering with the program and then asked to assess their current level of knowledge/attitudes/skills/self-efficacy *after* volunteering.[29] This study design provided student volunteers with an opportunity to reflect on how much they have changed as a function of their work with the UW-MHO Program and may serve as a useful tool for overcoming response-shift bias.[32]

Outcome Measures

In 1997 researchers from UCSD conducted a review of the literature to identify common methods for assessing medical students' attitudes toward working with people experiencing houselessness. Unable to identify a well-validated survey instrument that met their needs, faculty with significant clinical experience in underserved medicine decided to develop their own. Their efforts resulted in the design of a survey with nine statements, each followed by a seven-point Likert scale.[21] In 2014, Smith et. al. modified the original survey to include seven additional statements regarding the care of underserved women, children, and minority families and to eliminate one item from the original survey.[22] This resulted in a survey instrument with 15 Likert-scale items, including five specifically related to people experiencing houselessness. This survey demonstrated high internal reliability.[22] For this evaluation, we included only the five items related to people experiencing houselessness (one knowledge item, one skills item, and three self-efficacy items) as well as one item each related to students' interest in working

with the underserved and interest in primary care. The survey items concerning unserved minority families, women, and children were not included because key stakeholders indicated that these populations were not high utilizers of the van and therefore student volunteers would not have had much experience working with these populations. In addition to this instrument, the student survey also utilized the 10-item Team Readiness Survey to assess student's collaboration skills. Both instruments used a 7-point Likert scale (1="not at all", 4="to a moderate extent", 7="to a great extent"). Students were also asked to provide demographic information at the end of the survey including age, self-identified gender, race/ethnicity, the number of times they volunteered with the UW-MHO Program, experience working with people experiencing houselessness prior to volunteering, and their health sciences program and degree. A sample copy of the student survey can be found in the Appendix.

Data Analysis Methods

We used Research Electronic Data Capture (REDCap) tools to collect and manage data from the student survey and all statistical data analyses were completed using Microsoft Excel.[33,34] The median and interquartile ranges for each survey item were calculated for both pre- and post-volunteering timepoints. Each survey item was assessed separately. Because the results of the survey were used to conduct the qualitative interviews, survey results were not kept anonymous.

Qualitative Data

Data Collection

Following the completion of the quantitative data collection and analysis, an evaluator conducted semi-structured interviews which were used to help explain and elaborate upon the quantitative findings. Results from the quantitative data analysis were used to help plan for the follow-up qualitative data collection phase. Purposive sampling was used to identify those students who volunteered with the UW-MHO Program two or more times. This cut-off was chosen as key stakeholders felt that those who volunteered with the van at least twice would have more information to provide evaluators.

Instrumentation

Students who completed the survey and indicated having volunteered with the UW-MHO Program at least twice were invited to serve as key informants and asked to participate in a semi-structured interview. A copy of the semi-structured interview guide can be found in the Appendix. The primary author conducted the semi-structured interviews using Zoom. Video was not required of the participants. Participants were informed that the meeting would be recorded and that closed captioning was enabled so that the audio of the interview could be automatically transcribed. The automatic transcription was then downloaded and cleaned, which then served as the main interview transcript.

Data Analysis Methods

All qualitative data analyses were conducted using Dedoose.[35] To assess the qualitative data, we used a combination of both inductive and deductive analysis. In terms of deductive analysis, some codes were predefined and developed based on the questions asked during the quantitative data collection phase of the study. These codes were based on the theory that the UW-MHO Program was created in part to improve students' knowledge, skills, attitudes, self-efficacy, and interprofessional collaboration skills. Aside from these predefined codes, the qualitative data analysis was inductive in that detailed readings of the raw interview transcripts were used to modify and add to the codebook as needed. Strategies included open coding and in vivo coding (codes developed from participant's own words).[36] In this way, we used a conventional approach to content analysis.[37]

The analytical process followed the following steps: a researcher familiarized themselves with the data, generated codes, finalized the code book, systematically applied coding to all data, organized codes into larger categories based on similarity, and ultimately established themes.[38] To assess the degree of consistency in how codes were applied, a second reader also independently and blindly coded a subset of the transcripts. The overall inter-coder reliability (ICR) was then calculated. The second coder did not independently come up with their own codes, rather they applied the codes generated by the first author.

Quantitative and Qualitative Data Integration

Integration of the qualitative and quantitative data during the analysis and interpretation of the data occurred via a narrative approach. The data are presented in a contiguous manner in that the quantitative and the qualitative findings are presented in separate sections with a subsequent section on how these data converge or diverge.

Evaluation Findings

We distributed the survey to forty-six students (graduated or current) who volunteered with the UW-MHO Program between its inception and December 31, 2021. In total, nine students responded to the survey (19.6% response rate). Two students responded anonymously and therefore were unable to be followed up for the qualitative portion of the evaluation, though they would have been eligible based on the predefined criteria for serving as a key informant. The remaining seven respondents also qualified to serve as key informants as they all indicated having volunteered with the UW-MHO Program at least twice.

Demographic data for the nine survey respondents are shown in Table 3. The majority of survey respondents were female (78%), white (56%), and non-Hispanic or Latino (100%). The mean age of the survey participants was 30.8 years and ranged from 20 to 58 years. The majority (78%) of respondents had prior experience working with the unhoused population and all respondents had volunteered with the UW-MHO Program at least twice, with 44% of respondents indicating they had volunteered 8 or more times. Additionally, of note, three of the nine survey respondents indicated during their qualitative interview that they previously or currently held a leadership position related to the UW-MHO Program. The professions that the survey participants were training for included Nurse Practitioner (11%), Physician (11%), Physician Assistant (22%), Public Health Practitioner, (33%), and two undergraduates on the pre-med track (22%). Professions not represented in this study population include Dentists, Dietitians, Health Administrators, Nurses, Occupational Therapists, Pharmacists, Physical Therapists, and Social Workers.

Table 3. Participant Demographics

Characteristic	% (n/N) or Mean (SD)
Age	
Mean age, years	30.8 (11.4) (range, 20 to 58)
Gender	
Female	78% (7/9)
Male	11% (1/9)
Genderqueer or genderfluid	11% (1/9)
Race	
White	56% (5/9)
Asian	22% (2/9)
Black or African American	11% (1/9)
More than one race	11% (1/9)

Characteristic	% (n/N) or Mean (SD)
Ethnicity	
Non-Hispanic or Latino	100% (9/9)
Prior experience working with the unhoused population	
Yes	78% (7/9)
No	22% (2/9)
Number of times participant volunteered with UW-MHO Program	
Once	0% (0/9)
2 to 3	22% (2/9)
4 to 5	22% (2/9)
6 to 7	11% (1/9)
8 or more	44% (4/9)
Profession for which student is training for*	
Public Health Practitioner	33% (3/9)
Physician Assistant	22% (2/9)
Undergraduate pre-med track	22% (2/9)
Nurse practitioner	11% (1/9)
Physician	11% (1/9)

* Other professions listed on the survey but not represented in the study population included Dentist, Dietitian, Health Administrator, Nurse, Occupational Therapist, Pharmacist, Physical Therapist, and Social Worker.

Student Survey Results

Results of the student survey are provided in Table 4. The survey included 17 items in total falling into one of four categories: self-perceived knowledge (1 item), self-perceived clinical skills (1 item), self-perceived self-efficacy (3 items), interest in working with the underserved and primary care (2 items), and interprofessional collaboration (10 items). Scores on each item could range from 1 to 7, with lower scores indicating 'not at all' and higher scores indicating 'to a great extent'. The median score across all survey participants increased by greater than 1 point from pre to post-evaluation on five of the seventeen survey items. On nine items, the median score across all survey participants increased by exactly one point, and only on three items did the median score not increase at all.

