

Driving Access to Care: Use of Mobile Units for Urine Specimen Collection During the Coronavirus Disease-19 (COVID-19) Pandemic

Jill S. Warrington, MD, PhD^{1,2} , Alexa Brett, BAS¹, Heather Foster¹, Jamie Brandon, BA¹, Samuel Francis-Fath, BS¹, Michael Joseph, BS^{1,3}, and Mark Fung, MD, PhD²

Abstract

Patients with substance use disorders (SUD) are at increased risk of both coronavirus disease-19 complications as well as exacerbations of their current conditions due to social distancing and isolation. Innovations that provide increased access to support substance use disorder patients may mitigate long-term sequelae associated with continued or renewed drug use. To improve patient access during the coronavirus disease-19 pandemic, we deployed a mobile unit to enable access to urine drug testing where needed for patients suffering from substance use disorder. Over a 3-week pilot program, 54 patients received urine drug testing across 5 providers and 8 zip codes. The mobile unit was cost-effective, demonstrating a volume-dependent 19% lower cost compared to pre-coronavirus disease-19 patient service centers in a similar geographic region. The mobile unit was well-received by patients and providers with an average of 9 out of 10 satisfaction scores and allowed for access to urine drug testing for 67% patients who would not have received testing during this time frame. No statistically significant differences were found in substance use positivity rates in comparison to pre-coronavirus disease findings; however, some shifts in use included higher rates of fentanyl and opioid positivity and reductions in tetrahydrocannabinol and cocaine use in the mobile collections setting. Deployment of mobile collection services during the coronavirus disease-19 pandemic has shown to be an effective mechanism for supporting patients suffering from substance use disorder, allowing for access to care of this often stigmatized, vulnerable population.

Keywords

COVID-19, specimen collection, mobile unit, urine drug testing, substance use disorder, Clinical Lab 2.0

Received June 6, 2020. Received revised July 13, 2020. Accepted for publication July 28, 2020.

Introduction

The link between substance use disorder (SUD) and social isolation has been well-recognized.¹ Since the beginning of the coronavirus disease-19 (COVID-19) global pandemic, multiple studies and reports have highlighted the unique risks associated with social distancing on the SUD population.^{2,3} Further, national disasters are nearly invariably accompanied by increased incidence of mental health conditions and SUD, in particular.⁴

¹ Aspent Health, South Burlington, VT, USA

² Department of Pathology and Laboratory Medicine, Robert Larner College of Medicine, University of Vermont Medical Center, VT, USA

³ True Vector Management Consulting, Milton, VT, USA

Corresponding Author:

Jill S. Warrington, Department of Pathology and Laboratory Medicine, University of Vermont Medical Center, 111 Colchester Avenue, Burlington, VT 05401, USA.

Email: jwarrington@aspenti.com



However, since SUD patients may be at increased risk of COVID-19 complications,³ telehealth and socially distanced care delivery have been advocated for whenever possible to limit COVID-19 exposures by professional societies and state regulatory bodies.⁵⁻⁸ For example, the American Society of Addiction Medicine (ASAM) convened an ASAM Caring for Patients During the COVID-19 Task Force that recommends consideration of postponing nonurgent outpatient appointments where telehealth or telephone options are not available.⁵ Given the potential for persistent COVID-19 risks until 2022,⁹ ongoing deferment of medical care may compromise medical conditions in the long-term.

To improve access to care and to support high risk patients during social distancing efforts, a variety of innovations and accommodations have been developed to support access to care for SUD patients during COVID-19 including telehealth services, regulatory leniency on take-home medications, and use of telephones for care delivery.¹⁰ Access to urine drug testing, a common therapeutic tool used to assist clinical decision-making in addiction treatment¹¹ and pain management, has been limited during COVID-19. Observed urine collections, in particular, have been seen as a risk to patients and care providers.⁵

To allow for increased access to urine drug testing during COVID-19 for patients who required the service, we introduced a mobile unit for urine collection that could reach the farther regions of our rural state of Vermont. Specifically, we leased a recreational vehicle (RV) to allow for increased social distancing and to facilitate patient comfort with this strategy. The RV was deployed to geographically rural regions, to regions where patient service centers (PSCs) were closed and upon request by providers for patients who were specifically in need of urine drug testing services.

