CASE STUDY

Rapid Development and Implementation of a Covid-19 Telehealth Clinic for Obstetric Patients

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To limit the chance of exposing obstetric patients to the coronavirus at its health care facilities, Columbia University Irving Medical Center quickly and efficiently implemented a telehealth process to monitor this high-risk population. The Virtual Covid Clinic includes virtual visits and easy-to-follow algorithms for triaging patients and transitioning between outpatient and inpatient care.

KEY TAKEAWAYS

» Virtual monitoring is essential during the coronavirus pandemic.

» A telehealth model must include close patient surveillance and engagement.

» Standardized visit templates and escalation protocols are needed.

» Effective communication and coordination can minimize viral exposure.

» Technical problems with video connections will occur; non-video phone calls are a viable alternative.

The Challenge

Over the past decade, telehealth, in conjunction with mobile health technologies such as health care apps and remote-monitoring equipment, has emerged as a convenient and cost-effective way to deliver care to patients for whom health care accessibility is limited. However, a dearth of
randomized trials proving the efficacy of telehealth techniques, especially in obstetrics, as well as practical difficulties with implementing these services, has slowed the integration of telehealth into the United States health care system.1-3 Despite these logistical obstacles and a lack of high-quality evidence, there is agreement in the scientific community that telehealth can improve access to care, decrease cost, and improve the patient experience.4

The Covid-19 pandemic has presented new challenges that telehealth is uniquely situated to solve.5,6 In a transformed world where social distancing is the norm and keeping patients out of hospitals and waiting rooms is imperative to slowing the spread of the virus, suddenly all patients have decreased access to health care, not just those who are geographically remote or socioeconomically disadvantaged. In health systems across New York City — including our own, Columbia University Irving Medical Center (CUIMC) — elective procedures and nonurgent visits are canceled and patients who would normally have been evaluated in person are triaged to determine the risk–benefit of exposure to a health care setting. Meanwhile, making care available to those known or suspected to have Covid-19 is a top priority.

The Goal

To minimize the exposure of obstetric patients with Covid-19 to health care facilities while quickly and efficiently implementing a process to monitor this high-risk population, we created a telehealth clinic that includes virtual visits and easy-to-follow algorithms for triaging clinical complaints and transitioning between outpatient and inpatient care. Unlike telemedicine systems of the past, which are generally implemented slowly as providers and patients acclimate to their use, this Virtual Covid Clinic (VCC) was implemented in a matter of days in order to meet the growing patient burden from the pandemic.

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Implementing a telehealth program with the rapidity required to meet patient needs at the peak of the pandemic was a particular challenge. As the public health crisis escalated, our department was making efforts to transition as much of our outpatient care as possible to telehealth, including prenatal and postpartum visits for non-infected pregnant women.

Prior to the outbreak of SARS-CoV-2, we had made some incremental progress toward incorporating telehealth into our practice. What had been a painstakingly slow process prior to the pandemic became a lightning-speed transition. In 2019, the Department of Obstetrics and Gynecology at CUIMC performed approximately 170,000 outpatient visits, 136 of which were video visits. In contrast, in just 2 1/2 weeks at the peak of the pandemic, the department performed 699 telehealth visits for routine obstetric care out of approximately 3,000 total obstetric visits. The VCC, as a disease-specific clinic to meet the needs of a pandemic, represents a unique component of a broader, department-wide rapid transition to telehealth within obstetrics.
The Execution

On February 1, 2020, exactly one month prior to the first confirmed Covid-19 case in New York City, our institution transitioned to a new Epic electronic medical record system, which has telehealth capability for all patients with camera-equipped smartphones. On March 13, 2020, our hospital system diagnosed its first pregnant patient with Covid-19. Starting with this index case, we contacted all Covid-positive patients by telephone at regular intervals to survey symptoms as we developed the virtual clinic. On March 23, we formally began seeing patients via video visits through the Virtual Covid Clinic (Figure 1).

FIGURE 1

Schematic for the Journey of a Sample Patient through the Virtual Covid Clinic (VCC)

This illustration shows the path that one patient might experience in the Virtual Covid Clinic.

When a patient tested positive for Covid-19 or had symptoms clinically suspicious for Covid-19 while awaiting test results, the clinical team caring for her alerted a dedicated tracking team via a centralized email address, who then added her to an electronic medical record (EMR) list and
a shareable spreadsheet for transparency and information-sharing. Patients were individually enrolled in the telehealth program via the MyChart mobile application and scheduled for a VCC visit by administrators from our Mothers Center, a preexisting multidisciplinary program within the Division of Maternal-Fetal Medicine that is designed to provide integrated high-risk obstetric care. Patients were scheduled for an initial visit within 24 hours of receiving a diagnosis of Covid-19 or of hospital discharge if testing was performed during an admission.