Students' degree of knowledge about the problems faced by people experiencing houselessness increased after volunteering with the UW-MHO Program. Although the median score increased by just 1 point, the lower bound of the interquartile range increased from 3 to 6, signifying higher post-volunteering scores overall compared to pre-volunteering scores. Clinical skills and self-efficacy also demonstrated improvement. Specifically, the median scores for all three self-efficacy-related items increased by greater than 1 point. After volunteering with the UW-MHO Program, students had a greater interest in working with the underserved, however, their interest in working in primary care remained unchanged. The median score on eight of the ten items related to interprofessional collaboration increased by at least 1 point. The two interprofessional-collaboration-related items that demonstrated no pre-post change in median score included "ability to share and exchange ideas in a team discussion" and "belief that the best decisions are made when team members openly share their views and ideas". However, most participants provided high pre-volunteer scores for both of these items, allowing little room for improvement. Notably, the post-volunteering interquartile range was 6 to 7 for all ten of the interprofessional-collaboration-related. This indicates that at least 75% of survey participants scored these items at 6 or 7 after volunteering with the UW-MHO Program.

Table 4. Student Survey Results

Survey Item	Pre-volunteering Score	Post-volunteering Score
	Median (IQR)	
Knowledge		
My degree of knowledge about the problems of people experiencing houselessness.	5 (3 to 6)	6 (6 to 6)
Clinical Skills		
My clinical skills regarding the problems of people experiencing houselessness.	4 (2 to 5)	5 (4 to 6)
Self-efficacy		
I feel capable of caring for people experiencing houselessness	4 (2.75 to 7)	5.5 (5 to 7)
I feel comfortable caring for people experiencing houselessness.	4.5 (3 to 5)	6 (5 to 6)
I believe I can make a difference in the care of the underserved.	4 (3 to 6)	6 (5 to 7)
Interest in working with underserved / primary care		
My interest in working with the underserved.	5 (4 to 7)	7 (6 to 7)
My interest in working in primary care.	5 (3 to 6)	5 (4 to 6)
Interprofessional collaboration		
I have a clear understanding of my role on an interprofessional team.	5 (4 to 6)	6 (6 to 7)
I am able to describe my professional role to another team member.	6 (5 to 7)	7 (6 to 7)
I understand the roles and practices of other professions in caring for patients.	6 (4 to 7)	7 (6 to 7)
I am able to share and exchange ideas in a team discussion.	6 (5 to 6)	6 (6 to 7)
I am comfortable sharing responsibility for patient care with other professionals on a team.	5 (5 to 6)	6 (6 to 7)
I perceive myself as someone who successfully engages in interprofessional collaborative practice.	5 (4 to 6)	7 (6 to 7)
I encourage the voices and opinions of all colleagues across professions to be heard in team conversations.	6 (5 to 7)	7 (6 to 7)
I am curious to learn more about the knowledge and skills of colleagues in other health professions.	5 (5 to 5)	6 (6 to 7)
I show my appreciation to colleagues from other professions for their skills, expertise, and contributions to the team.	6 (5 to 7)	7 (6 to 7)
I believe that the best decisions are made when team members openly share their views and ideas.	6 (5 to 7)	6 (6 to 7)

Semi-structured Interviews Results

We interviewed seven of the nine survey respondents using a semi-structured interview guide. All interviews were conducted by the primary author and lasted an average of 24 minutes (ranging from 14 to 29 minutes). The students interviewed were studying for the following professions: public health practitioner (3 students), physician assistant (2 students), nurse practitioner (1 student), and an undergraduate on the pre-med track (1 student). The coding process and thematic/content analysis are further described below.

Our original code book included five codes based on the questions administered during the quantitative student survey. These codes included knowledge, skills, attitude, self-efficacy, and interprofessional collaboration. After reviewing the raw transcripts, an additional 19 parent codes and 4 child codes were added to the codebook. A copy of the codebook can be found in the Appendix. Once codes were established, the primary author coded all the transcripts and then a second author blindly applied codes to a subset of the transcripts. Inter-coder reliability was calculated and found to be 0.60 signifying moderate consistency and validity. In total, 320 codes were applied across all seven of the transcripts, with an average of 47 codes applied to each transcript (range 31 to 55). The most commonly applied code was 'knowledge', which appeared in the transcripts 35 times. Following the applications of codes, the primary author organized these codes into larger categories based on similarity and ultimately established themes. In total, six key themes emerged from the qualitative data and were centered around the following topics: Knowledge, Skills, Attitude, Interprofessional Collaboration, Preceptors, and Improvements. These themes are further described below.

Theme 1: Knowledge

Students who volunteered with the UW-MHO Program acquired information and knowledge in two primary areas: barriers to healthcare experienced by the unhoused population and medical conditions faced by the unhoused population.

Across all of the interview transcripts, the 'knowledge' code co-occurred with the 'barriers' code, 'resources' code, and 'stigma' code, 10, 8, and 4 times, respectively. Several participants mentioned that volunteering with the UW-MHO Program exposed them to the realities of living unhoused and the many barriers that this population faces in terms of accessing healthcare. Barriers noticed by participants included medical mistrust, lack of physical access to healthcare, difficulty navigating complicated systems, financial barriers, history of being discriminated against, transportation issues, inability to store refrigerated medications, lack of technological literacy or access to the internet, and English as a second language. Students learned of these barriers either through direct conversations with clients and/or observation. One public health student (female, 25) stated the following:

> *And then I also think I learned a lot about just like the difficulties of navigating different housing and healthcare and employment and disability services – it's a really complicated system, all of those systems. And it's really hard to navigate when you have limited Internet or phone access or limited technological literacy or maybe speak English as a second language. Or have had previously traumatizing experiences with those systems. I think that just understanding how hard it is to actually make those systems work for every person. That was something I did not know coming in.*

Hearing first-hand experiences directly from individuals living unhoused appeared to help students fully comprehend the healthcare barriers faced by this population. One of the physician assistant students (female, 27) alluded to this in the following statement:

> *I would say working through the van I learned a lot just because you are first-hand getting that exposure while working with this this type of population. And so, […] they come to you with real life experiences such as, […] where they're going to store their medication for the night, you know if someone has insulin and needs it to be refrigerated. Or you know transportation issues getting appointments and things like that. So, I learned a lot about [the] nuances of homelessness that I didn't fully understand until I was just having these real conversations.*

Additionally, students recognized the need to address these barriers and how the UW-MHO Program serves in part as a way to do so. Multiple students mentioned how one advantage to the van was in its ability to meet people where they are at and potentially help to alleviate some of the discrimination and biases that occur when the unhoused population attempt to seek healthcare. One of the public health students (female, 30) spoke to this point below:

> *I think that it (volunteering) really opened up my eyes around barriers to accessing healthcare and just I think that's an element of the van that we shouldn't take for granted. Just like the opportunity to be able to connect with people where they are. [Also], a lot of people spoke with (sic) these experiences of discrimination when seeking medical care. […] It's just like thinking about the ways in which we need to be creative to really address barriers to access and care and how important that is and how we can't be overlooking the folks that are most marginalized by this healthcare system that we have.*

In addition to increased awareness of the barriers to healthcare faced by the unhoused population, students gained knowledge concerning the unique and most common medical conditions faced by the unhoused population. Commonly mentioned medical conditions/concerns mentioned by students included chronic disease management (i.e., diabetes), footcare, wound care, and dental hygiene. One physician assistant student (female, 27) stated the following related to this topic:

> *Yeah, I would say specifically on the van we do a lot of wound care, glucose checks, [and] foot care. And it's just a lot of like health care needs that I wasn't aware of before. You know we spend so much time on our feet and I think I definitely learned how valuable foot care can be, especially for these unhoused individuals.*

Another public health student (female, 30) had a similar realization:

> *I think I grew a little bit of awareness around just like how hard living unhoused can be on the body and like take tolls on things. Like kind of causing chronic diseases as well as just like the management of chronic diseases when you don't have access to healthcare. And, like the challenges that are associated with that. As well as just like the stress of being unhoused. And I think something that I had I hadn't thought about as much, but just like saw as like a recurring thing is like foot care and like how important that is.*

Commonly, statements related to the medical conditions faced by the unhoused population and their barriers to accessing healthcare were coupled with comments about recognizing the need for affordable housing and how “housing is healthcare”. This indicates that volunteering with the UW-MHO Program may have also provided students with an ability to “see the big picture” and perhaps some level of systems thinking.

