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Descriptive Report

Establishing a COVID-19 Vaccine Clinic at a Student-Run Free Clinic

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Abstract

Coronavirus Disease 2019 (COVID-19) is a highly contagious infectious disease associated with significant rates of morbidity and mortality. With limited treatments for COVID-19, the most effective strategy developed to mitigate the effects of this disease is vaccination. Unity Clinic, an interdisciplinary, student-run free clinic (SRFC) at the University of Oklahoma Health Sciences Center (OUHSC), created a COVID-19 vaccine clinic that started in January 2021 to participate in the mass vaccination campaign in Oklahoma. Health profession students from seven different colleges present at OUHSC served in either non-clinical or clinical volunteer roles at the vaccine clinics. Between January 6 and July 16, 2021, Unity Clinic hosted 119 vaccine clinics, administered 39,665 vaccines, and had 16,830 student volunteer hours logged. The vaccines administered through Unity Clinic composed 1.2% of all vaccines administered in the state and 11.1% of all vaccines administered in Oklahoma County. This descriptive report demonstrates the effective use of an SRFC for large-scale COVID-19 vaccination events. Unity Clinic's COVID-19 vaccine clinic has the potential to serve as a model for other SRFCs around the country to use for the current COVID-19 pandemic and adapt for other public health issues in the future.

Introduction

In 2019, the first cases of coronavirus disease 2019 (COVID-19) were identified in Wuhan, China.[1] COVID-19 is a highly contagious infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) associated with significant rates of morbidity and mortality.[2] As of June 2021, there have been over 614,000 deaths from COVID-19 in the United States alone.[3] Shortly after the identification of SARS-CoV-2, an unprecedented, global vaccine development campaign was launched to address the COVID-19 pandemic.[4] Prior to the development of the COVID-19 vaccine, the fastest vaccine to transition from development to deployment was the mumps vaccine, which took about four years.[5] The COVID-19 vaccine transitioned from development to deployment in a quarter of the time required for the mumps vaccine and the COVID-19 vaccine was deployed less than 12 months after development began. In December of 2020, the two-dose regimen Pfizer-BioNTech and Moderna COVID-19 vaccines were both granted Emergency Use Authorization (EUA) by the United States Food and Drug Administration to mitigate the COVID-19 pandemic.[6-9] Two months later, in February of 2021, EUA was granted for use of the single-dose regimen Johnson & Johnson COVID-19 vaccine.[10]

The next challenge involved the logistics of distributing the COVID-19 vaccine to community partners that would administer the vaccine to patients, giving priority to the most vulnerable community members first. Once the COVID-19 vaccines were distributed to community facilities, large-scale clinic operations were implemented for the mass vaccination campaign. The urgency surrounding the COVID-19 pandemic justified the need for collaborative and innovative community

efforts that often equipped healthcare professionals, healthcare students, and community members to partner in the mass vaccination campaign.

The University of Oklahoma Health Sciences Center's (OUHSC) interdisciplinary, student-run free clinic (SRFC), Unity Clinic, was utilized as one of these ideal vehicles for this mass vaccination campaign in Oklahoma County, Oklahoma. In early January 2021, Unity Clinic's first vaccine clinic was held for community members qualifying for the COVID-19 vaccine. This descriptive report is intended to demonstrate the effective use of an SRFC for large-scale COVID-19 vaccination events.

Unity Clinic

Unity Clinic is a student-run interdisciplinary clinic that operates under guidance of the Interdisciplinary Education Office at OUHSC. In collaboration with community organizers of Oklahoma County, the clinic's mission is two-fold: to provide comprehensive care to patients who are uninsured and/or underserved at little-to-no cost to patients; and to facilitate a deeper understanding of and appreciation for interdisciplinary collaboration among the clinic's student volunteers. Since its inception in 2018, the clinic has successfully set up two regularly operating primary care clinics, incorporated participation of over 350 students representing 8 health professions, and served over 200 patients who reside in Oklahoma. Providing comprehensive healthcare to patients who are uninsured and/or underserved is the primary objective of Unity Clinic; as such, Unity Clinic also strives to recognize and address other social determinants of a health, including food insecurity, transportation, and access to other resources.