In this pilot study, we aimed to rapidly deploy a low-cost solution for performing urine collections for patients in need of services during COVID-19. In addition to financial and operational considerations, the primary outcomes were to address patient needs and the patient experience during this time. A secondary outcome included evaluation of substance use positivity rates in this population as an evaluation of treatment adherence and relapse. The implementation of this strategy embodies several of the Clinical Lab 2.0 movement principles including improving the value of care for SUD patients at a critical time as well as partnering with providers to identify high-risk patients and coordinating care through delivery of targeted services.¹²

Methods

This study is an observational, convenience sampling of a quality improvement project implemented by a commercial laboratory, Aspent Health. The time from conception of the use of an RV to implementation spanned 8 business days in order to rapidly address patient needs to the evolving COVID-19 pandemic. The first week was devoted to conceptualization and implementation. The remaining 3 business days finalized

training and identified providers and patients who needed the service. The concept development phase included identification of vehicle and source, pricing and definition of contractual obligations, business plan development, and leadership approval. Implementation efforts included orientation to the RV's layout, the development of specific protocols ($n = 6$ protocols), training material for collectors, development of provider-centered educational material, and training of 6 collectors. The staff received additional training in patient privacy, patient health information protection, the role of the Health Insurance Portability and Accountability Act in mobile settings, as well as in professional communication to uphold standards for excellence in patient experience.

A critical aspect to the operational design included the need to ensure safe COVID-19 practices were in place. Protocols were redesigned to be contactless and to allow for 6-foot distancing between patients and staff. In addition, scheduling requirements were planned to allow for a full disinfection using a bleach solution of all surfaces in between each patient's collections. Staff were required to wear medical care-grade masks and lab coat coverings at all times. Only one staff member and patient were allowed in the RV at one time as per Vermont Department of Health's recommendations.¹³

The pilot program was initiated on May 7, approximately 6 weeks after the stay-at-home order was issued across the state of Vermont and was conducted from May 7 to May 29, 2020. The mobile unit was offered to all Vermont providers who were actively ordering laboratory testing through this laboratory during this study period. A total of 5 providers expressed a particular need for their patients at this time and included providers both offering office-based opioid treatment ($n = 4$) and specializing in addiction care ($n = 1$). These providers were predominantly located within the southern region of our state where rurality prevails and access to care had been limited during social distancing efforts. Providers selected individual patients who specifically needed urine drug testing during a stay-at-home order implemented within the state of Vermont. Criteria for selection were based on patients' lack of personal transportation, patients' lack of childcare coverage, poor mobility due to health diagnosis, the patient's being deemed high risk for relapse/overdose or for COVID-19 complications, and patients or providers' preference for the patient to shelter in place or remain within their rural community during COVID-19. Patients who were identified as needing urine drug testing were either scheduled by their providers or instructed to be available for a telephone call to schedule an appointment on the day of the collection. Appointments were scheduled within 4 to 8 hours. The RV was used during routine business hours on weekdays during this study period. The vehicle was deployed to either the parking lot of the local provider's office or the patient's home as prearranged during scheduling.