Each day, the provider assigned to the VCC accessed virtual visits via an electronic schedule. We created an algorithm that divided patients to visits every 24, 48, or 72 hours based on severity of symptoms (Figure 2).
Patients were instructed to measure their temperature twice daily and self-isolate. Patients with respiratory symptoms were prescribed a pulse oximeter and asked to measure their oxygen saturation daily. During virtual visits, patients were questioned regarding new or worsening symptoms and about obstetrical symptoms (Figure 3).
Patients triggering criteria for in-person evaluation were sent to OB triage or the Emergency Department, depending on their gestational age, and the patient arrival protocol was activated. The labor and delivery charge nurse and covering providers were notified so they could secure isolation rooms. Patients were met outside the hospital, given a mask, and escorted inside to minimize risk of exposing others by assisting with doors and elevators. Patients discharged from triage or the Emergency Department restarted virtual outpatient management. Patients were followed for a minimum of 14 days after their positive test result or until noted to have sustained improvement of
symptoms, whichever came later. After 14 days, patients were discharged from the VCC to the care of their prenatal provider with recommendations to continue social distancing as endorsed by the Centers for Disease Control and Prevention (CDC).7

**Hurdles Faced**

The team responded to several situations that presented obstacles.

**Patient Tracking**

As with other rapid changes made during the pandemic, we encountered some obstacles. We did not have a sophisticated way to query the EMR for patients who tested positive for Covid-19 or to receive an automatic alert when a positive test resulted. Thus, we created a central email address for ease of notification of the tracking team by clinical providers. On March 22, 2020, we instituted universal screening of patients admitted to the obstetric service; the VCC team was informed of any patient who screened positive via the same mechanism.

**Language Barriers**

English is not the preferred language of many of our patients and our EMR telehealth platform does not have built-in interpreter services. We overcame this obstacle by calling interpreters on a separate device on speaker phone. Interpretations were then clearly audible to the provider and patient.

**Patient Outreach and Technological Issues**

Occasionally patients were not able to connect to the video interface. In these instances, we would conduct phone visits. Afterward, office staff contacted the patient to troubleshoot the application. We also were unable to reach several patients by video or phone. After two attempts, their prenatal provider was informed and would attempt to reach the patient. If the patient was not reached by the 14th day of her follow-up period, she was discharged from the clinic.

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**Vital Sign Monitoring**

When designing the VCC, we explored options to measure vital signs remotely. Although remote patient monitoring is ideally suited to this scenario, we did not have access to a system that would rapidly allow us to implement an escalation plan based on parameters appropriate for pregnant patients. During the first week of the program, patients were asked to check their temperature daily with a home thermometer and prescribed pulse oximeters. They were counseled about abnormal
By the third week of the program, our hospital obtained a supply of pulse oximeters for outpatient surveillance. With no universally accepted device on the market for fetal monitoring, patients were counseled on fetal movement counting with strict precautions for decreased fetal movement.

**The Team**

To consistently execute telehealth visits, a dedicated VCC team was constructed, including trainees and faculty who were responsible for patient tracking and telehealth visits and administrators responsible for scheduling. A stepwise protocol was created, and all providers were trained on the process and execution of telehealth visits. Administrators were drawn from the existent infrastructure of the Mother Center, with the Center’s coordinators and schedulers acting as coordinators and schedulers for the VCC.

Initially, one Maternal-Fetal Medicine attending and one fellow were the only providers seeing patients in the VCC. As the clinic’s census grew, more coverage was required and the coverage pool was expanded to include residents from the Department of Obstetrics and Gynecology. Beginning April 4, 2020, a second-, third- or fourth-year resident was dedicated to the VCC each day, alternating on a rotating basis. Residents presented patients to and discussed plans with the Maternal-Fetal Medicine attending. With a census of 69 patients in our study period and a maximum of 26 visits on our busiest day, one to three providers were scheduled to see patients each day.

**Metrics**

We undertook a retrospective review of our follow-up of obstetric patients who tested positive for Covid-19. We abstracted data from all patients who were followed from March 23, 2020, to April 8, 2020. The EMR was reviewed for information regarding payer status, gestational age at entry to evaluation for Covid-19, test date, date of symptoms onset, rate of no-shows for telehealth appointments, and need for triage evaluation or admission. Descriptive statistics were tabulated for all patients. All statistics are deemed to be descriptive because our cohort was not gathered from random selection. Categorical variables were described as counts and percentages. Continuous variables were described as means or medians and interquartile ranges or simple ranges, as appropriate. This study was approved by the CUIMC Institutional Review Board (AAAS9214).

Of the 69 patients referred to the VCC, 67 were antepartum and two were postpartum. The mean gestational age of those pregnant at presentation was 30.4 weeks (SD 8.3 weeks). Most patients referred were suspected to have Covid based on symptoms while 11 patients (15.9%) were asymptomatic and tested per our obstetric admission guidelines; 46 patients (67%) held public insurance.