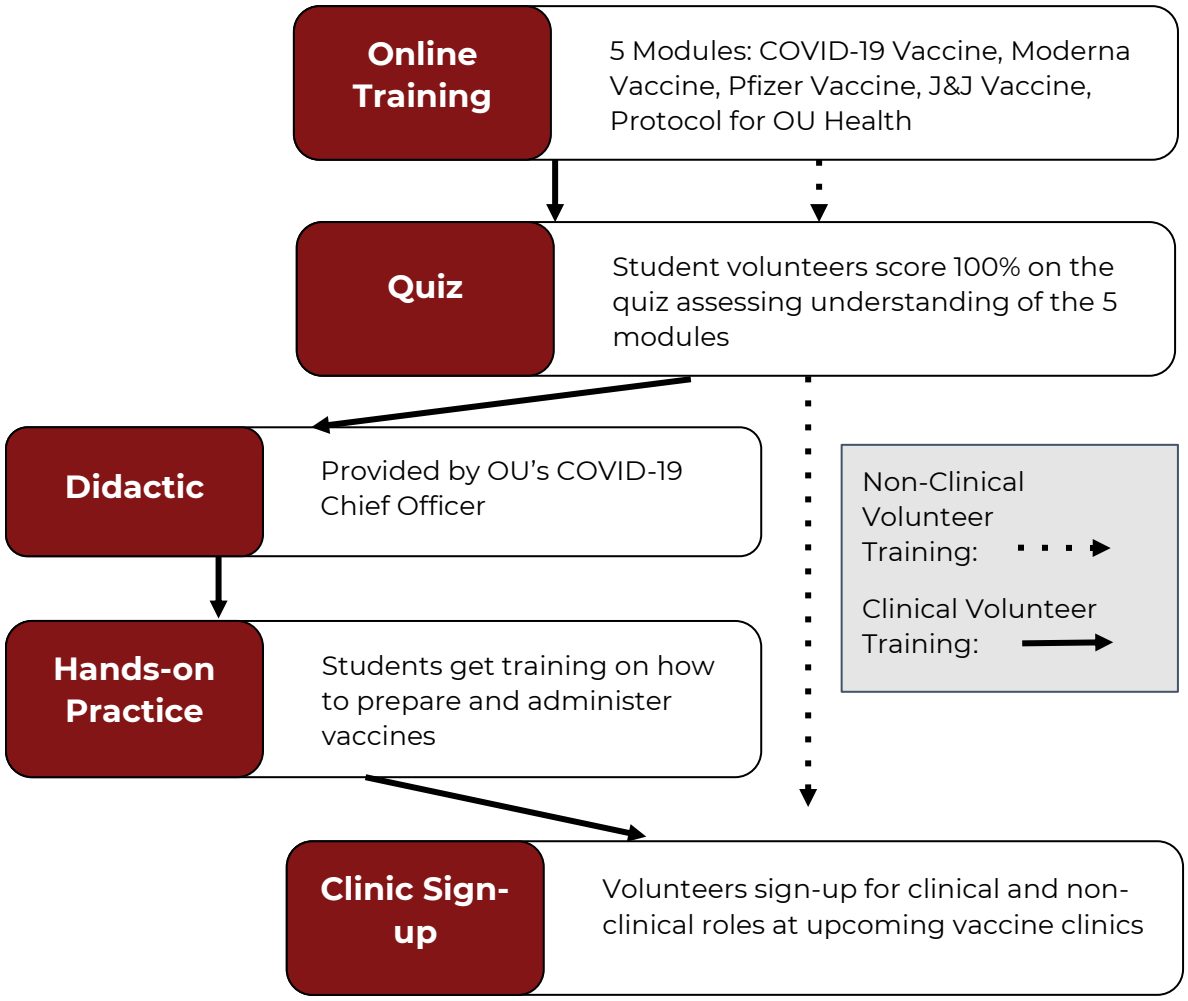
Establishing the COVID-19 Vaccine Clinic

Following EUA of the COVID-19 vaccines, the Oklahoma State Department of Health (OSDH) began consolidating strategic community partners to help distribute the vaccine. One of these strategic partners was The University of Oklahoma (OU) Health, which is the adjunct hospital system to OUHSC. The working group then recognized the educational and interdisciplinary value that the vaccine initiative could provide for OUHSC students. As a result, student leaders of Unity Clinic were contacted to coordinate student volunteer recruitment, training, and on-site clinic operations for the COVID-19 vaccine clinics. To date, no previous COVID-19 mass-vaccination events have been documented by other SRFCs; as such, the students of Unity Clinic developed the vaccine clinic with insight from experts at the academic center.