For home mobile service visits, the team was limited to seeing up to 12 patients to allow travel time, disinfecting of shared space and equipment, and adherence to COVID-19 infection control protocols. For centrally located mobile collection stationary at a parking site, we scheduled patients in

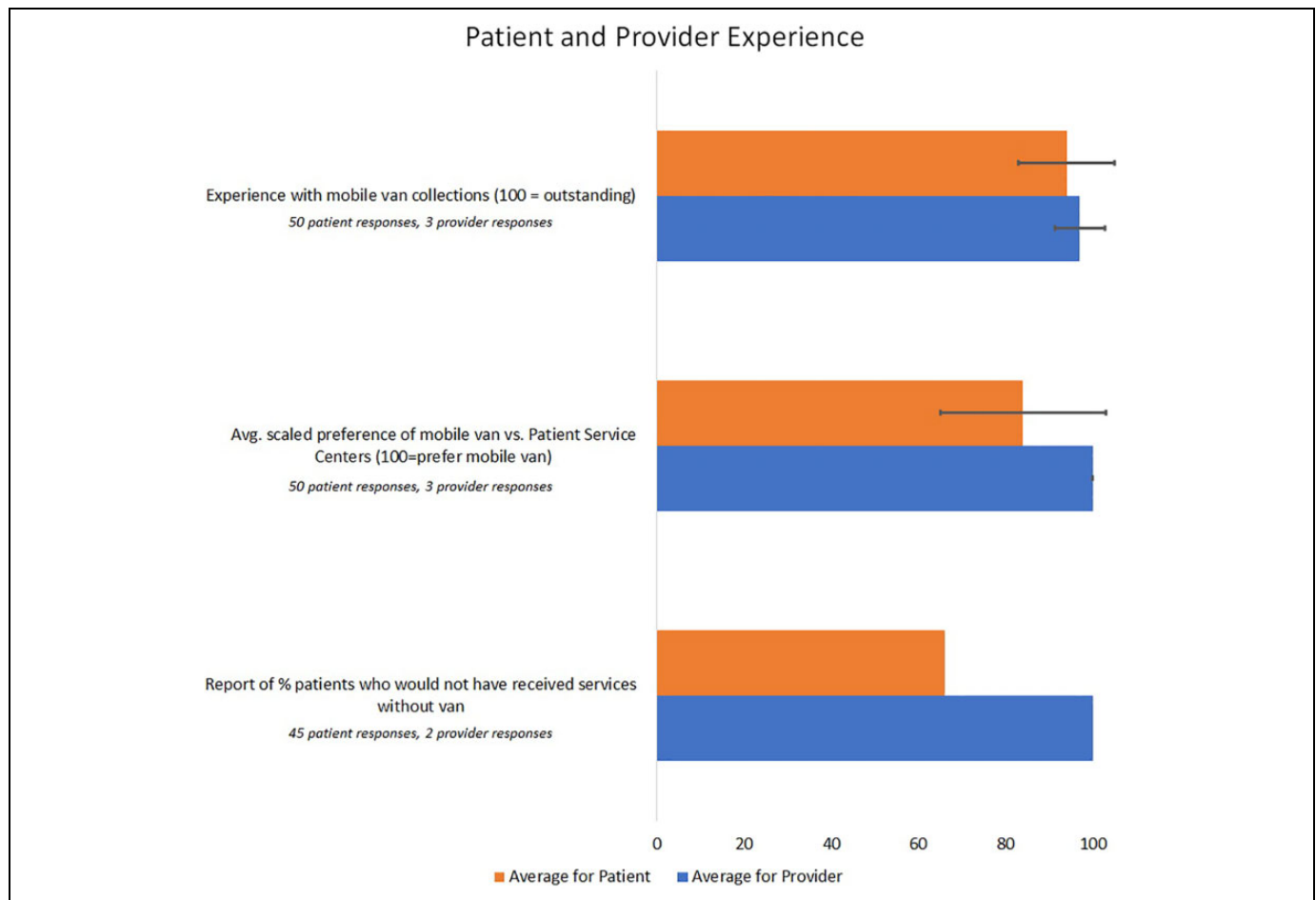


Figure 1. Patient and provider experiences were gathered by inquiry. The following specific questions were asked to patients with the enclosed minor modifications for the providers: (1) How would you rate your experience with this mobile service collection on a scale of 1 to 10? 1 being dissatisfied and 10 being outstanding experience, (2) On a scale of 1 to 10, how likely are you to choose (or for provider; likely are you to refer) a collection performed with mobile service over a collection performed at a patient service center? 1 being least likely, 10 being the most likely, and (3) Would you (or for provider: your patients) have gotten testing services had this van not come to you? Yes or No (Percentage result demonstrates the percentage of “no” response). One individual patient answered maybe and 3 (of $n = 52$) were unanswered. Three providers responded to questions 1 and 2 and two providers to question 3. The numeric responses were multiplied by 10 to equate on the x-axis with the percent of question 3. Orange bars represent the average for the patients and the blue bars for the provider.

15-minute increments to allow for disinfecting of shared space and equipment, and to adhere to COVID-19 infection control protocols. These limitations, in addition to driving time, allowed for a maximum capacity of approximately 20 to 30 patients per day. The projected maximum capacity of the mobile unit is approximately 425 specimen collections per month. Location preference was determined based on the individual patients’ preference and needs by their providers. The risk to privacy of the RV driving to the patient’s home was discussed with each provider and, in turn, patients. To keep the mobile unit in service, gas cards were used by collectors to avoid monetary transactions during mobile unit services. Two full-time trained collectors (one male, one female) with a combined 7 years’ experience were assigned to the mobile unit per day of mobile service operation. Requested collections were a mix of observed and unobserved specimen collection protocols.

Observed urine collections were performed according to the predefined mobile collections protocol within the bathroom of the RV. All protocols were written in response to COVID-19 to include strict safety measures. Specimens were stored at room temperature until delivery to the laboratory via United Parcel Service (UPS) or direct specimen drop off to the lab by colleagues who collected the specimens. Urine drug screening by enzyme immunoassay and/or testing by liquid chromatography-tandem mass spectrometry were performed within the laboratory as directed by electronic ordering. Tests ordered spanned the routine test compendium offerings including common drugs of abuse testing such as opioids, central nervous system depressants, stimulants, tetrahydrocannabinol (THC), and medication-assisted treatment medications. Available aggregated test results for participants ($n = 52$) were compared with pre-COVID-19 average test positivity rates for the specific providers’ patient populations ($N = 295$; January 1 to March 1, 2020).

