Ohio Case Study #1

Provider: Cleveland Clinic Glickman Urological and Kidney Institute

Topic: Virtual Visits for Men's Urological Care

AMA Virtual Care Value Streams: Clinical Outcomes, Quality and Safety; Access to Care

Executive Summary

Cleveland Clinic is a not-for-profit, integrated health care system dedicated to patient-centered care, teaching, and research. With a footprint in Northeast Ohio, Florida and Nevada, Cleveland Clinic Health System operates 19 hospitals with approximately 6,000 staffed beds, 21 outpatient Family Health Centers, 11 ambulatory surgery centers and numerous physician offices. Cleveland Clinic employs more than 4,600 salaried physicians and scientists. In 2020, the system cared for 2.4 million unique patients, including 9 million outpatient visits and 273,000 hospital admissions and observations. And, in 2020, Cleveland Clinic conducted 1.2 million virtual visits, compared with 37,000 in 2019.

This increase in visits presents a plethora of data and information about the many uses and advantages of telehealth. One of the areas in which these advantages were seen is men's urological health. Cleveland Clinic recently conducted a national survey as part of the national "MENtion It" campaign that found some men prefer seeing their doctor virtually. The results of this survey help show that beyond increasing access to care, on-demand virtual visits in men's urological care can also help in the field of health equity and reaching minority and underserved populations. Rates of kidney failure from hypertension and diabetes are much higher in the Black-African American population. According to Cleveland Clinic, African American men are also at higher risk for developing the most dangerous types of prostate cancer.[1]

Survey Findings

The online survey was taken in 2021 by a representative sample of 1,000 American males 18 years of age and older, with additional oversamples for demographics representing Hispanic, Black/African American, Asian/Pacific Islander and Native American/Alaskan Native. Key survey findings included:

- One-quarter of men of color (26%) and 20% of white men said they visit their physician less than once a year or never.
- Sixty-six percent of all men used digital health services in the past 12 months.
- Roughly half (52%) of men of color and 37% of white men said when they need to visit a doctor, it is difficult for them to get the time off work to do so.
- Twenty-nine percent of all men said they would prefer to have an online visit with a doctor/health care professional rather than an in-person visit.

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[1] https://newsroom.clevelandclinic.org/2021/09/01/cleveland-clinic-national-survey-finds-some-men-prefer-seeing-their-doctor-virtually/

- Younger generations are more open to virtual visits, with 41% of millennials and 36% of Generation Z adults preferring an online visit, compared with 9% of boomers/silent generation.
- When discussing sexual health issues, 44% of all men said they prefer to speak with a doctor online or over the phone because they are too embarrassed to do it in person.
- More than half of Hispanic men (56%) said they prefer discussing sexual health issues with a doctor online because they're too embarrassed to do so in person.

Conclusion

Although the Cleveland Clinic expected to see an increase in access with the virtual health offerings, some of the health equity measures were less expected. Understanding that younger adult male patients, and particularly those men in the Hispanic community, are more willing to discuss and disclose sexual health issues online, has helped lead to more and better diagnoses in the areas of reproductive health and erectile dysfunction, as well as increased cancer screenings.

These findings will help encourage best practices at Cleveland Clinic by increasing access to virtual services, as well as help the Clinic strategically assess how to better serve certain populations in-person and help achieve better health equity.

"These findings have helped us understand better ways of reaching men of color, such as adding a Hispanic Men's Health Clinic at Cleveland Clinic Lutheran Hospital, a location with a large Hispanic population," said Georges Haber, MD, chair of urology in the Glickman Urological and Kidney Institute. "Our hope is to continue educating men that early detection through preventive health screenings and checkups are essential to diagnosing many of these conditions while they are still in early treatable and curable stages."

Survey Methodology

Key findings of an online survey conducted among a nationally representative sample of 1,000 American males 18 years of age and older, living in the continental United States. In addition to the general population sample of males, an oversample was collected for minority male races/ethnicities to reach the following total samples for each:

- Hispanic (n = 364 total sample)
- Black/African American (n = 318 total sample)
- Asian/Pacific Islander (n = 340 total sample)
- Native American/Alaskan Native (n = 355 total sample)

The online survey was conducted by Savanta and completed between May 18– May 27, 2021. The margin of error (MOE) for the total male Gen Pop sample at the 95% confidence level is +/- 2.12 percentage points.

Ohio Case Study #2

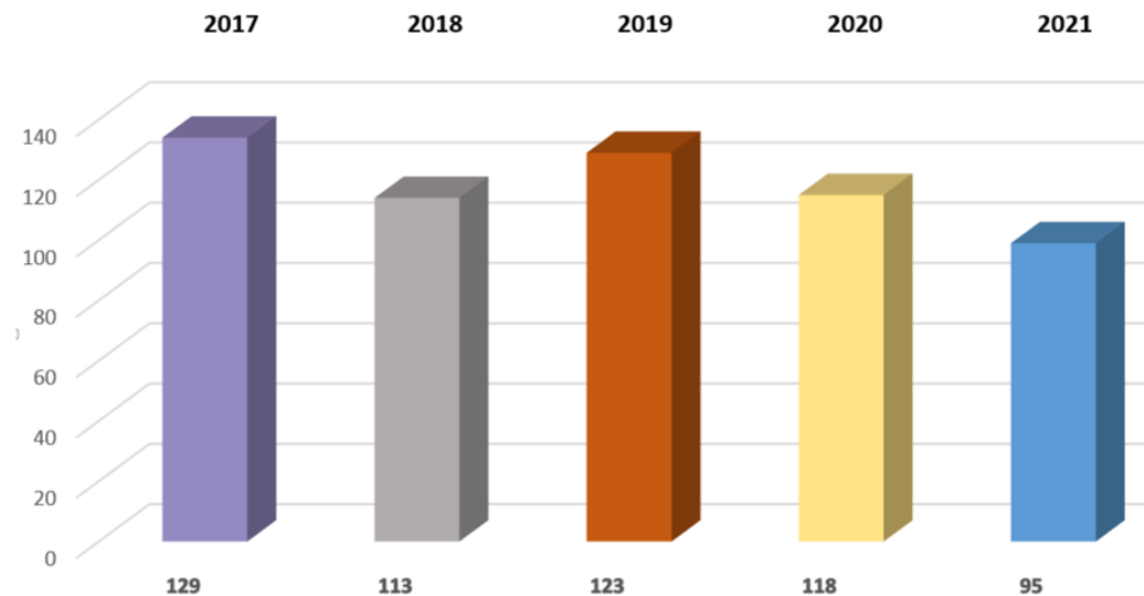Cleveland Clinic - Lung Transplant Remote Patient Monitoring

Strategic Goals

The Cleveland Clinic Lung Transplant Program utilizes remote patient monitoring to improve clinical outcomes. Home spirometry measurements provide data to maintain continuity of care.

Description

Cleveland Clinic is a nonprofit multispecialty academic medical center that integrates clinical and hospital care with research and education. The Cleveland Clinic Health System operates 21 hospitals with 6,496 beds in Ohio, Florida, Abu Dhabi, and London. In 2021, 226 outpatient locations accommodated 10.2 million patient visits, and virtual visits totaled 841,000.