Theme 2: Skills

Most student volunteers felt that the UW-MHO Program did not provide adequate opportunities to practice or improve their clinical skills. However, the UW-MHO Program did provide them with the opportunity to acquire and practice other types of skills that are advantageous to a career in healthcare.

We applied the 'clinical skills' code a total of 13 times and the 'other skills' code a total of 9 times. Only one transcript did not have a 'clinical skills' code applied to it. Also of note, the 'skills' code and the 'communication' code co-occurred 7 times across 5 transcripts. Most participants indicated that the van did not provide them with adequate opportunities to improve on or practice their clinical skills. One nurse practitioner student (male, 58) even explicitly mentioned that he thought the volunteer experience should have been more experiential and action-oriented:

> *I thought we were gonna (sic) do more like hands on like people going like a spot check, just, you know, blood pressure, heart rate, maybe quick listen to their, you know, heart and lung sound, but it really is like handing out more resources or directing people to and connecting people to resources. I did do some checks; you know foot checks for people with diabetes. But I thought it would be more hands on, and I think there's an opportunity for more hands on.*

Participants mentioned that although the UW-MHO Program utilizers did come to the van with clinical concerns, there was a consensus that there typically wasn't a whole lot that could be done for them on the van. As such, volunteers typically resorted to referring clients to other clinics and providing additional resources. When participants did make mention of clinical skills, they included the following: check of an inflamed limb, blood sugar check, foot care, and wound care. Some limitations to providing clinical care stated by participants included privacy issues and technicalities related to licensing.

Although participants did not feel that their *clinical* skills improved after volunteering with the UW-MHO Program, several participants cited improvements in other skills such as interpersonal skills and "soft skills" (i.e., those attributes that enable individuals to interact effectively and harmoniously with others). Some of these skills included how to build trust, effective communication, body language, approachability, resourcefulness, interviewing techniques, documentation, and critical problem-solving. Some examples of these are laid out below.

A public health student (female, 25) on interviewing skills:

> *I think yeah learning how to sort of ask the right questions or really open ended questions or wait an uncomfortable amount of time for responses, or you know things like that. You know and talking to people who are in crisis or have you know a serious mental illness or are just going through a really, really hard time. I got a lot of practice doing that and learned a lot about that, and I think that's useful in all areas, but I think it's really useful in working with unhoused populations, because that's you know almost always the case somebody is almost always having a really hard time so that was super valuable.*

A public health student (female, 34) on body language:

> *But she was giving me tips like […] if someone comes and wants something, your body language…don't stand like this…don't put your hand there…like if they tell you ok I need hand sanitizer, and this and that…gather it but don't like, don't even like, don't offer to*

put it in their bag for them because […] someone can perceive you as being invasive of their space or you can even put your hand in someone's bag and you could get hurt like they might have sharp objects. (Public health student, female, 34)

A physician assistant student (female, 27) on problem solving and resourcefulness:

Because on the van we don't carry as many supplies as maybe an ER would […] you just kind of have to work with what you have, and I think that's a really good skill in medicine in general to have. […] You just see what you have and how you can help, and even if that just means you know you have like a bandage or something you've got to make that work somehow with limited resources and that's a lot of like critical thinking and problem solving that I think you can't learn (sic) through just like reading a book.

A public health student (female, 34) on trust and approachability:

So, I think from for me as an epidemiologist, I did pick up cues around if I had to work with this community, like how would be the best way to approach them and to build trust.

Finally, one nurse practitioner student (male, 55) suggested that volunteering with the UW-MHO Program sparked his interest in learning a new skill. Through volunteering with the UW-MHO Program, he recognized the importance of being able to speak another language as a medical provider, which spurred him to relearn and practice Spanish:

I […] used to speak fairly fluent Spanish because I worked in Spain, […] but I had someone from Mexico, so a lot of idiomatic difference in what word choices, so it triggered me to go back and get a book on, you know, North American Spanish so that I'm not saying something like you know back from Spain, Spanish. So, it just kind of pointed out that it's a continuing skill, language and medical language, especially, as you know, it's constantly changing, so it was a good trigger to remind me.

Although the majority of participants did not feel that volunteering with the UW-MHO Program improved their clinical skills, the volunteering experience did provide them with adequate opportunities to acquire and practice other skills that are crucial to a career in healthcare, especially those skills that are important when working with the unhoused and other vulnerable populations.

Theme 3: Attitude

Volunteering with the UW-MHO Program led to increased perspective, empathy, and comfortability in working with the unhoused population.

We developed this theme primarily based on data associated with the 'attitude' code, which we applied 13 times across all 7 transcripts. Some data from the 'self-efficacy' code (applied 3 times across 2 transcripts) and the 'prior experience' code (applied 17 times across 6 transcripts) also informed the development of this theme. Co-occurrence of the 'attitude' code and the 'prior experience' code arose 6 times across 4 interviews. Many participants mentioned that because of their prior experiences they already had a positive attitude/feeling toward the unhoused population before volunteering with the UW-MHO Program. As such, the UW-MHO Program did not specifically provide them with a new perspective on homelessness. The experience did however reaffirm their decision and desire to work with this population. The few students who did not have much prior experience working with the unhoused population did comment on how their perceptions of individuals experiencing houselessness changed after volunteering with the UW-MHO Program. For example, one public health student (female,

34) who had a prior negative experience of being “robbed” by someone living unhoused discussed how volunteering with the UW-MHO Program helped her break down the walls she had built up from that prior negative experience:

> *Well, I hadn’t really had experience caring for people with homelessness. Where I come from…I mean honestly, I was telling my friends I was surprised that in the US you have this amount of people experiencing homelessness. I'm an African and where I come from dynamics are kind of different. […] Most of the times we do find people around in the street but it's people who have like mental health disorders maybe people who act schizophrenic or other communities are like I know this is a really bad person. So, like really bad like picking stuff from the trash to eat – those are the kind of people you would find in the street but not someone who is like healthy and you know has all their reasoning and difficulties for experiencing homelessness. So, for me, this was new. This was new, honestly. Like I said, I've worked in settings where I have been robbed before by someone who I knew was struggling from an addiction and I was thinking ok but then I had to realize well it's not everybody with homeless (sic) that is really struggling from an addiction (sic) and vice versa and it's not good just to put everybody in one box. They're like different strains of people within this large umbrella of people that we are looking at.*
>
> *So, this experience that I've had in the van, I think it kind of just helped bring down my guards towards people that I might perceive as experiencing homelessness when I just realized, […] and this is within the context of the US, it's not necessarily because they're struggling with an addiction and would not mind hurting you to get money to for the addiction. It can be driven by different things. It can be driven by you know that their actual financial situation at that moment, you know it could be driven by a lot of things. So, I feel like it kind of brought down my guards and sure like even though they are experiencing homelessness they're not always like aggressive, no, lot of times they're not really. Like they might be mentally or emotionally not very stable at times but they're not aggressive like they just want to hurt you or rob you or things like that and yeah so it brought down my guard kind of.*

Another public health student (female, 25) who mentioned not having an attitude in the first place explained that the experience provided a more in-depth and holistic view of the problems unhoused populations face, ultimately giving her a better idea of how health sciences professionals can help:

> *I don't know if it (volunteering) changed it (attitude) so much as it sort of like developed in the first place. […] I just didn't have that much context going in and I hadn't thought about it (homelessness) that much before. So, […] I had some preconceived notions but I just didn't really know what I was getting into. But I think that you know through doing that (volunteering), then I was really able to develop, I think a more in depth and more holistic view of the problems unhoused populations face, and then you know what clinicians and health sciences folks can do to help.*

Finally, another public health student (female, 30) realized that before volunteering with the UW-MHO Program she had primarily thought about the unhoused population in the service receiving position, but that through her volunteering experience she realized that the unhoused population is a thriving community built on mutual aid and self-government.