Table 1. Themes and Provider Responses to Open-Ended Question.

Open-ended responses/themes	Compiled responses
Theme 1: Providing access to care	<p>“First the pandemic stopped all my patients from going to the office and they were not have [sic] UDS done, some had gone for over 12 weeks. Most patients see their UDS as a way to support their success in recovery while others are indication of difficulties and provide me the opportunity to work with them more intensely on their recoveries”</p> <p>“A few of them were very grateful because they really wanted to do a UDS but did not want to go out in public due to health issues, or it was painful to make a trip to the lab.”</p> <p>“This has been one of the most unique services . . . and really ideal for those patients who face the most extensive of barriers to access, or have the most health risk and really cannot afford to come in to the lab.”</p>
Theme 2: Support for continuation	<p>“I would like to see it continue as when in the office I do all the collections so I have to cut my appointments short to do them so I can keep on time. Much more time management effective to send them out to the RV.”</p> <p>“It has been a long-needed thing in our community especially for those facing other social barriers and stigma to access already. This service is great.”</p>
Theme 3: Addressing treatment adherence	<p>“They would not follow through unless it literally came to them due to their ambivalence about being in treatment.”</p> <p>“Those who could not make it may have to transfer out of our program to a level of care with lesser requirements.”</p>

Patient experience measures, an assessment of patient need and self-identification of gender were determined through patient inquiry at the delivery of service (Figure 1). Input from provider experience was obtained retrospectively after closure of the pilot program. Respondents were the team’s nurses ($n = 2$) and social worker ($n = 1$). These 3 responders were part of the service teams partnering with all 5 ordering providers involved in this study. Attainment of a low-cost solution was ensured through the development of the business plan financial model where the efficacy of the mobile unit was compared to the financial performance of the closed PSCs in service areas with underserved populations. The need for a rapid deployment was defined during business plan development with the expectation of a 2-week launch to implementation time frame. All patients requiring urine drug testing were selected and directed by their individual providers.