Cleveland Clinic's Lung Transplant Program started in 1990 and throughout the last 30 years the team has completed more than 2,000 transplants. Importantly, long-term survival rates are above the national average. Annually, Cleveland Clinic is a leader in the number of lung transplants performed (Figure 1).
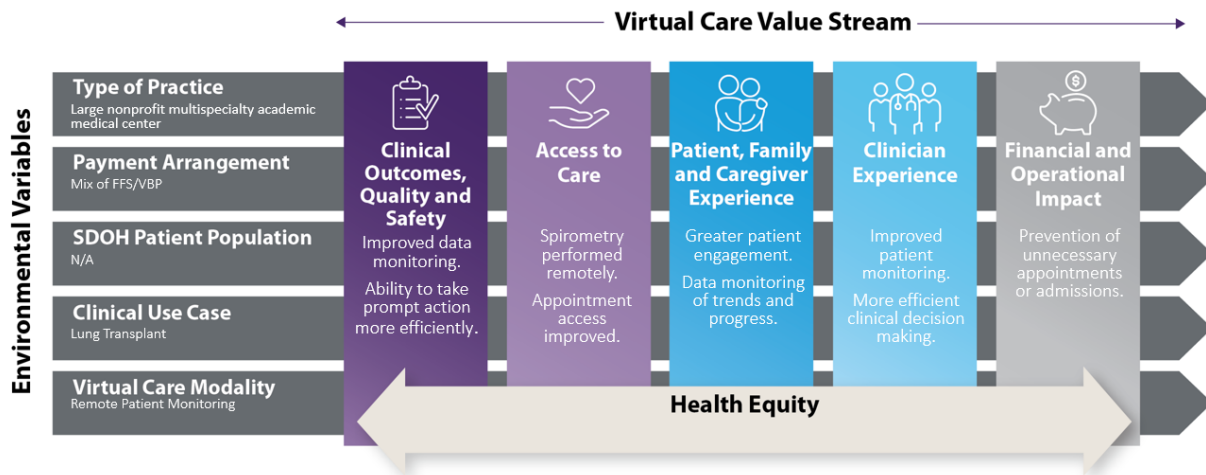
FIGURE 1. LUNG TRANSPLANTS PERFORMED 2017-2021

The program follows the patient for the life of their transplant, maintaining continuity of care. Before transplant, patients are evaluated every 3 months. Once the patient is discharged from the hospital after undergoing lung transplantation, outpatient visits occur weekly for the first 3-4 weeks, then a visit at 6 weeks, and then a visit every 1-3 months for the rest of their lives. At each of the in-person clinic visits the patient performs spirometry to help evaluate if infection or rejection may be present. Monitoring patient's lung function in the time between clinic visits may allow earlier detection of lung function decline.

To address this concern, the lung transplant patient monitors their lung function with a home spirometer. The patient performs home spirometry measurement sessions in the morning and evening every day for the first year. After the first year, home spirometry measurements are still performed at least once daily.

CLEVELAND CLINIC LUNG TRANSPLANT REMOTE MONITORING AND IMPACT SUMMARY

At the end of 2017, a spirometer with Bluetooth capabilities and connected to a smart device changed remote monitoring of lung transplant patients at the Cleveland Clinic (Figure 2). This allowed better monitoring while enriching patient and caregiver experience. Access to care was improved with financial and operations also being enhanced.
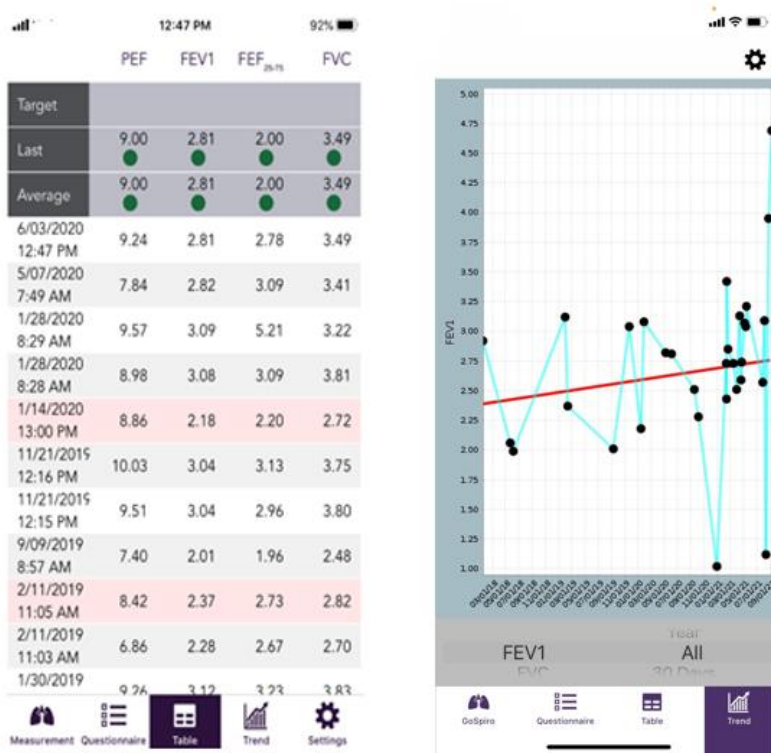
FIGURE 2. HOME SPIROMETER WITH RESULT

The spirometer provides the ability to transmit home measurements to the electronic health record. This feature is paramount in monitoring the data and maintaining compliance. Changes in the patient's condition are observed by receiving triggered alarms based on the data and being able to immediately evaluate the home spirometry measurements. Alarms are triggered based on weekly use and a drop in the Forced Expiratory Volume in the first second (FEV_1) greater than 10% for 3 consecutive days. Efficiently treating possible infection or rejection is important for long-term survival.

Being able to quickly take action is important for lung transplant patients due to being immunocompromised. A common occurrence is that patients contact the lung transplant team because they do not feel well. The additional information from home spirometry helps in decision making. One specific patient had very abnormal home spirometry measurements in the setting of increased symptoms, and the team sent the patient to the emergency department for evaluation. Another patient was routinely checking spirometry measurements providing numerous data points. The lung transplant team observed a decline in lung function and arranged for the patient to return to clinic sooner for evaluation. The return visit uncovered a cancer diagnosis. Bringing the patient back earlier than planned allowed the physician to take action on the new diagnosis as soon as possible.

Remote monitoring has provided for greater patient engagement with their care. Patients and families are able to see the data and know the lung transplant team are evaluating the same real-time information (Figure 3). The patient and their family can collaborate with their care team and are an important part of the process, taking ownership of their health versus just receiving guidance. This has also led to better clinical outcomes.

FIGURE 3. SPIROMETRY APPLICATION DATA AND TREND

A patient's position on the lung transplant list can change depending on the severity of their condition. If a patient's condition changes between visits, the opportunity to evaluate the patient's position on the lung transplant list could be delayed. In one instance, a patient was using a spirometer weekly prior to transplant. It was noticed the patient's lung function score dropped significantly. The physician became aware of the decrease and requested more testing, which confirmed the decrease in lung function. The re-evaluation of the patient caused a change in the patient's position on the United Network for Organ Sharing (UNOS) waiting list. Remote monitoring of the patient initiated action to bring about a transplant just 1 week later.

There have been operational and financial impact to the organization and its patients. The pandemic created hurdles with appointments, but also created opportunity. Patient safety is always a priority and the pandemic highlighted this for the immunosuppressed lung transplant patient. New measures were implemented to promote safe access for in-person appointments. New or impaired patients were seen in person. Stable, established patients had their in-person visits postponed based on their last visit. The patient's remote monitoring spirometry results

were also considered when evaluating a need for an in-person visit. Remote monitoring was highly valued with patients being seen virtually until it was possible to have the patient on site for their appointment.

Lung transplant patients routinely have appointments for high-demand procedures, such as spirometry, bronchoscopy, and computerized tomography (CT) scan. Remote monitoring has helped create greater access for patients by prioritizing those patients who need the procedure sooner. Patients who are remotely monitored and show stability are preventing unwarranted procedures from being ordered. The patients being remotely monitored are also active in maintaining their health, which is assisting in avoiding hospital admission. This ability to rule out unneeded procedures and hospital admissions creates a financial benefit to the patient and institution.