> *I think from that experience of spending time with Georgetown tiny house village I learned a lot more about just the ways in which these populations are able to advocate for themselves, how they have like their own cultures and like ways of like kind of self-governing, and like providing services within their community, and like performing mutual aid in a way that I thought was really beautiful.*

Generally, students also felt that their experience volunteering with the UW-MHO Program contributed to an increased level of comfort in providing care for or working with the unhoused population. This is likely a contributing factor toward the UW-MHO Program increasing students' self-efficacy.

Theme 4: Interprofessional Collaboration

Volunteering with the UW-MHO Program led to an increased understanding of other professional's roles on the team and how all team members must work together to achieve their commonly shared goals of providing clients with the care and resources they need.

We developed this theme based on the following codes: 'interprofessional collaboration', 'knowledge', 'student types', 'relationship building', and 'networking'. Each of these codes was applied 18, 35, 13, 9, and 7 times, respectively. Notably, the code 'knowledge' co-occurred with 'interprofessional collaboration' 7 times across 5 transcripts and with 'relationship building' 8 times across 5 transcripts. Student volunteers commonly spoke about the advantageous services that other disciplines could provide to the clients. One public health student (female, 30) noted the importance of pharmacy students being able to give recommendations for the cheapest over the counter options for clients:

> *I got a better understanding of pharmacy as well and, like the ways in which pharmacist do play like a direct service role like being able to speak to different even over the counter medications.*

Another public health student (female, 25) stated that she regularly noticed that the social work students were the "MVPs" of the team:

> *I think I learned the most about what social work does because I think I had the least experience with that coming in. I had pretty good experience with health care in general and then public health through my program but less with you know social work and the school of social work. So, I don't know if I was surprised, but I regularly noticed that they were sort of the MVP of the team. And I know we advertise it, as you know, street medicine, and so it draws a lot of clinical professions, but some of the most valuable services weren't actually clinical services and so having social workers there was amazing.*

Similarly, a physician assistant student (female, 27) made parallel comments about both the role of social workers and pharmacists:

> *I didn't really know a lot about like what pharmacy students do or the role, I guess, like I've always worked with social workers in the ER but, like you know learning about how social workers interact with the community on a community level was also new to me. So, I definitely learned a lot about like different roles and how these different careers can do different things in various settings.*

Finally, a nurse practitioner student (male, 55) mentioned how helpful it was to have social work and public health insight to understand the resources available and to provide knowledge of how the system works to patients.

While participants did not comment on whether their volunteer experience improved their perceptions of themselves as collaborators, students did gain awareness of the roles of other healthcare professionals in a collaborative team. One public health student (female, 25) spoke positively about her experiences working with students from other health sciences disciplines.

> *But it was really nice to see it in action and actually get to work with people in different professions than myself. The van definitely draws a lot of different disciplines. I actually got to work with those people [from other disciplines] and see what it is that they do, what skills they bring to the group, and how we can all use our individual roles and skills to provide pretty comprehensive services for people. So how can we provide the social work side, how can we provide medications, counseling, all of that kind of stuff. It was really nice to see it in action and actually get to meet some people who are doing it.*

While students demonstrated an increased understanding of the roles of other health professionals, one public health student (female, 30) stated that "most of that learning came through just like informal conversations, while you're standing around, though", indicating that the knowledge gained may have resulted more from the opportunity to converse with other health professionals and less about the experience of volunteering itself. This student did however, have extensive prior experience working on interdisciplinary teams:

> *I think as someone in public health and also public administration, I tend to work on pretty interdisciplinary teams just naturally. So, for me that wasn't such a radical concept, but I could see it being like really meaningful for folks that were like MED students or nurses that were a little bit more siloed within their specific disciplines. […] But for me, I work with people from all kinds of different disciplines and so like I understand that was a big focus of the van, but, for me, I didn't really feel like that big of a deal.*

She also mentioned that, although she had experience working interprofessional, at times, she felt unsure of her role as a public health professional on such a clinically focused team.

> *As a public health student, there's always that kind of a moment of like what can I do in this moment? Like I can't actually do any kind of medical care and I'm not a social worker. And you start to really kind of realize like oh I don't I don't actually have much value as a direct service provider within my own specific profession. But I can say hi to people, and I can like set up the table really nice and like stuff like that, so I think like the public health role it feels important yet, […] it never really felt like we fully understood why we were there or how it could be helpful. But also, like, I still feel like public health has a role it just needs to be figured out a little bit more clearly.*

Volunteers generally felt that there was a good mix of disciplines each time they volunteered, however, there was an expressed desire to work with more students from dentistry, health systems and policy, epidemiology, pharmacy, and PT/OT.

Theme 5: Preceptors

Student volunteers had mixed experiences with preceptors.

The 'preceptor' code occurred a total of 16 times across 6 of the transcripts. The most common co-occurring code with 'preceptor' was 'improvements' (co-occurred 3 times). While most students had positive interactions with the preceptors while volunteering with the UW-MHO Program, some students

mentioned a need for the preceptors to teach more and others wished that the preceptor made more of an effort to instill community amongst the group. One physician assistant student (female, 27) stated:

> *I think we need some preceptors who are willing to teach. I mean some of the ones that are like lifers are going to be onboard for a really long time and like their great then some preceptors aren't. They don't teach as much, and so I wish we had like more preceptors who we're willing to do that.*

Similarly, another physician assistant student (female, 26) also commented on the benefits of working under a preceptor with good teaching skills:

> *When I did one of the street medicine ones, the preceptor who did that was like really good at asking a bunch of like kind of like quizzing questions and stuff like that, like Oh, what would you have thought if they like presented like this, or something like that. […] I think that yeah just like having a little bit more of like challenge would be nice.*

> *I felt like the first time I volunteered, the provider we were working with was like super engaging with us and really helpful and then the other time they were kind of like off talking to their own patients […] and then there was a couple of us like on the outside of the van who were seeing patients, so it was just like a little bit less of like a full community feeling.*

Additionally, one nurse practitioner student (male, 58) emphasized the need for greater consistency among preceptors:

> *I think a penalty from being like from COVID and the pandemic over the last year that I've seen is that the foot clinic that we were able to do through a separate facility was very active, but the van was having staffing turnover and leadership turnover, so I think it's really core to have a consistent leadership group and maybe the same preceptor and or outreach coordinator each night that they're there, instead of having it rotate so that there is continuity.*

On the other hand, there were also mentions of positives. Several participants indicated that the preceptor provided them with ample networking opportunities. One nurse practitioner student (male, 55) stated:

> *I probably got the most from a couple of contacts that I made with faculty that we're precepting and mentoring and that actually turned into a continuing involvement with the One Health Program.*

Another public health student (female, 34) had a similar experience in that the preceptors were open to networking and helping her to connect to additional opportunities:

> *Some preceptors will even tell students if you're looking for this and this opportunity, please feel free to shoot me an email after this, you know, so it was nice getting to explore and getting to see what others are doing and stuff. I think it was a great experience.*

One of the public health students (female, 25) spoke highly of her encounters with the preceptors:

> *The preceptors are great. A lot of them are quite experienced with sort of street medicine or working with similar populations. Particularly like when we were about to go into a situation or afterwards…debriefing…they could give a lot of contexts…so they*

could let us you know, like how often do they see this problem, what would you usually do in a clinic versus what do you do on a street. They also were really supportive in sort of doing a general debrief at the end. You know, letting people talk about how did they feel (sic) about the experience, like what did they learn, and not necessarily just like clinical things that they learned, but just what are they learning about the experience through volunteering. And there were also really helpful when we got into some you know tighter situations because it is sometimes a riskier place to give care and they were really great about navigating that, and you know, helping make sure everybody is safe and comfortable and supported when some of the harder things happen.