According to the policy defining activities which constitute research at the University of Vermont and the University of Vermont Medical Center, this work met criteria for operational improvement activities exempt from ethics review and instead meets criteria for program evaluation. Statistical evaluation by Student t tests with a P value set at .05 were performed where indicated.

Results

During the 3-week pilot program evaluation, 54 patients referred by 5 total providers received RV-based collection services spanning 8 zip codes across Vermont. The vehicle frequented regions included villages, towns, and cities. The mobile unit was deployed to sites ranging from 15 to 2 hours 45 minutes away from the laboratory. All locations had populations less than 20 000 inhabitants, thereby qualifying for at least one definition of rurality by federal standards.¹⁴

Demographic information on the patient population demonstrated that more males ($n = 29$) than females ($n = 23$) used

this service (58% males: 42% females with 5% unidentified). The average age was 41 ± 9 years (mean \pm standard deviation [SD]). Through the course of the pilot program, one patient was unable to use services due to an inability to leave her home secondary to mobility limitations. Given COVID-19 safety concerns, collectors were instructed not to enter the home at that time. No safety incidents nor evidence of aggressive behavior were identified. All patients complied with collection instructions throughout the program. A total of 12 patients were visited in the home and 42 patients had specimen collected in a centrally located parking lot.

To assess patient experience, patients demonstrated an average overall satisfaction rate of 9.4 of 10 (± 1.03 SD) across the pilot program by patient survey (Figure 1). Females (42% of cases) had an average satisfaction score of 9.4 out of 10 and males (58% of cases) had an average score of 9.3 out of 10. On average, patients identified preference of use of the mobile unit over the preexisting standard-of-care PSCs (average of 8.4 out of 10 ± 1.9 ; Figure 1).

Care team members ($n = 3$) working with all 5 ordering providers involved in this pilot program responded to a set of standardized and open-ended questions. These individuals expressed satisfaction with the service (10 out of 10; Figure 1) and articulated that the RV provided an unmet need for select patients (Table 1). One individual specifically stated that they hoped the service would continue to allow for improvements in their office’s operational workflow.

Mobile collections increased specimen volume at a time when little testing was being performed. In two-thirds of cases (71% females, 62% males), patients acknowledged they would not have received services if the mobile unit were not available. Due to the flexibility of a mobile unit and the RV’s ability to travel to many service areas, the collection volume during the pilot period increased by 67% in comparison to the pre-COVID-19 monthly averages of the PSCs. This increase in volume was attributable in part to the ability of patients, who

Table 2. Comparison of Substance Use Pre-COVID-19 to Use During RV Pilot Program.

Common substances [†]	Pre-COVID-19 positivity rates (N = 295)	RV program positivity rates (NS; n = 52)*
Buprenorphine	91.48%	96.15%
Fentanyl	5.65%	13.46%
Methadone metabolite (EDDP)	0.93%	0.00%
Opioids (general) + Oxycodone	7.99%	11.54%
Alcohol metabolite(s) EtG or EtS	15.65%	13.46%
Benzodiazepines	5.97%	1.92%
Amphetamines	6.82%	5.77%
Methylphenidate	4.59%	5.41%
THC metabolites	50.85%	36.54%
Cocaine metabolite	5.86%	1.92%
Ecstasy	0.00%	0.00%
Heroin (6-AM)	2.76%	2.44%

Abbreviations: 6-AM, 6-acetylmorphine; COVID-19, coronavirus disease-19; EDDP, 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine; EtG, ethyl glucuronide; EtS, ethyl sulfate; NS, not significant; RV, recreational vehicle; THC, tetrahydrocannabinol.