PROGRAM IMPACT

VALUE STREAM	EVIDENCE OF PROGRAM IMPACT
Clinical Outcomes, Quality and Safety	Alarm fired if a spirometry measure is not performed in seven days. Alarm fired if patient's FEV1 drops 10% for three consecutive days. Remote monitoring of the data with alarms allows for prompt action more efficiently to help evaluate infection vs rejection.
Access to Care	Patients perform spirometry at home providing measurements allowing continual evaluation of progress and health. Remote monitoring creates improved appointment access by triaging patients which need in person procedures sooner.
Patient, Family and Caregiver Experience	Patients and family are engaged as part of their health care team by being able to evaluate the same remote monitoring data. Patients and family can evaluate trends in their data knowing the progress of their health.
Clinician Experience	Clinicians are able to monitor compliance more effectively. Clinical decisions are more efficient with the ability to get alarm notifications, monitor remote data, and take action sooner.
Financial and Operational Impact	Remote monitoring confirms and prevents the need for additional procedures, emergency department visits, and hospital admissions.

Source: Data and content for this case study were provided by and used with permission from Cleveland Clinic.

Ohio Case Study #3

Provider: Cleveland Clinic Children's Hospital

Topic: Virtual visits for infants discharged from the NICU

AMA Virtual Care Value Streams: Clinical, Quality and Safety Outcomes, Access to Care (availability of care and equitable care), Health Equity (equity in access to care)

<u>**Executive Summary**</u>
Background: Cleveland Clinic is a not-for-profit, integrated health care system dedicated to patient-centered care, teaching, and research. The Neonatal Intensive Care Unit (NICU) of the Cleveland Clinic Children's Hospital comprises three NICUs: a level 4 unit at the main campus, and two level 3 units at Hillcrest and Fairview Hospitals. A substantial number of infants admitted to the NICU have a complex medical course. At discharge, many still have complex needs, which may be burdensome for parents who do not have the same support at home as in the NICU. We identified a potential gap in managing these fragile infants soon after being discharged from the NICU to home. Our objective was to bridge this potential gap when we started our Tele-neonatology program to follow up on infants discharged from the NICU. Since 2018, the program has grown manifold—from 113 visits in 2018 to 826 in 2021.

Methodology: This report is based on a two-part exploration of our program. The first part pertains to a study conducted with the parents about the relationship between the insurance type of the mother and her frequency of NICU visitation, and the time spent on skin-to-skin care of their infant. The second part is based on an ongoing survey of the feedback received from the parents of infants regarding their experience of the post-discharge virtual visit.

Outcomes: Of the 1,031 parent-infant dyads analyzed, 68.4% showed up for their virtual visit. In a subgroup of this population, the no-show rate was much higher in parents with government insurance (69%) compared with private (31%). A previous study had shown a similar gap in the visitation of government and private insured parents to the NICU. The parent-infant dyads who showed up for the appointment were more likely to be the mothers who also showed up to the NICU more often during their infant's stay (81.6% vs. 73.8% days of the week in the first 5 weeks of life); those who performed more skin-to-skin care of their infants (spent 38 minutes vs. 22 minutes per day); infants with more extended stay (66.8 days vs. 41.6 days); and those with a greater distance of their residence from the NICU (19.1 miles vs. 15.8 miles). Mothers who did not show up were more likely to have higher depression, anxiety, and stress scores and had infants with higher gestational age (31 vs. 29 weeks) and higher birth weight (1628 vs. 1351 grams).

The survey results based on 85 respondents who were asked about their experience with the virtual visits showed that the program was well-received. On a Likert scale-based scoring from

1-5, in response to the question "How helpful has this virtual telemedicine Zoom visit been to you?" the respondents gave an average score of 4.5/5. They scored the question "How well did the telemedicine visit meet your needs?" at an average of 4.6/5, and to the question "How strongly would you recommend this type of visit?" they scored an average of 4.4/5. Almost 80% of the respondents thought the visit added new information on top of the pediatrician visit. In addition, very few parents had technical difficulties during their visit.

Conclusions:
The disparity in visitation to the NICU between the government- and private-insured families persisted in their show-up rate at post-discharge virtual visits. Although the virtual visits could not bridge the gap between the insurance groups, it was encouraging to find that the visits were utilized better by parents of infants with more complex medical needs and those who stayed further away from the hospital. In addition, most parents found these visits to be very helpful.

The Tele-neonatology program has now expanded to include prenatal consults for mothers with complications of pregnancy and fetus. We have also started a follow-up Tele-lactation program provided by certified experts for mothers breastfeeding their infants at discharge from the NICU.

Future directions:
We identified gaps in support for the parents of normal newborns discharged from the nursery. Telemedicine on-demand with an expert answering questions and guiding these mothers could be a solution that can potentially reduce unnecessary readmissions and emergency room visits.

Ohio Case Study #4

Provider: Cleveland Clinic Center for Pain Recovery

Topic: Demonstration of Engagement and Effectiveness in Virtual Chronic Pain Programs

AMA Virtual Care Value Streams: Clinical Outcomes, Quality and Safety; Access to Care

Executive Summary

Cleveland Clinic is a not-for-profit, integrated health care system dedicated to patient-centered care, teaching, and research. With a footprint in Northeast Ohio, Florida and Nevada, Cleveland Clinic Health System operates 19 hospitals with approximately 6,000 staffed beds, 21 outpatient Family Health Centers, 11 ambulatory surgery centers and numerous physician offices. Cleveland Clinic employs more than 4,600 salaried physicians and scientists. In 2020, the system cared for 2.4 million unique patients, including 9 million outpatient visits and 273,000 hospital admissions and observations. And, in 2020, Cleveland Clinic conducted 1.2 million virtual visits, compared with 37,000 in 2019.

This increase in visits presents a plethora of data and information about the many uses and advantages of telehealth, and chronic pain is no exception. Chronic pain affects millions of Americans, many of whom have tried several treatments without full relief. The Cleveland Center for Comprehensive Pain Recovery (CCPR) was formed with the overarching goal of providing the most effective treatment and evaluation for individuals with chronic pain based on a "whole-person" model of care. The foundation of our approach lies in attention to the neurological/biological, psychological and social factors that impact pain. Individuals with chronic pain have unique and complex needs that require a specialized multidisciplinary approach. The CCPR team works together to provide this comprehensive approach to care in a centralized service.

The COVID-19 pandemic created major challenges for patients seeking pain care. For individuals with chronic pain, managing stress, engaging in physical activity and social connection are lifestyle necessities, in addition to having access to medical care. The pandemic created significant barriers, leading to more pain-related distress and less health promoting behaviors. Therefore, our team quickly converted many of our services to online and virtual formats to enhance accessibility to care with the onset of the pandemic in 2019. In 2019 only 1% of our team's psychology visits were virtual. By 2021, 94% of our psychology visits were virtual, and 81% of our pain medicine visits utilized a virtual format. Notably, we also found a 30% increase overall in pain psychology visits from 2019-2022. This study highlights patient engagement in our behavioral services for chronic pain, as well as outcomes from the programs.

Study Findings

PROJECT 1: Single Session Behavioral Pain Management Classes: Standard of Care for Chronic Pain Patients

Empowered Relief (ER) is a single-session, 2-hour pain relief skills class for acute/surgical and chronic pain that was developed by Beth Darnall, PhD, at Stanford University. Multiple randomized trials provide efficacy evidence for ER delivered across different patient populations and delivery formats.[1] The Cleveland Clinic has adopted ER as a standard of care approach for all patients who have chronic pain as well as individuals who are preparing for spine surgery. The class is a foundational approach as part of our TREK (Transform, Restore, Empower, Knowledge) for Success Programs. Our TREK classes are introductory pathways to our more intensive group treatment programs focused on restoring function and reducing emotional suffering related to chronic pain.