Another public health student (female, 30) felt that the preceptors were supportive and demonstrated tremendous patient-center care:

They're (the preceptors) all super great. I think that they played a really important role in terms of like when students maybe felt like a little hesitant about something they were generally really willing to kind of be like okay, maybe we should try this and I think the people that would volunteer with the van - like I don't know if there was like some sampling bias there in terms of just like people that had like really incredible like patient centered care approaches to medicine or like we're just like comfortable working with these populations or if they're just like generally really nice people – but I think it was really cool to see the ways in which they just treat…like they treated everyone with so much dignity and so much compassion and that was awesome.

While preceptors did a good job of facilitating networking and connecting students to other opportunities improvements could be made in terms of providing increased opportunities for teaching. However, based on participant comments it does appear that at least some preceptors are doing this adequately. Finally, one student requested that the same preceptors volunteer with the van over time so that there is some consistency (both for patients and clients).

Theme 6: Improvements

Improvements suggested by participants do not fall into any one specific category but rather point to several potential shortcomings in the current operations of the UW-MHO Program. The suggestions for improvement should be considered a starting point for further exploration of ways to improve the UW-MHO Program.

We applied the code 'improvements' a total of 19 times across all 7 transcripts. Aside from the improvements already mentioned above (see Theme 5 – need for more preceptors who are willing to teach; and Theme 1 – increased hands-on opportunities), participants suggested several other possible areas of improvement. For one, many volunteers appeared to hear about the van by happenstance. One public health student (female, age 34) stated the following:

I found out about the van because I was passing on the street and I saw the van and I was curious, but I had never really picked up any notices about it through the School of Public Health newsletters or the communications team or stuff like that. I just saw the van on the street and I got curious about it.

Another nurse practitioner student (male, 55) also mentioned the following about how he heard about volunteering with the UW-MHO Program:

It was kind of circuitous. It was during the ABSN program last year and two of the people that I volunteered with at King County COVID response were doing the foot clinic, and so, then I realized, it was in my Canvas – U-district street medicine – as an option that was loaded, and I just hadn't seen it, so I explored it then just got involved.

Additionally, there appear to be difficulties in terms of the logistics of signing up to volunteer and the timing and availability of opportunities. One nurse practitioner student (male, 55) stated:

You get really enthusiastic people at the beginning of the quarter signing up (to volunteer) through like maybe the whole course the quarter so maybe not everyone gets a chance to participate. And then things happen or they get exhausted and tired and then they're having to change later on in the program and cancel, and at that point then everyone else has already made plans. So, some kind of way of breaking that up so everyone gets a chance and it's not like shuffle turnover.

One undergraduate on the pre-med track (female, 20) also commented on the difficulties of getting signed up to volunteer:

I would just say the scheduling is just like it's a little funky. Like I'm never too sure if, like it saved or not so. If you put your name in the scheduling, you don't really get a notification…like it will usually go to your spam folder. It's not like too accurate if it's saved or not and then you won't like get an email like reminder of it and that's a little bit like hard.

Another physician assistant student (female, 26) expressed similar concerns:

We'd get like the email for the month and then yeah it was like basically always full unless you did it (signed up) like that weekend, or like […] within those [first] couple days. And so, you really had to just jump on it. And then you could sign up for being a backup person. And sometimes those were open, but I never did that because I just didn't know if anyone would cancel. I wish that there was like more opportunities because I would sometimes see I'd want to sign up and then it would already be full or something.

In addition to scheduling issues, student volunteers expressed how it would be advantageous to foster long-term partnerships with community-based organizations and to provide services in concert with those organizations. For example, one public health student (female, 25) brought up the following:

So, every once in a while, we would work with University Heights when they had a clothing drive and we would get you know, clothing and warm weather gear from them that we could then bring you know further out than just their area. So, I think that the van could really work with a lot of different groups in the University District area to expand services.

Finally, one public health student (female, 30) advocated that more focus be placed on the community being served and less focus be placed on the van as a student learning opportunity:

I think a lot of times the van was positioned as like a learning opportunity for students, which I think is really important, but sometimes it felt and maybe it was just like the early days, when we were trying to like get continued funding and like prove this program was working. But I think sometimes it got lost that we were there to provide a service to community members and so just like I want to like call out that tension sort of between the two were like sometimes in the conversations around like administrating

the van it felt a little bit more like: How do we make this a good experience for students, as opposed to like: How do we make this a good experience for the people we're serving. And like there weren't any like major like red flags that came up, it was just like there was a tension between the two, and so I think just wanting to call out that dynamic.

Despite suggestions for improvement, student volunteers generally spoke very highly of their experiences volunteering with the UW-MHO Program.

Quantitative and Qualitative Data Synthesis

For the most part, the quantitative and the qualitative data converged (i.e., agreed with one another). For example, the quantitative data indicated that students demonstrated improvements in their self-perception as someone who successfully engages in interprofessional collaborative practice and the qualitative data contributing to Theme 4 support these quantitative findings. They indicate that the students recognized the important role other professionals have in achieving patient-centered care and also touches on their comfortability and enjoyment in working on an interprofessional team. One area where the quantitative and qualitative data diverged was in relation to students' self-perceived clinical skills related to the problems of people experiencing houselessness. As demonstrated by the qualitative data, several students felt there exists a need for increased hands-on opportunities and for more preceptors who are willing to teach. Logically, clinical skills can only improve if students have been taught them in the first place and then provided with an opportunity to practice. Finally, while the qualitative data did not explicitly bring up whether volunteering improved students' self-perceived self-efficacy in caring for people experiencing houselessness, the quantitative data indicate that volunteering had a positive effect on this outcome. This may be in part due to the high level of soft skills and interpersonal skills gained by the students as described under Theme 2 and the changes in attitude toward people experiencing houselessness as described in Theme 3.

Discussion

This study contributes to the scant literature assessing the effectiveness of university-affiliated MHC programs. Our findings are consistent with other evaluations of university-affiliated MHCs. A qualitative study of the Touro University Nevada MHC found that volunteering with their van improved students' understanding of patients experiencing homelessness, their medical needs, and treatment complexities.[20] Our study also found that students who volunteered demonstrated increased knowledge of the medical conditions faced by the unhoused population. Additionally, we also found that students who volunteered gained knowledge about the barriers to healthcare experienced by people experiencing houselessness. A pre-post evaluation found that students who participated in the student-run free clinic elective at UCSD were more likely to have gained more favorable attitudes toward working with the underserved and people experiencing houselessness compared with students who had not taken the elective.[21,22] Although our study was not comparative, our findings also demonstrate that volunteering with the UW-MHO Program provides an opportunity for students to unlearn biases and gain increased empathy and perspectives. This study also adds to the literature on university-affiliated MHCs as it is the first, to our knowledge, to evaluate an MHCs effect on students' interprofessional collaboration skills.

There are several strengths to this evaluation. First, we utilized mixed methods instead of conducting a purely quantitative or purely qualitative study. Using both types of data in conjunction means the strengths of one type of data often mitigate the weaknesses of the other. The qualitative data provide detailed and contextualized insights and the quantitative data offer generalizability and external validity.

Additionally, although this evaluation contained a small sample size, the UW-MHO program leadership can use the instruments developed for this evaluation to continually assess the program as it grows. As more volunteers complete the survey, there will be increased power to conduct inferential statistics. Finally, our use of a retrospective pre-post test study design helps to control for response-shift bias. A major disadvantage of this study design is that it does not address rival hypotheses and therefore causality cannot be determined. However, causality was less of a focus here.