For recruitment, student volunteers of Unity Clinic were asked to complete a Google Form (2020, Google, Mountain View, CA) indicating their interest in volunteering. Students were organized based on their professional program, which determined what activities they were qualified to participate in within vaccine clinic operations. For example, nursing, dental, and medical students were qualified to perform vaccine injections with the oversight of a faculty member from their program, whereas public health and graduate students were qualified to participate in non-clinical roles. Injection training sessions were offered for qualified students on a first-come, first-served basis with OU's COVID-19 Chief Officer overseeing the training and certification process summarized in Figure 1. Students were required to complete an online training and quiz assessing their basic knowledge of the Pfizer BioNTech (COMIRNATY) mRNA, Moderna mRNA, and Johnson & Johnson's (J&J) Janssen viral vector COVID-19 vaccines prior to signing up for an on-site training session. Then, students viewed a didactic provided by the Chief Officer and participated in a hands-on injection skill workshop with guidance from OU Health providers. Once completed, students were provided with proof of certification of their vaccine injection training.

Clinic infrastructure and supplies were purchased and provided by OU Health, and all COVID-19 vaccines were supplied by the OSDH. Prior to each clinic, a SignUp Genius (2021, Lumaverse Technologies, Charlotte, NC) form was sent to the volunteer email list. Then, students scheduled themselves to volunteer in specific roles at specific vaccine clinic sites and dates. Clinic sites were identified within and near the hospital campus for patient accessibility and ease of transportation of clinic supplies. The

Figure 1. Process workflow of Unity Clinic vaccine clinic volunteer training and onboarding



COVID-19: coronavirus disease 2019; OU: University of Oklahoma; J&J: Johnson & Johnson

designated COVID-19 working group, composed of OU Health staff and administrators, OUHSC faculty, and Unity Clinic student leaders, met weekly to discuss and develop the clinic protocol, workflow, and other pertinent matters regarding the clinic. Furthermore, a student leadership committee was organically formed to address on-site operational needs and improve clinical operations.

Clinic Structure and Workflow

The OUHSC faculty, staff, and health profession students participated in a collaborative effort to administer the COVID-19 vaccine to the community through Unity Clinic. With guidance from faculty and staff, student leaders serving as Volunteer Coordinators delegated clinic responsibilities to clinical and non-clinical student volunteers. Students that volunteered were able to serve in several different capacities: Wayfinder, Greeter, Front Table Check-in, Administrative, Runner, Vaccine Puller, Vaccine Administrator, and Monitor. Of these roles, Wayfinder, Greeter, Front Table Check-in, Administrative, and Runner were non-clinical volunteer roles, and Vaccine Puller, Vaccine Administrator, and Monitor were clinical volunteer roles. Both clinical and non-clinical volunteers were respectively coordinated and led by an identified Volunteer Coordinator representing Unity Clinic (Figure 2).