Our behavioral pain management classes are all offered virtually and delivered by a live therapist in a secure online format. To illustrate the feasibility and utility of the ER classes, we aimed to highlight the following:

- Participation rates in ER class (chronic pain and surgical cohorts), including number of patients who attended, cancelled, and no showed.
- Patient satisfaction with the ER class based on the post-class survey.
- Impact of the class on patient-reported outcomes, compared to patients who cancelled/no showed.

Results

A. Chronic Pain Cohort (Non-surgical)

Patient Engagement

A total of 307 patients were referred to the class, of which 221 (72.0%) completed the ER session, 61 (19.9%) canceled, and 25 (8.1%) no-showed. Average age of the entire cohort was 51.0 (SD = 14.1) years, with 70.4% female and 78.8% white (Table 1). Patients who completed the ER session were more likely to be male and lived in ZIP codes with higher median income, compared to patients who canceled or were no-shows for their ER session. There were no significant group differences for age, race, or marital status.

Class Acceptability and Utility

Immediately after the class, participants received an e-survey to assess their perceptions about the class, including satisfaction, perceived usefulness of information, and likelihood to use the skills learned; all items use a 10-point scale, where 1 is the lowest rating and 10 is the highest possible rating. A total of 71 patients whose reason for taking the class was for chronic pain completed the satisfaction survey. About 28% of patients were > 60 years old, with 80% female and 83% white. All means were between 6.70 and 7.61, and the medians were between 7 and 8.5. The largest mean was for the question, "How likely are you to use the skills and information you learned?" This question also had the greatest percentage of patients who answered "10" (31.0%).

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[1] https://empower.stanford.edu/

Impact of the Class on Patient Reported Outcomes

Among patients who completed the ER session, within-group change was statistically significant for the Pain Interference T-score, PROMIS Self-Efficacy for Managing Symptoms, Pain Catastrophizing (PCS) total score, and all PCS subscores (all $P < 0.01$), as well as the PROMIS Fatigue and PHQ-9 (depression) score. Among patients who completed the ER session, change in both PROMIS-GH Physical and Mental Health T-score, as well as PROMIS Physical Function T-score, PROMIS Social Role Satisfaction, and GAD-7 (anxiety) total score were not significant. Among patients who canceled or were no-shows, none of the within-group changes were statistically significant for all scales. For all scores and sub scores, there were no statistically significant between-group differences in change score (all $P > 0.08$); which is thought to be attributed to low completion rates of patient-reported outcomes (PRO) data by this group.

Question	Mean Score
How satisfied were you with the class?	6.90
Please rate your likelihood to recommend this class to another person who has chronic pain.	7.10
How relevant was this class to you?	6.70
How useful was the information presented in the class?	6.76
How likely are you to use the skills and information you learned?	7.61
How likely are you to participate in additional pain psychology services or programs offered in the CCPR (such as the Chronic Pain NeuroRehabilitation Program, Back on TREK; 1:1 counseling or other groups) as a result of participation in the class?	7.16

N = 70

B. Spine Surgery Cohort

Patient Engagement

Of the 227 patients who were scheduled for Empowered Relief, 126 attended the class (55.5% engagement rate). Class participants mean age was 63.7, with 62.6% female and 83.7% white.
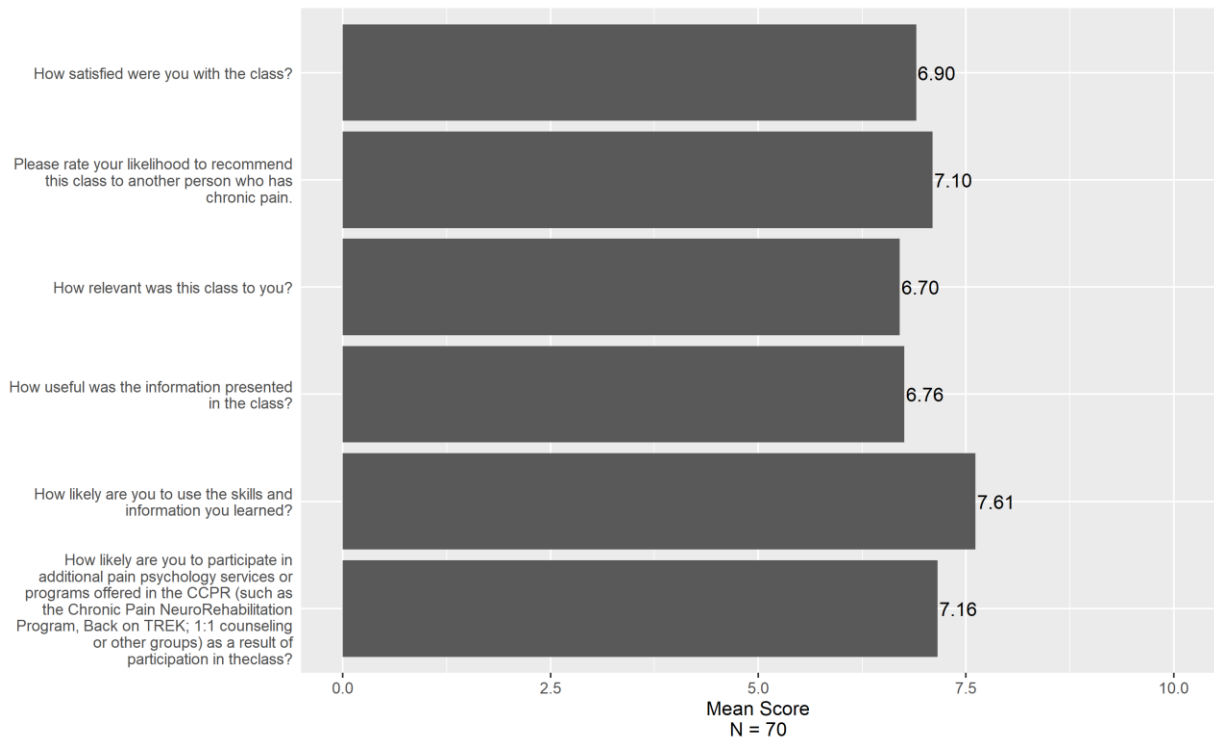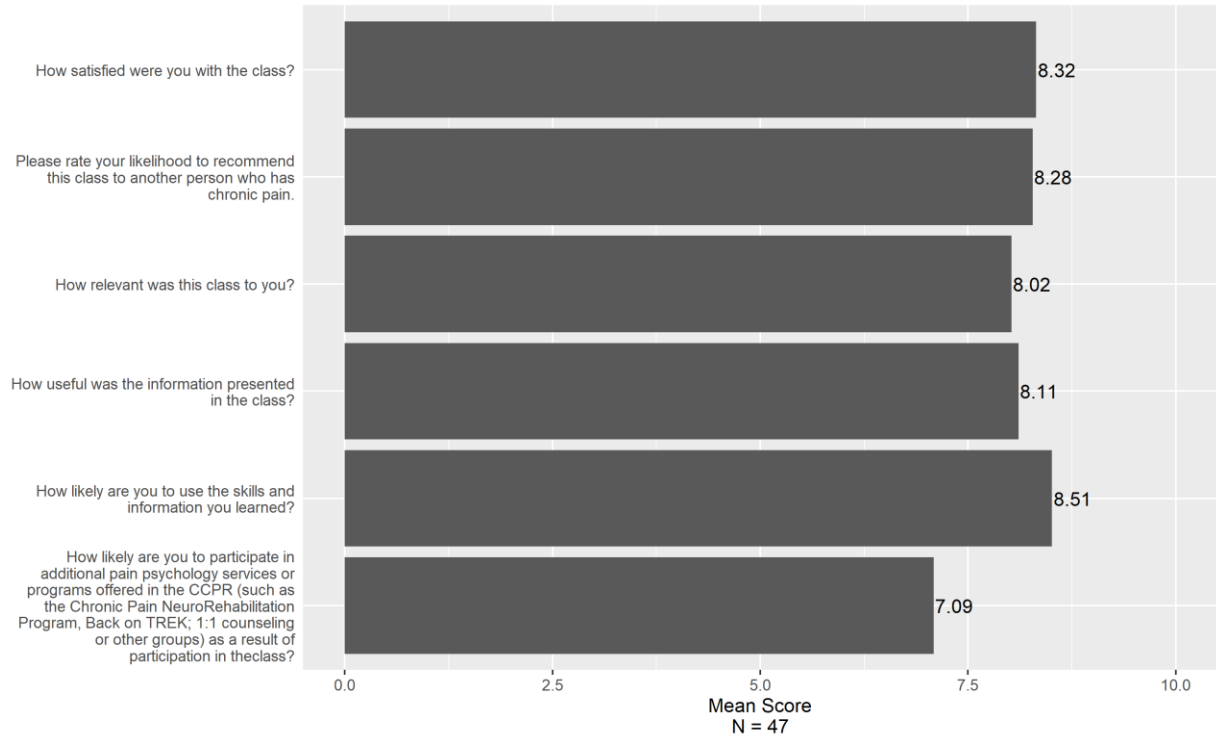
Class Acceptability and Utility