Other weaknesses to our study also exist. For one, our study had a relatively small sample size (N=9) and according to our initial power analyses, we did not meet the minimum required number of participants to accurately detect an effect. As such, we could not conduct any inferential statistical analyses. Additionally, out of the three key stakeholder groups, students, clients, and administrators, this evaluation only focused on one of them. It is also important that an evaluation be conducted that includes utilizers of the van. It was determined early on that this was not feasible for this evaluation due to time constraints and the expressed need to have a working relationship with the population before engaging in research, which the primary author did not.

Additionally, the study population may not be representative of all students' experiences who volunteered with the van. Since all students who responded to the survey had volunteered with the van at least twice, they may have had more positive experiences than those who only volunteered with the van once and then never returned. The latter population is not represented in the above data. In terms of the statical analyses, it is debated as to if it is appropriate to run a two-sample t-test on Likert-scale data, as Likert-scale data are not technically continuous, but rather ordinal, discrete, and have a limited range.[39] These properties violate the assumptions of most parametric tests.

Conclusions

This evaluation found that volunteering with the UW-MHO Program improved student volunteers' self-perceived knowledge, attitudes, and self-efficacy toward treating and working with people experiencing houselessness. While students perceived the program improved their interpersonal and "soft skills", they did not perceive it to improve their clinical skills. While developing clinical skills are not a goal of the program, students expressed a desire to have a more hands-on experience. Therefore, program leadership may consider focusing on recruiting preceptors who possess a desire to teach and structuring the program in such a way that students are provided with more opportunities to provide care. Additionally, while students reported some improvements in interprofessional collaboration, many students already came in with a comfort in working on interdisciplinary teams. Similarly, most students had experience working with the unhoused population before volunteering with the van. Since one of the goals of the UW-MHO Program is to offer an experience that gives a broader context to patients' lives, it may be helpful to purposefully recruit student volunteers who have had little to no prior experience with this population. If the suggestions proposed by this evaluation are taken into consideration, the UW-MHO Program will be successful in creating healthcare professionals who provide more holistic and patient-centered care.

References

1. Health Insurance Coverage of the Total Population. Kaiser Family Foundation. https://www.kff.org/other/state-indicator/total-population/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2019. Accessed2021.
2. Allen EM, Call KT, Beebe TJ, McAlpine DD, Johnson PJ. Barriers to Care and Health Care Utilization Among the Publicly Insured. *Med Care.* 2017;55(3):207-214.
3. Butkus R, Rapp K, Cooney TG, Engel LS. Envisioning a Better U.S. Health Care System for All: Reducing Barriers to Care and Addressing Social Determinants of Health. *Annals of internal medicine.* 2020;172(2_Supplement):S50.
4. Clair A, Reeves A, Loopstra R, McKee M, Dorling D, Stuckler D. The impact of the housing crisis on self-reported health in Europe: multilevel longitudinal modelling of 27 EU countries. *Eur J Public Health.* 2016;26(5):788-793.
5. Institute of Medicine Committee on Health Care for Homeless P. In: *Homelessness, Health, and Human Needs.* Washington (DC): National Academies Press (US) Copyright © 1988 by the National Academy of Sciences.; 1988.
6. Arias E, Tejada-Vera B, Ahmad F. Provisional life expectancy estimates for January through June, 2020. 2021.
7. Homeless Mortality Data Workgroup of the National Health Care for the Homeless Council. *Homeless Mortality Data Tool Kit: Understanding and Tracking Deaths of People Experiencing Homelessness.* National Health Care for the Homeless Council; January 2021.
8. Malone NC, Williams MM, Smith Fawzi MC, et al. Mobile health clinics in the United States. *Int J Equity Health.* 2020;19(1):40.
9. Alvi RA, Justason L, Liotta C, et al. The Eagles Eye Mobile: assessing its ability to deliver eye care in a high-risk community. *J Pediatr Ophthalmol Strabismus.* 2015;52(2):98-105.
10. Edgerley LP, El-Sayed YY, Druzin ML, Kiernan M, Daniels KI. Use of a community mobile health van to increase early access to prenatal care. *Matern Child Health J.* 2007;11(3):235-239.
11. Hill C, Zurakowski D, Bennet J, et al. Knowledgeable Neighbors: a mobile clinic model for disease prevention and screening in underserved communities. *Am J Public Health.* 2012;102(3):406-410.
12. Morano JP, Zelenev A, Walton MR, Bruce RD, Altice FL. Latent tuberculosis infection screening in foreign-born populations: a successful mobile clinic outreach model. *Am J Public Health.* 2014;104(8):1508-1515.
13. Nuttbrock L, McQuistion H, Rosenblum A, Magura S. Broadening perspectives on mobile medical outreach to homeless people. *J Health Care Poor Underserved.* 2003;14(1):5-16.
14. Beck E. The UCSD student-run free clinic project: Transdisciplinary health professional education. *Journal of Health Care for the Poor and Underserved.* 2005;16(2):207-219.
15. Clark DL, Melillo A, Wallace D, Pierrel S, Buck DS. A multidisciplinary, learner-centered, student-run clinic for the homeless. *Fam Med.* 2003;35(6):394-397.
16. Asanad K, Zheng J, Chan-Golston A, et al. Assessing quality of care through client satisfaction at an interprofessional student-run free clinic. *J Interprof Care.* 2018;32(2):203-210.
17. Barry M, Fleck E, Lentz S, Bell C, O'Connor P, Horwitz R. "Medicine on wheels": an opportunity for outreach and housestaff education. *Conn Med.* 1994;58(9):535-539.
18. Hastings J, Zulman D, Wali S. UCLA Mobile clinic project. *Journal of Health Care for the Poor and Underserved.* 2007;18(4):744-748.

19. Palma ML, Arthofer A, Halstead KM, Wahba JM, Martinez DA. Service Learning in Health Care for Underserved Communities: University of Iowa Mobile Clinic, 2019. *American journal of public health.* 2020;110(9):1304-1307.
20. Duford A, Matvienko O. Student-Led Mobile Health Clinic: Patients Served and Learning Experience. *J Physician Assist Educ.* 2019;30(3):149-154.
21. Hoffman D. *Orientation to and participation in a student run free clinic: effect on medical students' attitudes and self-efficacy regarding the medically underserved*, University of California, San Diego; 2000.
22. Smith SD, Yoon R, Johnson ML, Natarajan L, Beck E. The effect of involvement in a student-run free clinic project on attitudes toward the underserved and interest in primary care. *J Health Care Poor Underserved.* 2014;25(2):877-889.
23. Ellison J. UW's new Mobile Health & Outreach Van will serve community and student experience. *UW News.* April 30, 2021.
24. Center for Health Sciences Interprofessional Education R, and Practice. Mobile Health and Outreach Van. University of Washington. https://collaborate.uw.edu/mobile/. Accessed.
25. Taguchi K. *UW News.* June 15, 2021.
26. Tent Cities. Seattle Housing and Resource Effort Women's Housing Equality and Enhancement League. http://www.sharewheel.org/Home/tent-cities. Accessed2021.
27. Morgan K. UW launches mobile clinic for underserved communities in U-District. *The Daily.* May 13, 2021.
28. Centers for Disease Control and Prevention. Introduction to program evaluation for public health programs: A self-study guide. *US Department of Health and Human Services Centers for Disease Control and Prevention Office of the Director, Office of Strategy and Innovation, Atlanta.* 2011.
29. Thomas VG, Campbell PB. *Evaluation in Today's World: Respecting Diversity, Improving Quality, and Promoting Usability.* Sage Publications; 2020.
30. McAndrew R, Kaskutas V. A Logic Model for Planning, Implementing, and Evaluating a Student-Run Free Clinic. *Journal of Student-Run Clinics.* 2020;6(1).
31. Milstein B, Wetterhall SF. Framework for program evaluation in public health. 1999.
32. Geldhof GJ, Warner DA, Finders JK, Thogmartin AA, Clark A, Longway KA. Revisiting the utility of retrospective pre-post designs: The need for mixed-method pilot data. *Eval Program Plann.* 2018;70:83-89.
33. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software platform partners. *Journal of biomedical informatics.* 2019;95:103208.
34. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of biomedical informatics.* 2009;42(2):377-381.
35. *Web application for managing, analyzing, and presenting qualitative and mixed method research data* [computer program]. Version 9.0.17. Los Angeles, CA: SocioCultural Research Consultants, LLC; 2021.
36. Bingham AJ, Witkowsky P. Deductive and inductive approaches to qualitative data analysis. *Analyzing and interpreting qualitative data: After the interview.* 2021:133-146.
37. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277-1288.
38. Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in pharmacy teaching and learning.* 2018;10(6):807-815.
39. Roberson PK, Shema S, Mundfrom D, Holmes T. Analysis of paired Likert data: how to evaluate change and preference questions. *Family medicine.* 1995;27(10):671-675.