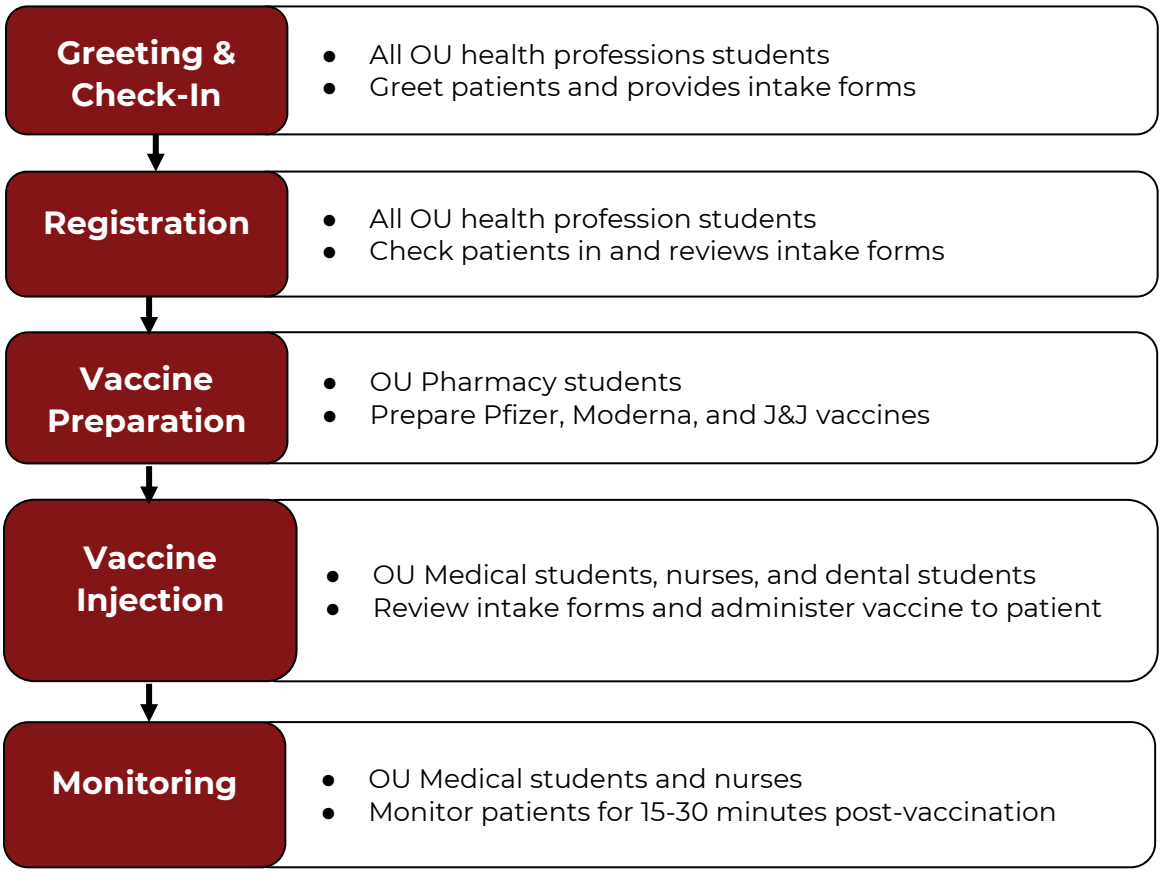
When a patient arrives to Unity Clinic to receive a COVID-19 vaccine, the patient is greeted by a volunteer, provided an intake form, and directed to proceed to registration, where volunteers check the patient in and review the

Figure 2. Description of the various clinical and non-clinical volunteer roles within the Unity Clinic vaccine clinic

Non-Clinical Volunteers	Clinical Volunteers
• **Wayfinder**: Direct arriving patients to designated parking and the clinic and maintain general flow of foot traffic. • **Greeter**: Welcome arriving patients as the face of OUHSC and direct them to various designations within the clinic. • **Front Table Check-In**: Pre-screen arriving patients for COVID-19 symptoms and prior adverse reactions to medications, vaccinations, etc. • **Administrative**: Check in patients on the database system and document their vaccination status. • **Runner**: Fill in any administrative/organization gaps as necessary. Serve as the bridge between all facets of the clinic.	• **Vaccine Puller**: Draw individual vaccine doses from stock vials using sterile technique. • **Vaccine Administrator**: Screen patients for any contraindications to the vaccine and deliver the vaccine injection • **Monitor**: Observe patients for 15-30 minutes post-vaccination and seek help from on-site licensed provider in case of any significant adverse reactions.