After initial presentation, eight patients (11.6%) required inpatient management; the rest were surveilled as outpatients. The mean number of telehealth visits per patient was 3.5 (SD 2.6) up to a maximum of 10 visits (Figure 4).
A total of 238 VCC visits were conducted; of these, 118 (49.6%) were via telephone and 120 (50.4%) were video. The program had a 15.9% no-show rate (45 scheduled visits or unanswered surveillance calls) (Figure 5).
These metrics are comparable to those of the Department of Obstetrics and Gynecology overall. During the same period, the Department completed 699 prenatal, preconception, or postpartum televisits for obstetric patients. There were 287 no-shows to telehealth visits, for a no-show rate of 29.1%. The in-person no-show rate during this time was 17.6%. Our algorithm for visit frequency was designed to establish contact with patients at least every 72 hours to account for the still-unknown disease course of Covid and the potential for rapid deterioration in patient status. A minimum of four visits would, therefore, be expected for patients with minimal symptoms and perfect attendance over the nearly 2-week period of the program.

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Twenty-one patients (30.4%) were escalated to in-person assessment following their VCC visit and six of those (8.7% of the total cohort, 28.6% of patients escalated) were admitted to the hospital. As of the time of data collection, of the 63 patients who had one or more visit with the VCC, 16 patients (25.4%) remain in the program, 26 (41.2%) have been discharged, and 21 (33.3%) were unable to be reached by VCC staff for subsequent scheduling or declined further follow-up.
While the VCC is still an active program and studies performed on telehealth for Covid-positive patients will certainly be performed after the pandemic is over, our metrics thus far (Figure 6) suggest that patients who initiated care with the VCC followed up with their virtual Covid care at a similar rate to non-Covid patients following up with their routine obstetric care. A loss rate of approximately one-third of established patients may be due to a constellation of factors, such as asymptomatic patients not believing that they need surveillance, a preference of patients to follow with their own provider for routine obstetric care, or a misunderstanding of the purpose of disease-specific surveillance. Still, with close to 30% of patients escalated to in-person treatment requiring hospital admission and with no known adverse events suffered at home among those patients who continued follow-up, it appears that our escalation algorithms are reasonable, though further validation will be needed as time progresses.

FIGURE 6

**Virtual Covid Clinic Over Time**

This figure shows the progression of the VCC through the peak of the pandemic, with number of patients with symptom onset, new positive tests, televisits, hospital admissions, and discharges from the program per day.

Source: The authors

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Where to Start

Institutions aiming to develop a virtual clinic, whether to fill an essential need during a pandemic or to augment existing clinical care models under normal circumstances, should first confirm the technological capabilities for video visits. Information technology staff should be involved early to facilitate optional telehealth functionality. Quickly forming a centralized team of clinical providers with the depth and flexibility to provide clinical and administrative coverage at predicted program scale, including key players with decision-making power, will streamline implementation and execution. Clear and precise algorithms for escalation to in-person care should be in place from the outset for standardization and quality assurance. Finally, early inquiries into adjunct remote patient monitoring devices to provide objective clinical data are recommended.

Next Steps

As the program evolves, our key measures of success will include minimization of loss to follow-up and percent of appropriate escalations in care. Inclusion of remote vital sign monitoring could provide an additional layer of safety and ensure that objective data are available for review. This also has the potential to reduce the number of obstetric triage visits. Stratification of patient outcomes by enrollment in the VCC versus standard of care would allow for further assessment of efficacy and safety of this model; however, given lack of standard of care in an unfolding pandemic, this may not be feasible.

The Covid-19 pandemic necessitated rapid adaptation of health systems and challenged providers to critically assess care models. We share our experience in the hope that this newly founded Covid-19 telehealth clinic may serve as a model for others experiencing the peak impact of the epidemic. Although the course of this pandemic remains uncertain, the transformations undertaken amidst this crisis have revealed the versatile capabilities of our system. We are now uniquely poised to harness this spirit of innovation and remodel our infrastructure to allow for the systematic implementation of telehealth in the future.

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References

1. Waller M, Stotler C. Telemedicine: a Primer. Curr Allergy Asthma Rep.

2. Magann EF, McKelvey SS, Hitt WC, Smith MV, Azam GA, Lowery CL. The use of telemedicine in obstetrics: a review of the literature. Obstet Gynecol Surv. 2011;66(6):170-8

3. Alves DS, Times VC, da Silva ÉMA, Melo PSA, Novaes MA. Advances in obstetric telemonitoring: a systematic review. Int J Med Inform.

4. Bradford NK, Caffery LJ, Smith AC. Telehealth services in rural and remote Australia: a systematic review of models of care and factors influencing success and sustainability. Rural Remote Health.

5. Rockwell KL, Gilroy AS. Incorporating telemedicine as part of COVID-19 outbreak response systems. Am J Manag Care. 2020;26(6):147-8

6. Park PG, Kim CH, Heo Y, Kim TS, Park CW, Kim CH. Out-of-hospital cohort treatment of coronavirus disease 2019 patients with mild symptoms in Korea: an experience from a single community treatment center. J Korean Med Sci.

7. U.S. Centers for Disease Control and Prevention. Social Distancing, Quarantine, and Isolation. Washington: U.S. Department of Health and Human Services. Accessed 16 April 2020. www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html.