Appendix

PubMed Search Strategy and Results

Search date: 10/10/2021

#	Search Strategy	Hits
1	Mobile Health Units[Mesh] OR Telemedicine[MeSH] OR "medical van" OR "mobile health" OR "mobile clinic" OR "street medicine"	44,530
2	Homeless Persons[Mesh] OR Homeless Youth[Mesh] OR "houseless" OR "homeless"	12,923
3	#1 AND #2	**159**

Embase Search Strategy and Results

Search date: 10/10/2021

#	Search Strategy	Hits
1	('field hospital'/exp OR 'mobile health unit' OR 'mobile health units' OR 'mobile health van' OR 'mobile hospital' OR 'mobile hospitals' OR 'mobile medical unit' OR 'mobile medical units' OR 'portable health clinic' OR 'portable healthcare facility' OR 'portable hospital' OR 'portable medical unit' OR 'mobile clinic' OR 'telemedicine'/exp)	54,924
2	('homelessness'/exp OR 'homeless person'/exp OR 'homeless households' OR 'homeless people' OR 'homeless person' OR 'homeless persons' OR 'homeless population' OR 'people living on the streets' OR 'street people' OR 'vagabond' OR 'vagrant people' OR 'vagrant person')	14,924
3	#1 AND #2	**91**

Total prior to deduplication: 250
Total after deduplication: 214
Hand searching: 5

Semi-structured Interview Guide

1. What did you **enjoy most** about your experience volunteering with the UW-MHOV?
2. What did you **enjoy least** about your experience volunteering with the UW-MHOV?
3. What general **lessons or takeaways** do you have from your time volunteering with the UW-MHOV?
4. What could have been **improved** about your experience volunteering with the UW-MHOV?
5. Can you describe your **comfortability** with caring for people experiencing houselessness now that you have volunteered with the UW-MHOV?
6. Through volunteering with the UW-MHOV, what **knowledge** did you gain about the problems faced by people experiencing houselessness?
    a. YES:
        - Can you describe an experience where you gained this knowledge?
        - What about your experience allowed you to gain that knowledge?
    b. NO:
        - What would have needed to be different about your experience for your knowledge to have improved?
7. Through volunteering with the UW-MHOV, what **clinical skills** did you gain that will help you work with people experiencing houselessness in the future?
    a. YES:
        - What clinical skills did you gain?
    b. NO:
        - Why don't you feel that you gained any clinical skills that will help you work with people experiencing houselessness in the future?
        - What would have needed to be different about your experience for your clinical skills to have improved?
8. Did volunteering with the UW-MHOV change your **attitude toward** caring for people experiencing houselessness?
    a. YES: If yes, how so?
    b. NO: If no, why not?
9. Did you have the opportunity to **work alongside other professions** when you volunteered with the UW-MHOV?
    a. YES:
        - What was that like?
        - How did volunteering with the UW-MHOV improve your ability to work inter-professionally with students from other disciplines?
        - Did you learn anything new about the roles/contributions of other healthcare professions?
        - Did anything surprise you about working interprofessionally on the UW-MHOV project?
    b. NO:
        - What professions do you wish you could have worked with on the van?
10. Is there anything else you would like to share with me about your experience volunteering with the UW-MHOV?

Program Evaluation of the UW Health Sciences Mobile Health and Outreach Van (UW-MHOV)

Thank you for taking the time to complete this survey. By doing so, you are both helping me, Shelby Kantner, complete my thesis work and contributing to the betterment of the University of Washington Health Sciences Mobile Health and Outreach Van (UW-MHOV).

We are interested in understanding how your experience volunteering with the UW-MHOV influenced your knowledge, skills, attitudes, and self-efficacy toward treating and working with people experiencing houselessness. We are also interested in understanding how volunteering with other health professions students has impacted your readiness to practice as part of a team.

Please answer each of the following questions twice:

- **As you would have at the start of your program**
- **As you would now, after having volunteered with the UW-MHOV**

While other experiences throughout your program may have changed your perception of the following items, please try to only consider how volunteering with the UW-MHOV changed your perception since the start of your program.

1. My degree of knowledge about the problems of people experiencing houselessness.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

2. My clinical skills regarding the problems of people experiencing houselessness.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

3. I feel capable of caring for people experiencing houselessness.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

4. I feel comfortable caring for people experiencing houselessness.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

5. I believe I can make a difference in the care of the underserved.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

6. My interest in working with the underserved.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

7. My interest in working in primary care.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

8. I have a clear understanding of my role on an interprofessional team.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:
Not at all — To a moderate extent — To a great extent
(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:
(Change the slider above to set a response)

9. I am able to describe my professional role to another team member.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

10. I understand the roles and practices of other professions in caring for patients.

AT THE START OF MY PROGRAM, PRIOR TO VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

11. I am able to share and exchange ideas in a team discussion.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

12. I am comfortable sharing responsibility for patient care with other professionals on a team.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

13. I perceive myself as someone who successfully engages in interprofessional collaborative practice.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

14. I encourage the voices and opinions of all colleagues across professions to be heard in team conversations.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

15. I am curious to learn more about the knowledge and skills of colleagues in other health professions.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

16. I show my appreciation to colleagues from other professions for their skills, expertise, and contributions to the team.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

17. I believe that the best decisions are made when team members openly share their views and ideas.

AT THE START OF MY PROGRAM, BEFORE VOLUNTEERING WITH THE UW-MHOV:

Not at all | To a moderate extent | To a great extent

(Change the slider above to set a response)

NOW, AFTER VOLUNTEERING WITH THE UW-MHOV:

(Change the slider above to set a response)

Contact Information

First Name

_____

Last Name

_____

Phone number

_____
(Include Area Code)

E-mail

_____

Demographic Information

Before volunteering with the UW-MHOV, did you have any prior experiences working with or providing care for people experiencing homelessness?