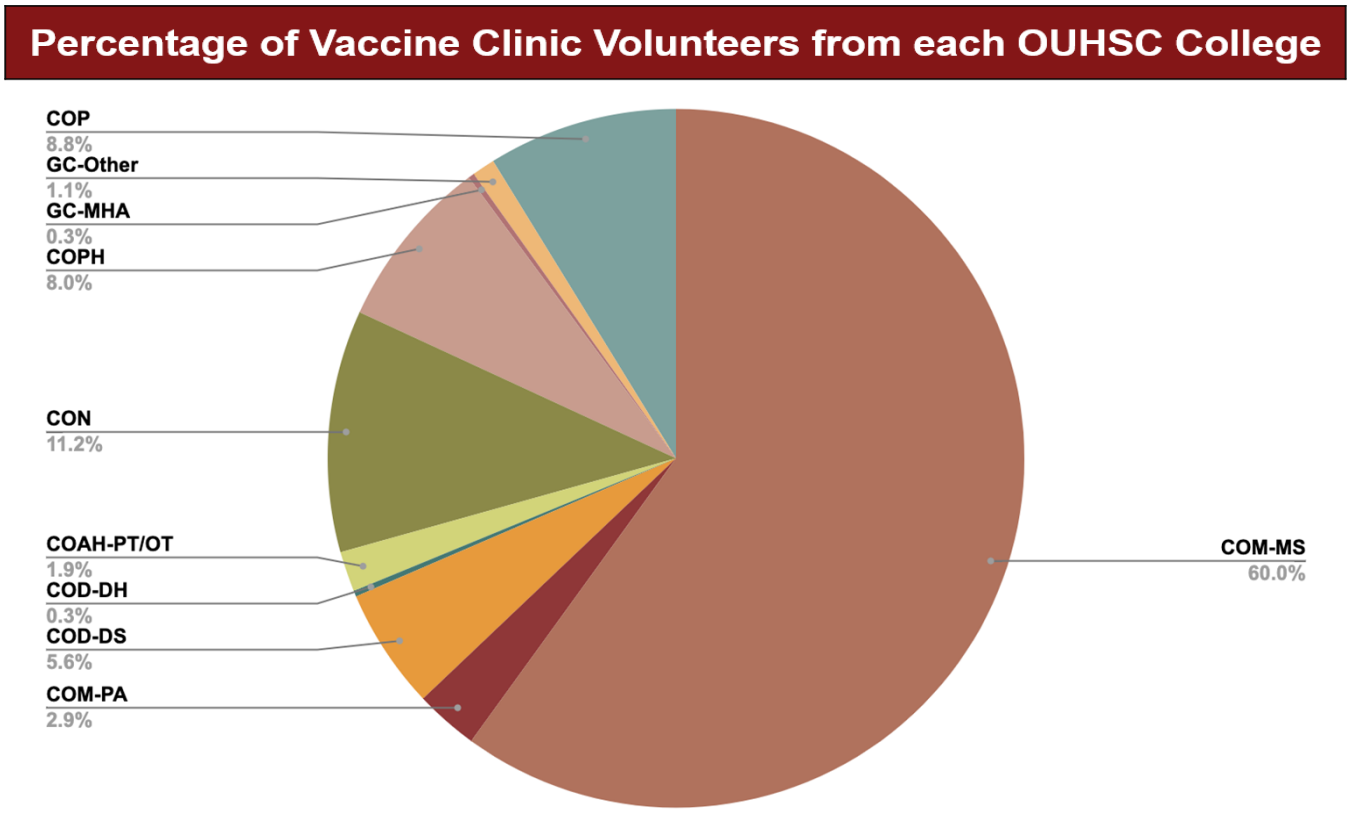
OUHSC: University of Oklahoma Health Sciences Center; COVID-19: coronavirus disease 2019

Figure 3. Unity Clinic vaccine clinic workflow



OU: University of Oklahoma; J&J: Johnson & Johnson

Figure 4. Percentage of Vaccine Clinic Volunteers from each University of Oklahoma Health Sciences Center College (n=375).



There are 10 slices depicted on the pie chart representing the different student volunteer colleges within the University of Oklahoma Health Science Center (OUHSC): College of Pharmacy (COP), Graduate College-Other (GC-Other), Graduate College-Masters in Health Administration (GC-MHA), College of Public Health (COPH), College of Nursing (CON), College of Allied Health-Physical Therapy/Occupational Therapy (COAH-PT/OT), College of Dentistry-Dental Hygienists (COD-DH), College of Dentistry-Dental Students (COD-DS), College of Medicine-Physician Assistants (COM-PA), and College of Medicine-Medical Students (COM-MS).

patient's intake form. The intake form details a patient's required personal information and outlines patient responses to a series of COVID-19 and vaccination screening questions (Online Appendix). Following check-in, the patient is directed to a station where the vaccine will be administered.

Once a patient is prepared to receive the COVID-19 vaccine, a clinical volunteer reviews the patient's intake form and discusses any positive responses to the screening questions. Depending on the specific positive responses on the intake form, the patient will be directed to wait for 15 or 30 minutes for post-injection monitoring.

After the vaccine is administered, the patient completes the predetermined 15 or 30 minutes of monitoring. The monitoring area is equipped with medical supplies and staffed by a physician to address any potential adverse reactions. After monitoring is completed, provided the patient has no adverse reactions, the clinical volunteers confirm the patient has waited the appropriate amount of time and directs them towards the clinic exit (Figure 3).

Outcomes

During each vaccine event, OU Health's Information Technology team tracked the vaccination rates in real time. This data was retroactively utilized to assess the success of these clinics, and Institutional Review Board approval was not required due to the descriptive nature of this report. Success outcomes of the interdisciplinary

SRFC COVID-19 vaccine clinics were evaluated by analyzing several variables, including:

- the number of unduplicated student volunteers,
- the number of student volunteer hours completed,
- the number of vaccines administered, and
- the hourly rate of vaccine administration.