Immediately after the class, participants received an e-survey to assess their perceptions about the class, including satisfaction, perceived usefulness of information, and likelihood to use the skills learned; all items use a 10-point scale, where 1 is the lowest rating and 10 is the highest possible rating. A total of 48 patients completed the survey. Results show high levels of satisfaction, utility and acceptability.

Descriptive statistics of responses to satisfaction survey questions.

Mean Score
N = 47

Impact of the Class on Patient Reported Outcomes

Among patients who completed the ER class, there was significant improvement in PROMIS Pain Interference T-score (mean change = -1.6 points, SD = 7.2, P = 0.046). There were no significant between-group differences in change in score for all PROs, which is thought to be attributed to low completion rates of the PRO data by both groups.

PROJECT 2: Virtual Intensive Outpatient Program (IOP) for the Most Complex and Refractory Chronic Pain Patients

The Cleveland Clinic Chronic Pain Neuro-Rehabilitation Program is an intensive outpatient program (IOP) that focuses primarily on physical reconditioning, medication management, social re-engagement, and psychological coping strategies to ensure that chronic pain and other complex neurological symptoms do not take over a person's life. The goal of this program is to restore maximum level of comfort and function among those with persistent pain conditions. This program is offered in a predominantly virtual format wherein patients participate in group behavioral sessions 4 hours per day, 4 days per week as

well as virtual medication management appointments. This program also includes a one-week intensive physical and occupational therapy program that is delivered in person.

Program Engagement

A total of 316 patients were evaluated for the virtual IOP. Of these, 98 (31.0%) completed the program. Less than 1% of patients dropped out of the program after starting. Descriptive statistics of patient characteristics for the entire cohort and stratified by course completion status are shown in Table 1. Patients who completed the course were significantly less likely to be white (P = 0.024).
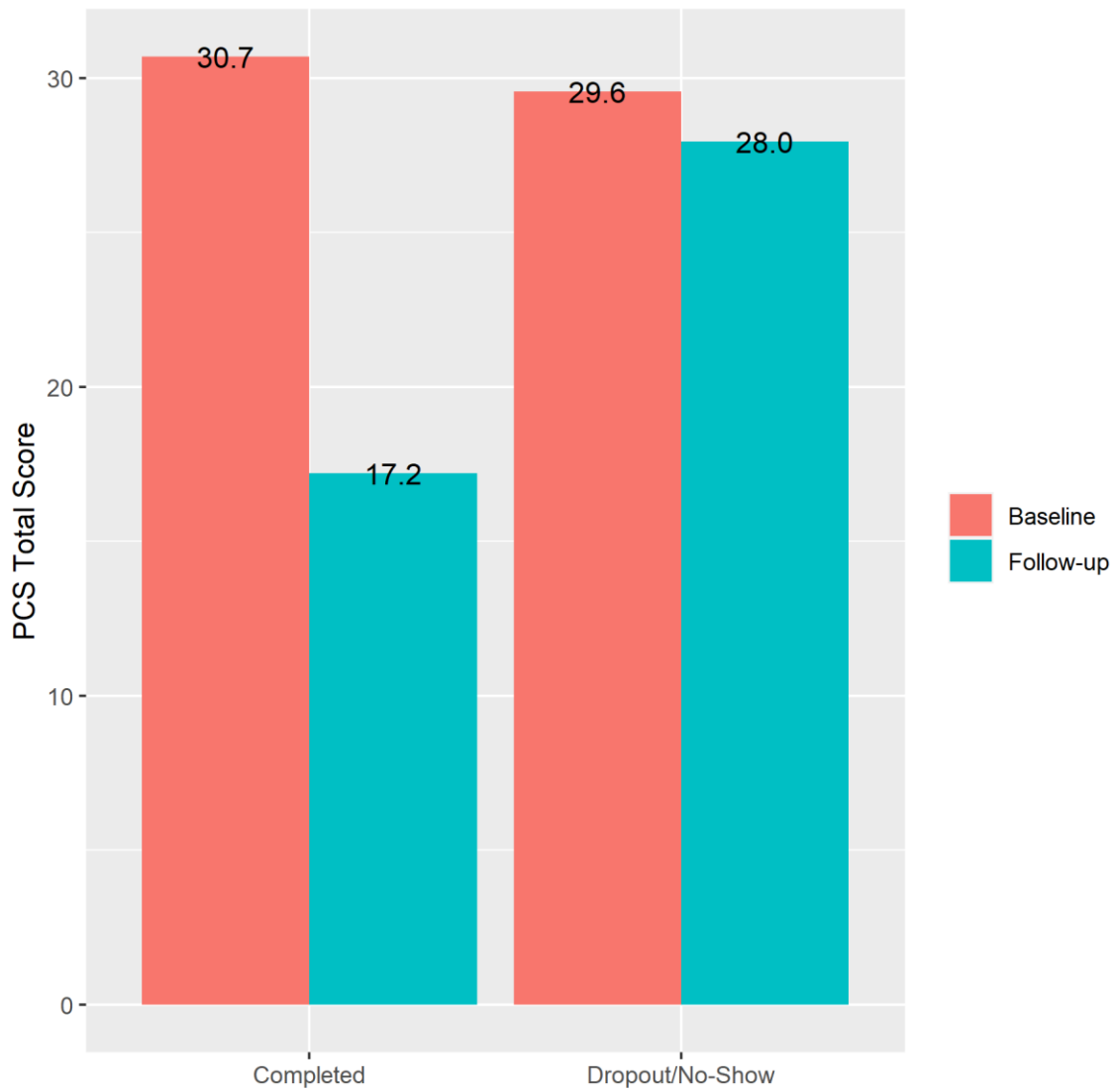
Impact of Program on Patient Reported Outcomes

Among patients who completed the IOP, there was statistically and clinically meaningful improvements in all patient-reported outcomes, except for anxiety (GAD-7), for which sample size was much smaller due to lower completion rates. Among patients who did not complete the IOP, there was statistically significant improvement in PROMIS Fatigue, PROMIS Pain Interference, and PROMIS Social Satisfaction; likely attributed to other treatment effects which were not controlled for in this analysis. Importantly, when comparing whether unadjusted change in score was different between the two groups, the group that completed the IOP had significantly more improvement for the majority of the pain outcome measures (PROMIS Global Health Physical, PROMIS Global Health Mental, PROMIS Pain Interference, PROMIS Physical Function, PCS Total Score and sub-scores, and depression (PHQ-9 total score).