*None of the substances reached statistically significant differences using Student t test (alpha set at $P = .05$).

[†]n = 51 for methadone metabolite (EDDP), n = 37 for methylphenidate, n = 41 for heroin, n = 52 for all others (2 of 54 patients were unable to produce a specimen due to paruresis).

had previously performed their own collections, to use this service when they themselves were unable to perform the collections due to COVID-19 restrictions.

Collectors were on service for a total of 10 business days across the 3 weeks. Each collector spent approximately 9.4 hours/d delivering services with an average volume of 0.3/collector/hour. The collectors spent 28% of their time in transit. The flexibility of the mobile unit improved utilization rates of the resources associated with the collection process. The improved utilization rate coupled with the increased testing volume reduced the cost/collection by 19% in comparison to stand-alone PSCs during the COVID-19 pandemic. The vehicle serviced 8 zip codes spanning cities (n = 4), towns (n = 3), and a village (n = 1).

To determine whether drug use in patient population utilizing the mobile unit differed from the pre-COVID-19 population, average positivity rates for substances were evaluated and compared to rates prior to COVID-19 (Table 2). No statistical differences were identified across average positivity rates pre-COVID-19 and in the samples tested; however, some shifts in substance use was seen including higher rates of fentanyl and opioid positivity in the mobile collections setting with reductions in THC and cocaine use.

Discussion

This pilot program's use of an RV to service urine specimen collection needs was well-received. Patients reported high satisfaction with the experience and in most cases preferred use of the mobile service over the use of the standard practice of PSCs. Providers corroborated the patient experience with positive responses.

The rapid deployment of the vehicle was feasible with a sustainable financial model as compared to the costs of operating fixed site PSCs. The average return on investment for comprehensive mobile health clinics are 30:1¹⁵; however, more

targeted services such as this deployment are closer to 7:1. The deployment of the mobile units for urine specimen collection demonstrated an increase in utilization during the COVID-19 pandemic with a corresponding lower cost of operation in comparison to pre-established PSCs. This early analysis suggests that a mobile unit may be a cost-effective means to support patient access and urine specimen collection; however, further analyses after social distancing efforts subside will be necessary.

Aside from acquisition of the vehicle, the largest operational lifts were centered on development of training material and aligning protocols with essential care requirements for the state during a stay-at-home order; however, these efforts were achievable within 8 business days prior to implementation.

Multiple studies have demonstrated successful deployment of mobile units in other clinical settings for years. There are approximately 2000 mobile clinics in the United States covering a range of services from sexually transmitted disease testing, blood pressure evaluation, pediatric care, dental care, and prenatal care.¹⁶⁻¹⁹ To our knowledge, the specific use of mobile units for urine specimen collection has not been previously reported in peer-reviewed literature.

Mobile units have been shown to improve patient access to care and to serve as a mechanism to overcome health disparities brought on by differences in socioeconomic status, race, and rural versus urban care settings.²⁰ They have also been leveraged to support stigmatized diseases, chronic disease management, and as a mechanism for addressing social determinants of health and population health.²⁰ They have also shown prior utility in public emergencies to supplement care disruptions.²¹ Advocacy for mobile units has supported the idea that the units are approachable, allowing for a home-like environment rather than a clinical environment.²² The use of the RV in this pilot study is well-aligned with a comfortable patient environment.

As a mobile unit designed to support the SUD population, this service is well-suited to the specific needs that are

prevalent within this population. The SUD population frequently contends with stigma,²³ is well-recognized as a chronic disease,²⁴ and is recognized as requiring support for social determinants of health.²⁵ The RV's use during the public health emergency of COVID-19 has been essential to care. As evidenced by patient and provider responses, the mobile unit appeared to enhance access to care overcoming barriers within the provider office such as time management as well as patient factors such as challenges posed by childcare needs, mobility, and COVID-19 risks.