Since mid-January of 2021, Unity Clinic has provided COVID-19 injection training and certification for approximately 300 students representing the professions of dentistry, dental hygiene, medicine, and physician assistant. Pharmacy and nursing students are excluded from this total because injection training is already a part of their formalized curriculum. In total, Unity Clinic had approximately 375 student volunteers. For SRFCs that hope to implement a similar COVID-19 vaccine program at their academic institution, it is important to incorporate students from all represented health professions in order to create an enriching interdisciplinary educational opportunity and sustainable volunteer model. A detailed breakdown of Unity Clinic's student volunteers based on health profession can be found in Figure 4. From January 6 to July 16 of 2021, Unity Clinic held 119 clinics for community members to receive the COVID-19 vaccine at no cost.

During those COVID-19 vaccine clinics, 31,306 Pfizer vaccines, 6,356 Moderna vaccines, and 2,003 J&J vaccines were administered. The Pfizer and Moderna COVID-19 vaccines are a two-dose regimen, while the J&J COVID-19 vaccine is a one-dose regimen. In total, an estimated 21,000 patients received a full regimen of their respective COVID-19 vaccine through Unity Clinic.

Unity Clinic's COVID-19 vaccine clinics were stratified into groups based on the number of vaccines administered. Small clinics administered 100 to 500 vaccines (n=19), intermediate clinics administered between 500 and 1000 vaccines (n=14), large clinics administered between 1000 and 2000 vaccines (n=9), and mega clinics administered over 2000 vaccines (n=4). The remaining COVID-19 vaccine clinics administered less than 100 vaccines (n=73). Small clinics had an average efficiency of 45 vaccinations per hour, intermediate clinics had an average efficiency of 72 vaccinations per hour, large clinics had an average efficiency of 107 vaccinations per hour, and mega clinics had an average efficiency of 158 vaccinations per hour. The largest mega clinic provided 3,185 vaccinations, and the highest efficiency achieved was 204 vaccinations per hour.

Table 1. Outcome measures from Unity Clinic's COVID-19 Vaccine Clinics

Variable	Number
Vaccine clinics	
Total	119
Total clinic hours	592
Vaccinations	
Pfizer	31,306
Moderna	6,356
Johnson & Johnson	2,003
Total	39,665
Efficiency* (number of vaccines administered)	
Small clinics (100-500)	45
Intermediate clinics (500-1000)	72
Large clinics (1000-2000)	107
Mega clinics (>2000)	158
Highest rate	204
Student volunteers	
Total	375
Total volunteer hours	16,830

Dataset collected from January 6, 2021 to July 16, 2021.
**Efficiency is measured as vaccinations per hour.*

In total, the 119 COVID-19 vaccine clinics operated over 592 cumulative hours, with a clinic lasting, on average, approximately 5 hours. The vaccine clinic of the longest duration was 14 hours, which was classified as a mega-clinic, based on the number of vaccines administered. Over the 119 clinics, 16,830 volunteer hours were logged by a variety of OUHSC health profession students, which does not account for time volunteered for online or in-person training (Table 1).

Discussion

The COVID-19 pandemic is a global crisis associated with significant morbidity and mortality. To date, the best strategy to mitigate this disease's effects on society, especially our most vulnerable community members, is to distribute and administer the COVID-19 vaccines as quickly,

efficiently, and strategically as possible. This requires a community-based approach involving buy-in from both the private and public sectors, and specifically, academic institutions with strategic relationships in the community.

Presently, Unity Clinic's COVID-19 vaccine clinics have the potential to serve as a model for other SRFCs to replicate in communities across the country. SRFCs have the potential to have a significant local, national, and global impact on the COVID-19 pandemic. The 39,665 vaccines administered through Unity Clinic composes 1.2% of all COVID-19 vaccines administered in the state of Oklahoma and 11.1% of all COVID-19 vaccines administered in Oklahoma County.[11] These outcomes provide reason to believe that SRFCs can play a significant role in COVID-19 vaccine rollout in every state in the country. On a broader level, it also provides preliminary evidence that SRFCs can play a significant role in addressing some of society's most pressing public health issues. Given the patient population that SRFCs typically serve, this could be of particular interest in mitigating access to care issues that have hindered many members of medically underserved communities from receiving the COVID-19 vaccine. Outside of the COVID-19 pandemic, the vaccine clinic model described in this report has potential to serve as a strategy to mitigate other diseases, like the seasonal Influenza A and B epidemics. In addition, this model could be adapted to meet other needs in the community, such as pediatric and adult vaccinations in medically underserved communities.