Table 1. Patient characteristics for entire sample and stratified by whether patients completed their ER session.

	All Patients	Completed IOP	Did not Attend Or Dropped out of IOP	P-value
N	316	98	218	
Age, mean (SD)	48.0 (13.9)	48.1 (13.5)	47.9 (14.1)	0.918
Female	243 (76.9%)	76 (77.6%)	167 (76.6%)	0.886
Race				
White	246 (77.8%)	67 (68.4%)	179 (82.1%)	0.024
Black	41 (13.0%)	18 (18.4%)	23 (10.6%)	
Other	29 (9.2%)	13 (13.3%)	16 (7.3%)	

Marital Status				
Married	153 (48.4%)	45 (45.9%)	108 (49.5%)	0.900
Single	110 (34.8%)	37 (37.8%)	73 (33.5%)	
Divorced	45 (14.2%)	13 (13.3%)	32 (14.7%)	
Widowed	5 (1.6%)	2 (2.0%)	3 (1.4%)	
Missing	3 (0.9%)	1 (1.0%)	2 (0.9%)	
Median Income by ZIP Code (x $1,000), mean (SD)	52.8 (19.5)	54.2 (17.3)	52.2 (20.4)	0.382

Changes in Pain Catastrophizing: Comparison between patients who completed the CPNP versus those who do not participate

Changes in Depression: Comparison between patients who completed the CPNP versus those who do not participate

Conclusion

These findings support the possibility that components of chronic pain treatment may be well-suited by the ability to incorporate telehealth. The Cleveland Clinic's Center for Comprehensive Pain Recovery (CCPR) virtual single session behavioral pain class showed remarkable levels of engagement for both the general chronic pain and spine surgery cohorts, and high satisfaction in the class. Additionally, those who attended the classes demonstrated clinical improvements in important areas of pain management, including pain interference, pain catastrophizing, self-efficacy, depression and fatigue; although, these findings must be considered in light of lack of a controlled comparison group. It is possible that clinical effects are "natural history," thus further analysis with larger samples of patients who did not attend the class would strengthen the findings.

Additionally, the virtual intensive outpatient program for pain showed excellent outcomes for those who attend. While in-person intensive treatment programs for chronic pain have decades of demonstrated efficacy, the true clinical impact of a virtual program is less clear. Findings from our outcomes suggest that this virtual model is effective. Limitations include reaching a smaller number of individuals in the chronic pain population and future efforts to strengthen engagement and understand barriers to treatment are needed.

In conclusion, the data shows that The Cleveland Center for Comprehensive Pain Recovery (CCPR) is engaging more patients who have chronic pain throughout the past 3 years with the integration of virtual technology, raising the possibility that virtual care enhances access and removes barriers to care.

Ohio Case Study #5

Provider: The MetroHealth System – Emergency Medicine

Topic: Virtual Pre-Hospital and EMS Care Program Model

Description

About The MetroHealth System

An urban safety-net health system, MetroHealth meets people where they are, providing care through four hospitals, four emergency departments, and more than 20 health centers and 40 additional sites. Each day, our 8,000 employees focus on providing our community with equitable health care–through patient-focused research, access to care, and support services–that seeks to eradicate health disparities rooted in systematic barriers. At MetroHealth, our Emergency Medicine physicians, nurses, paramedics, and EMS instructors, all experts in the delivery of emergency care, treat the most critically injured or ill patients 365 days a year, 24 hours a day. Equipped with a large, full-service emergency department and pre-hospital team, MetroHealth can handle virtually any situation.

Case Study Summary

We have invested significant time, effort, and clinical and technological expertise in building this virtual emergency medicine program. We believe we are just beginning to understand how to best use telehealth in partnership with our EMS agencies and community partners to treat patients in the most appropriate locations. We have also conducted extensive surveys to understand how to improve access to real-time video interactions between respective EMS agencies, their patients, and our providers. Using what we have learned from the survey and our care model design, we believe that we can help other providers and health systems understand the most critical components when building a virtual care partnership with EMS agencies.

Overview of Virtual Pre-Hospital and EMS Program Model

In collaboration with local EMS agencies and other community partners, MetroHealth launched in January 2021 a virtual care delivery model that provides EMS teams greater flexibility to address the emergency health care needs of patients following a 911 call. This patient-centered model offers individuals receiving medical treatment better access to advanced life-saving services at the right time and place.

Our virtual EM program model of traditional and telehealth communication tools builds on the longstanding relationship between EM physicians, health systems, and EMS agencies to provide high-quality clinical oversight and support for clinical care in the field. Essential to program delivery are our EMS partners that use patient care protocols to respond to on-site acute clinical care conditions. Recognizing that EMS patient care encounters are often complex and diverse, EM physicians are

traditionally available by telephone to advise on unique scenarios that do not align precisely with existing protocols. Medical directors and healthcare systems also offer clinical oversight to EMS agencies through in-depth education sessions and quality assurance programs.

The addition of telehealth tools, such as real-time video conferencing and clinical data sharing across the same communications platform, dramatically expands and enhances the traditional relationship between emergency medicine and EMS providers. For the patient at the center of the encounter, it provides the individual with a more meaningful care experience allowing the physician and the EMS provider to work more effectively together.

With a shared video-conferencing platform, we can provide better care for our patients at the right time and place. Our ED physicians can safely and effectively triage patients away from the emergency department while still meeting their care needs by providing real-time off-site medical advice and prescription drug management. We have found it to be a valuable tool in assessing the seriousness of a patient's condition, especially when the individual is refusing EMS transport. The platform allows us to assist our EMS partners in convincing the patient and family, when applicable, that a higher level of emergency care is required.

In developing this program, we knew building a relationship of trust with our EMS providers was essential. Ensuring they were comfortable with the mode of care delivery and the telehealth process was also critical for program success. Recognizing this need, an intuitive process that easily integrates into the preexisting workflow of EMS providers was developed that simplified activation procedures and assured a rapid connection to the physician on call. We also limited the need for additional documentation to reduce the workload for EMS personnel. Choosing a video conferencing solution that was widely used and easy to navigate for our EMS and emergency physicians also was important. With only a few system modifications, we could provide a video conferencing platform for all care providers that was simple, easy to use, and required minimal steps to access.

Implementing a virtual care program across several organizations created a few unexpected challenges. We learned early on it was necessary to adapt our EMS training to meet the needs of individuals who work various clinical shifts across a large geographic area. We also modified our training sessions to address the learning needs of participants with varying technology comfort levels. We discovered that wireless connectivity across a broad geographic area was also surprisingly sporadic and unpredictable in the initial deployment. Still, connectivity has improved through collaboration with our EMS partners and our ability to bring in other resources to address the issue.

One thing we experienced in implementing this program, but cannot fully quantify, is how to strengthen the patient refusal of care and transport process, as there is a significant patient safety benefit if we enhance this process. The video link and physician connection allow us to work with EMS personnel to assess patient decision-making capacity more effectively and encourage patients toward decisions that are in their best interests. The current and most widely-used process to handle refusals involves just the EMS personnel or possibly a telephone link with the emergency physician. The video conference call is a far more effective platform for these encounters.