○ Yes ○ No

Please indicate the number of times you have volunteered with the UW-MHOV:

○ Once ○ 2 to 3 ○ 4 to 5
○ 6 to 7 ○ 8 or more

Please indicate the profession for which you are training:

○ Dentist
○ Dietitian
○ Health Administrator
○ Nurse
○ Nurse Practitioner
○ Occupational Therapist
○ Pharmacist
○ Physician
○ Physician Assistant
○ Physical Therapist
○ Public Health Professional
○ Social Worker
○ Other

Please specify "Other"

_____

Race

○ American Indian/Alaska Native
○ Asian
○ Native Hawaiian or Other Pacific Islander
○ Black or African American
○ White
○ More Than One Race
○ Unknown / Not Reported

Ethnicity

○ Hispanic or Latino ○ NOT Hispanic or Latino ○ Unknown / Not Reported

Age (years)

_____

Gender

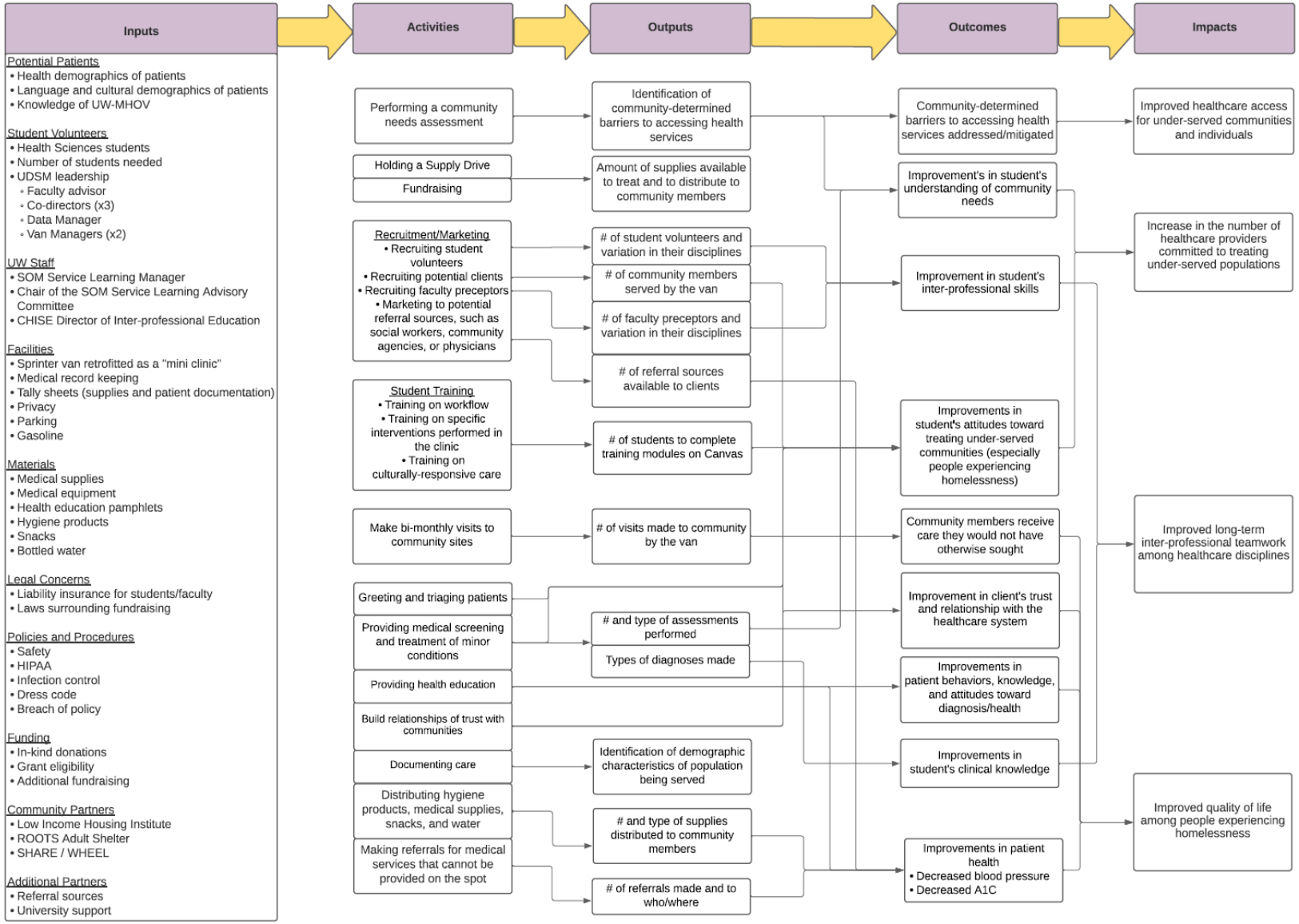
○ Female
○ Male
○ Genderqueer or genderfluid
○ Agender
○ Non-binary
○ Questioning or unsure
○ Prefer not to disclose
○ Additional gender category/identity not listed

Please specify "Additional gender category/identity not listed"

_____

Thank you for taking the time to complete this survey. Depending on the nature of your answers, you may be contacted at a later date to complete a short key informant interview.

Working Logic Model



Codebook

Title	Description	Notes
Knowledge	To be applied to any mention of lessons learned, increased/expanded understanding, or generally improved awareness.	The concept of knowledge refers to familiarity with factual information and theoretical concepts. Knowledge can be transferred from one person to another or it can be self-acquired through observation and study. Skills, however, refer to the ability to apply knowledge to specific situations
Skills	Should be applied when a participant indicates their ability to use their knowledge effectively and readily in execution or performance.	See above. Also, may be applied when there is mention of not acquiring skills
- Clinical skills (child code)	Any action performed by a student that involves direct patient care which is intended to impact clinical outcomes.	Any time one of the child codes is applied, also apply the parent code.
- Other skills (child code)	To include organization, resourcefulness, inter-personal skills, soft skills, etc. (i.e., personal attributes that enable someone to interact effectively and harmoniously with other people)	Any time one of the child codes is applied, also apply the parent code.
Attitude	Descriptions of student's thinking or feeling toward people living unhoused or caring for people living unhoused.	
Self-efficacy	References to an individual's belief in their capacity to execute behaviors necessary to complete a task or achieve a goal.	
Interprofessional collaboration	Mentions of approaching patient care from a team-based perspective. Acknowledgement of other professionals' roles on the team.	May also use this code for mentions of teamwork.
Preceptors	Applied to any mention of a professor or instructor and their role or contribution to the student volunteers experience.	
Patient-centered care	Mentions or explanations of providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions.	
Student types	Used when student volunteers mentioned the types of students that they volunteered with or that they wished they had volunteered with (e.g., dentistry, PT, PA, nursing, etc.)	
Relationship Building	The process of developing social connections.	Differs from the 'networking' code in that the 'relationship building' code can be applied to developing connections outside of for professional proposes.
Networking	Applied when a student volunteer describes the action or process of interacting with	

	others to exchange information and develop a professional contact.	
Mentorship	Mentions of a more experienced or knowledgeable person who guides and nurtures the development of a less experienced person.	Often applied in conjunction with 'networking' and 'relationship building' codes
Privacy	When participant mentions the state or condition of being free from being observed or disturbed by other people.	
Stigma	When participant expresses or mentions disgrace associated with the unhoused population.	
Improvements	Applied to comments related to how the van or program could be made better.	Subjects may not explicitly state when something needs to be improved, so this may need to be implied.
Leadership	Mentions of leadership positions (i.e., people responsible for running the van)	Not to be applied to development of leadership skills – if this is mentioned, use "skills" code.
Staffing	When participants mention those individuals who are employed to run the van or the role of staff more generally.	
Logistics	When participant mentions anything related to the detailed coordination of running/operating the mobile health and outreach program.	
- Scheduling (child code)	Mentions of the process for signing up to volunteer or the number of opportunities to volunteer	
- Van location (child code)	Applied to comments about the van's physical placement or where the van should/could be located.	
Safety	Mentions of being protected from or needing to be protected from something that causes danger, risk, or injury.	
Consistency	Mentions of things happening repeatedly in a similar way.	May also be applied to mentions of inconsistency or transition.
Communication	When a participant mentions the act of transferring information from one place, person, or group to another.	
Prior experience	When participant mentions any prior work or volunteer experience (but especially related to working with the unhoused population)	
Barriers	Anything that restricts the use of health services by making it more difficult for some individuals to access, use or benefit from care.	
Resources	Includes resources needed to run the van, resources provided by the van, and resources requested by utilizers of the van.	Also applies to mentions of connecting clients to other resources or making referrals.
Weather	Mention of the seasons, rain, sunshine, etc.	

Codes shaded in grey were predetermined from the survey prior to qualitative data analysis.