Since the early months of the COVID-19 vaccine rollout, vaccine rates have plateaued or decreased as misinformation has led to increasing distrust of the vaccines and fear of their potential side effects. This bias has also been shown to be more prevalent in smaller minority communities, where access to healthcare and health education is largely inadequate.[12] Furthermore, many minority populations understandably have a historical basis for distrust of healthcare in the United States.[13–15] However, the data has consistently shown that vaccination from COVID-19 is associated with decreased risk of morbidity and mortality due to the virus, and it remains as the gold standard for combatting the pandemic.[16] To address this growing issue and adapt to the community's needs, Unity Clinic has transitioned from mass vaccination events to more local, community-based clinics at the explicit request of various community organizations across Oklahoma County. In these ongoing clinics, student leaders consult with partner organizations and determine optimal site-specific clinic workflow. Additionally, students operate the clinic with supervision and guidance from a licensed OU Health provider.

Unity Clinic successfully created an interdisciplinary, student-run mass-vaccination initiative to combat COVID-19 in Oklahoma County. The success of this vaccination initiative demonstrates the vital role that interdisciplinary collaboration among healthcare professionals can play in the community, especially in times of emergent need. Moreover, this initiative highlights the adaptability exhibited and impact made by health profession students in forming a fully functional SRFC on short notice. These COVID-19 vaccine clinics provided clinical patient experience for students and empowered them to continue reaching out to their communities, despite not yet having a license to practice. In addition, medical students were able to log their hours as credit towards a Community Health elective; nursing students were able to log their hours towards their total clinical experience for their program; and pharmacy students were able to hone their skills by drawing and distributing the COVID-19 vaccine to OU Health employees and students specifically. OU Health recognized these outcomes and, as a result, entrusted Unity Clinic student volunteers with autonomy, supplies, and faculty preceptors to coordinate and operate other, "pop-up" vaccine clinics off-campus and in the community.

Three foundational elements were identified as being required for a successful COVID-19 vaccine clinic program. First, it is important to have a collaborative working relationship with the local state or county department of health for access to resources, support, and most importantly, COVID-19 vaccines for the clinics. Second, it is crucial to have support and buy-in from the health institution directly affiliated with the SRFC, which can assist with designing the vaccine clinics as an educational opportunity for all health professions. Finally, significant health profession

student interest and involvement in planning, leading, volunteering, and improving the vaccine clinics is a key component in creating a sustainable and impactful COVID-19 vaccine clinic.

While the student-run vaccine initiative through Unity Clinic is generally regarded as a major success from inception to carry-out, there were still opportunities for improvement that could be implemented in the future at other SRFCs interested in starting their own COVID-19 vaccine clinics. Many of the clinic's areas of need were largely attributed to the time constraints within which volunteers were working. Given the emergent nature of the COVID-19 vaccine roll-out, opportunities for systematic data tracking were not thoroughly sought out prior to the clinic's launch, resulting in a disorganized approach to quality improvement of clinic operations and a resulting potential delay in achieving our maximum clinic efficiency. Similarly, training and onboarding volunteers could be strengthened with more standardized tutorials and certified experts, especially regarding the patient registration and screening platforms. Finally, distinguishing a student representative from each profession program would allow for more accurate and comprehensive feedback of all aspects of the clinic, from drawing the vaccine to post-vaccination monitoring. Our hope is that the lessons we learned from our own experience can benefit other SRFCs to proactively develop a clinic infrastructure if an urgent need were to arise again.

Conclusion

From conceptualization to operation, Unity Clinic student volunteers have demonstrated an unwavering commitment to the vaccine initiative, a collaborative attitude throughout the planning and implementation processes, and a highly adaptive approach to any obstacles that arose along the way. We believe that our clinic model and practices are transferrable across many SRFCs across the country and can be further expanded upon. We are continually inspired by what students have already accomplished within SRFCs and motivated by how students' experiences within SRFCs will mold them into more adaptable, equitable, and humanitarian champions of health.

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Disclosures

The authors have no conflicts of interest to disclose.

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