We learned some valuable lessons while implementing this virtual care program that we believe others may find helpful. We now know that wireless connectivity utilizing cellular coverage should not be presumed to be widely reliable in a given region to support this type of system, especially if the service

needs to operate in residential areas and places of business. The patient population that seems to be most helped by this program requires comprehensive access to their health care information and pharmacy record. This population also significantly benefits from greater access to case management and social work support. In many ways, this is not surprising since these have long been unmet needs of the EMS and ED patient populations.

Given the program feedback we have received from patients, EMS agencies, and community organizations, we plan to continue to expand our team of emergency medicine physicians that can respond to EMS telehealth calls. We are also planning to expand our EMS partners' participation and will continue to evolve the process steps to initiate and document the EMS telehealth patient chart for the physician.

Strategic Goals

The MetroHealth System and its EMS partners utilized a comprehensive and tailored video conferencing platform to:

- Improve clinical and quality outcomes among pre-hospital patients.
- Utilize a virtual care option to convert the need for ambulance transport and connect the patient to the most appropriate care level.
- Enhance the level of collaboration between our emergency physicians and the EMS providers in the field.

Value Stream	Primary Driver (sub-stream)	Relevant Measures	Impact Goals
Clinical Outcomes, Quality and Safety	Clinical quality and safety outcomes	Speed of response to the virtual visit	Technology improvements and workflow processes quickened the response speed.
	Clinical processes	MetroHealth and EMS agency teamwork	Expand EMS participation and collaborative opportunities.
Clinical Experience	Technology experience	Reliability of video conference connection and devices	Improved the video conference connection by integrating additional resources into the platform.
		Technology platform ease of use	Designed a workflow process to ensure that the platform is simple, easy to use, and requires minimal steps to access.

Ohio Case Study #6

Provider: The MetroHealth System: OB-GYN & Maternal Fetal Medicine Departments – Main Campus

Topic: Launching a Bluetooth Blood Pressure Remote Patient Monitoring Program with Clinically Relevant Alerts and Meaningful Patient Engagement

Description

About The MetroHealth System

An urban safety-net health system, MetroHealth meets people where they are, providing care through four hospitals, four emergency departments, and more than 20 health centers and 40 additional sites. Each day, our 8,000 employees focus on providing our community with equitable health care—through patient-focused research, access to care, and support services—that seeks to eradicate health disparities rooted in systematic barriers. As one of America's 14 research centers for high-risk pregnancy, MetroHealth has pioneered treatments, including medication therapy to prevent prematurity, and operates the largest maternal-fetal fellowship program in northern Ohio.

Case Study Summary

The MetroHealth System has developed its comprehensive virtual maternity care program to better engage and educate our pregnant and postpartum patients and to monitor and triage those at high risk before, during, and after their pregnancy. We have redesigned the in-clinic workflows to integrate with virtual care and have incorporated new clinical and non-clinical team members to support and partner with our physicians.

In building our hypertension program using a Bluetooth-enabled BP cuff, we have worked to identify what is clinically relevant for elevated and critical alerts for pregnant and postpartum patients. Moreover, we want our clinicians to have actionable data transmitted directly into our electronic medical records (EMR), and we do not want to create undue anxiety for our patients by having them manually enter their blood pressure readings. In addition, we have extensive patient engagement data with two sources of patient education: Emmi and Babyscripts. We are just beginning to discover the relationship between increased patient engagement via digital tools and patient experience scores.

Overview of Virtual Maternity Care Program Model

MetroHealth's virtual maternity care program provides digital patient education and remote patient monitoring (RPM) to engage a patient in their pregnancy while delivering the highest quality and safest experience for mom and baby. To support our learning objectives, we utilize the Babyscripts mobile app for daily education, health reminders, and checklists; Emmi provides our patients with engaging educational content via text message. To care for patients diagnosed with hypertension during pregnancy or postpartum, Babyscripts remote blood pressure (BP) monitoring is an option and includes compliance reminders, symptom reporting, immediate notification of out-of-range BP readings, and 24/7 alert management. Developing this program was a team effort of internal and external partners, including digital care services, information technology staff, legal support, prenatal care medical staff, patient providers, third-party vendors, and dedicated virtual care staff.

Case Study

Recent changes in monitoring recommendations for pregnant patients with chronic hypertension combined with telehealth advances in home-based BP cuff monitoring present us with an opportunity to care for more patients and hopefully improve pregnancy outcomes. The American College of Obstetricians and Gynecologists (ACOG) recommends monitoring all patients after delivery with nurse visits and blood pressure to prevent maternal morbidity and mortality and combat the maternal mortality crisis in our country, but this has led to implementation challenges. In addition, the changes to in-person clinical care during the COVID-19 pandemic made in-person visits less frequent. Prior studies[1] found that RPM tools for BPs were not only effective, but actually, the text-based monitoring was more effective in obtaining BPs and meeting current clinical guidelines in the immediate post-discharge period in women with pregnancy-related hypertension compared with traditional office-based follow-up. Additionally, the 2022 Chronic Hypertension in the Antepartum Patient (CHAP) trial[2] found that anti-hypertensive medication with a goal of <140/90 significantly decreased pre-eclampsia, pre-eclampsia with severe features, and preterm births without increasing the risk of low birth weight in infants, making the ability to monitor BPs to achieve this goal a critical component of prenatal care.

The time-consuming process of previous home-based BP cuffs programs required patients to write and share their BP values with a health care provider electronically. The Bluetooth-enabled BP cuff integrates with the Epic EMR and automates this process for the patient and health care provider by transmitting BP readings from the cuff to the Babyscripts App. The hope is that the program's ease of use and convenience, in combination with digital educational content and health reminders, will improve program compliance, increase patient participation in follow-up to postpartum visits, and encourage patients to have a more active role in their health.

RPM provides health care professionals with 24/7 alerts of BP triggers and access to daily BP readings that are reviewed by prenatal care medical staff. This alert service enables our health care professionals to respond to critical BP readings within 15 minutes according to our workflow protocols. It also allows us to monitor a patient's health outside of an office visit, provide necessary care when needed, and enhance our capacity to identify potential pregnancy complications and treat the sickest patients without delay when they need us the most.

Since implementing our Bluetooth-enabled BP monitoring in October 2021, we have received, on average per month:

- 1,168 home BP readings with a patient compliance rate of 62.7%.
- 52 elevated and 61 critical BP readings that triggered a response.

When compared to our historical control group of patients who would have been eligible for the RPM program but delivered before implementation, significantly more Babyscripts patients have:

- Started on BP medication (41% versus 23%).
- Received critical readings that resulted in readmissions for anti-hypertensive treatment (11% as opposed to 5%).

Without a change in our follow-up to postpartum visits (60% contrasted with 51%).

[1] Hirshberg, A., Downes, K., & Srinivas, S. (2018). Comparing standard office-based follow-up with text-based remote monitoring in the management of postpartum hypertension: a randomised clinical trial. *BMJ Quality & Safety*, *27*(11), 871–877. https://doi.org/10.1136/bmjqs-2018-007837

[2] Tita, A. T., Szychowski, J. M., Boggess, K., Dugoff, L., Sibai, B., Lawrence, K., Hughes, B. L., Bell, J., Aagaard, K., Edwards, R. K., Gibson, K., Haas, D. M., Plante, L., Metz, T., Casey, B., Esplin, S., Longo, S., Hoffman, M., Saade, G. R., Hoppe, K. K., ... Chronic Hypertension and Pregnancy (CHAP) Trial Consortium (2022). Treatment for mild chronic hypertension during pregnancy. *The New England Journal of Medicine*, 386(19), 1781–1792. https://doi.org/10.1056/NEJMoa2201295

Although our study group is not large enough to show any significant improvement in pregnancy outcomes at this time, the highlighted CHAP study indicates that more aggressive BP control improves pregnancy outcomes in patients with mild hypertension. The ability to respond more quickly and with more BP readings will enable us to implement these new guidelines better to keep patients within the goal range.