There are a few limitations to the study. As demonstrated by the differences in test positivity pre-COVID-19 and with use of the RV, there are clear differences in the patient population selected for urine drug testing via mobile collections. This was expected as the RV is likely shifting access to care and being used for the sickest patients during an emergency setting. Also, during COVID-19 substantial health disparities have been observed between the African American and Caucasian communities.²⁶ Unfortunately, we did not include race as a variable in our data collection during this study. While significant differences were not found in test results in this patient population in comparison to our usual population within Vermont, there is a known selection bias by providers in determining who needed services most during this COVID-19. Prior studies have frequently demonstrated differences in the patient populations served through mobile unit access.²⁰ Another limitation is the potential risk to anonymity by this method, particularly in settings in which the RV visited the patient's home. Privacy concerns were mitigated by initial conversations with the provider, training the staff with privacy concerns and supporting discretion in the community, and keeping RV's window shades drawn.

Given the value of the mobile unit, this strategy may be of value outside of the immediate COVID-19 emergency status. We have committed to use of an RV to support this population in the future. Further evaluation will elucidate as to whether these findings are largely attributable to COVID-19 or more generalizable to the SUD population outside of a public health emergency. Future directions could include chronic disease monitoring and routine health screening in the SUD population. In addition, partnering with preexisting efforts such as visiting nursing associations may be possible.

This study represents a practical example of a laboratory effort to address the needs of our SUD region's SUD patients during the COVID-19. This effort embodies core principles of the Clinical Laboratory 2.0 movement by providing services that extended outside of the analytical framework to support care delivery: Laboratorians partnered with care providers to identify a high-risk patient population and coordinated the delivery of care to a vulnerable patient population amid a global pandemic.¹²

Authors' Note

Ethics approval and consent to participate See methods section. Jill S. Warrington, the corresponding author, drafted the manuscript, coordinated with the Institutional Review Board at her home institution (the

University of Vermont Medical Center), and prepared the document for submission. Alexa Brett led the quality improvement project with development and implementation of COVID-19 specific mobile-unit operational and safety protocols, staff training, and patient survey material. Heather Foster evaluated the operational elements of the project, contributing the manuscript's results section. Jamie Brandon developed the project concept and, in coordination with Michael Joseph, contributed to the financial and operational contributions. Mark Fung provided material input to the study design and manuscript writing.

Acknowledgments

The authors want to thank their respective institutions for recognizing the importance of scholarship. The authors would specifically like to acknowledge the enthusiastic participation and dedication of their collection staff in this pilot project, especially Melissa Schnare, Chad Blair, Kate Greenwood, and Shelbie Billado. In addition, they are grateful for the logistics and communication support provided to them by Jon Higgins and Deidre Lozier.


Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article. Heather Foster, Alexa Brett, Samuel Francis-Fath, and Jamie Brandon are salaried by Aspenti Health, a laboratory focused on population health management for Substance Use Disorders. Jill S. Warrington carries a nonsalaried position as Chief Medical Officer at Aspenti Health where she holds a small portion of stock options (<\$1000 in value). She also is a member of the community advisory council at Blue Cross Blue Shield of Vermont. Mark Fung is a consultant for Cerus Corporation for services as a data safety monitoring board member, is a consultant for Biocogniv, has received an honorarium from Grifols Corporation as an educational speaker, and is a Board Member of Project Santa Fe Foundation, from whom he receives no compensation. Michael Joseph is an independent consultant from True Vector Management Consulting with over 30 years of healthcare IT experience who was working for Aspenti Health. This study was conducted at Aspenti Health. The University of Vermont is a participating organization of the Project Santa Fe Foundation of which the Clinical Lab 2.0 movement is an initiative.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Jill S. Warrington  <https://orcid.org/0000-0002-2196-1789>

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