Overall, the patient feedback has been positive. Anecdotal evidence from clinical staff reveals that many patients showed a greater engagement in their health, others were more knowledgeable about their BP readings, and some began to recognize the connection between healthy habits and controlled BP readings. Survey results indicate that most of our patients felt a stronger connection to their clinical staff (87.5%), and for others, BP self-monitoring offers a bit of serenity (63%).

We discovered early in the implementation phase some technology barriers. The Bluetooth technology would not connect at home for some patients. For others, the limited access to a high-speed internet service provider prevented them from participating in our remote BP program and other telehealth services. Ranked by the U.S. Census in 2020 as the least connected big city in the country, more than 30% of Cleveland, Ohio, households have no internet access at home. Recognizing this need in our community, MetroHealth Institute for H.O.P.E.™'s Digital Connectivity Initiative, in collaboration with several other community-based partners, is offering high-speed, low-cost internet access to households in neighborhoods surrounding our health centers. This initiative also includes access to related internet service devices, digital literacy training, and help desk support to ensure service utilization.

MetroHealth has financially invested in this program because we believe it is a practical value-based approach that generates cost savings for our health care system and provides better health outcomes for mom and baby. Remote monitoring, check-in, and reminders reduce in-person visits for lower-risk patients and provide our health care system with short-term cost savings. When a trigger is reported, health care professionals can immediately care for the patient over the phone instead of scheduling a more expensive in-person visit. Providing better treatment options today for pregnant women with hypertension increases the likelihood that these patients will live longer with fewer cardiovascular health problems and deliver healthier babies in the future while reducing long-term health care costs.

For health care providers considering a similar program, we recommend developing a 24/7 workflow process to field incoming trigger calls in a timely fashion. Given the results of initial findings and the patient feedback we received, we would like to expand this program and offer it to all pregnant patients with the goal of fewer in-patient visits needed to provide high-quality care.

Strategic Goals

The MetroHealth System OB-GYN Department adopted RPM blood pressure cuffs to:

- Improve clinical and quality outcomes among obstetrics patients.
- Improve the timeliness of treatment for both mild and severe hypertensive disease in pregnancy.
- Improve patient satisfaction with their health care.
- Reduce no-show rates while increasing the number of touchpoints with obstetrics patients.

Impact Goals

Value Stream	Primary Driver (sub-stream)	Relevant Measures	Impact Goals
Clinical Outcomes, Quality and Safety	Clinical quality and safety outcomes	Rate of pre-eclampsia	Decrease by 10%
		Balancing measure: Readmission rates of severe hypertension	Anticipate rates to increase by 50% due to increased

			awareness of hypertension.
	Clinical process	Program compliance	Improve adherence to weekly home BP checks by at least 67%.
		Triggers captured	Critical triggers are answered within 15 minutes, adhering to the existing workflow process.
Access to Care	Availability of care	Compliance with postpartum visits	Maintain a postpartum return rate of at least 60%, adhering to ACOG's current standard [3]
Patient, Family and Caregiver Experience	Technology experience	Patient app enrollment	61% of patients have enrolled in the Babyscripts App.
		App-related educational content usage	On average, each user viewed 5.2 app-related educational sessions.
		Patient satisfaction survey results	87.5% of patients indicated that being able to check their blood pressure at home provided some peace of mind.
			63% of patients felt the experience connected them more to their clinical provider.
Health Equity	Equity in clinical outcomes, quality and safety	Relative reduction in preterm births in patients enrolled in the home BP monitoring program to the patients in our study population.	Reduce the percentage of iatrogenic preterm births from hypertensive disorders of pregnancy rates by at least 20%.

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[3] According to the American College of Obstetricians and Gynecologists (ACOG) 40% of women in the United States do not follow up for postpartum care. Source: ACOG (2016). *Optimizing Postpartum Care* (Committee Opinion No. 666). *Obstetrics & Gynecology*. 127(6), 187-192. https://doi: 10.1097/AOG.0000000000001487

Relevant Literature Supporting Illustrative Impact Estimates

Value Stream	Study Description
Clinical Outcomes, Quality and Safety	A 2020 study found that postpartum remote BP monitoring combined with an HDP management plan reduced HDP-related readmission rates when compared to standard postpartum outpatient care. The study also found it a promising strategy for early detection and treatment of uncontrolled hypertension. A 2019 study found that monitoring remote BP readings in low-risk pregnant women resulted in numerous recordings during the antepartum and postpartum periods.
Patient, Family and Caregiver Experience	A 2019 study found that telehealth with remote BP monitoring for postpartum blood pressure surveillance and treatment of hypertension is feasible, as assessed by recruitment, consent and retention. The study also found that participants preferred home BP monitoring to clinic BP monitoring. A 2019 study found that using a mobile prenatal pregnancy app decreased the number of in-person visits in low-risk pregnant women with no reduction in patient or provider satisfaction.

Ohio Case Study #7

Provider: OhioHealth Vascular Neurology Provider Group

Topic: Telehealth Use in Treating Acute Stroke and Managing Patients in Stroke Prevention Clinic

AMA Virtual Care Value Streams: Clinical Outcomes, Quality and Safety; Access to Care

Executive Summary

The OhioHealth Vascular Neurology Group has utilized telehealth for 7 years and has identified outstanding benefits in providing stroke care to reach the community. The patients in this study received treatment for acute stroke care in inpatient and outpatient settings.

This study looked at data from for a period of 2 years, from 2019–2022, which was amidst the crux of the COVID-19 pandemic. The need for telehealth interventions during this time was critical, as keeping patients out of the hospital, and avoiding the need for transfer to other settings, was paramount in helping to keep disease burden of COVID-19 down. There was also an issue at this time with hospital bed shortages and health care staff fatigue and shortages, so this tele-rounding and inpatient stroke service served the purpose of giving optimal quality stroke care and not burdening the urban and tertiary care centers that were overwhelmed without affecting patient care.

Survey Findings

Preliminary data suggest that OhioHealth Vascular Neurology Group was able to see 66 patients for a period of 2 years. Specifically, the super specialty stroke service was able to see 44 total patients with diagnosis of ischemic stroke and/or transient ischemic attack (TIA).

These patients were seen by the stroke team for their diagnosis at the community hospital without requiring transfer to another facility. They were seen irrespective of in-person neurology weekday or weekend coverage. From the total of 44 patients, only 1 patient required transfer due to complexity of the case and unavailability of neurosurgery specialty to see this patient via telehealth. There was one additional transfer for a non-stroke related complaint.

After immediate assessment and treatment, the patients' intended destination was home with home health. Forty-five of the patients were able to be released directly home, while 15 went to an inpatient rehabilitation center or skilled nursing facility, and 3 were admitted to hospice.

Thirty-day recurrence of stroke or ischemic symptoms incidence was zero. And, almost 50%, 20 out of the 44 patients, followed-up with an in-person visit within 30 days, which is highly recommended post-acute stroke hospitalization to establish stroke care.

More tendency to follow up was noted in stroke patients after seeing the subspecialty trained physician compared to non-stroke patients was also observed. We think that after detailed discussion and education of the stroke and stroke symptoms, patients took their health seriously. This was also emphasized to make sure we reiterated the need for follow-up, with calls from our multidisciplinary clinic staff.

One of the criteria to look at the stroke symptoms that are followed is NIHSS (NIH Stroke Scale) that grades stroke symptoms from 0-37, with 0 being asymptomatic and 37 having worse neurological symptom presentation. Overall, in our study post follow-up, Stroke Scale improved from 1 to 0 in 30 days post symptoms follow-up, which is the ideal outcome.

During the peak of the pandemic, the goal was to minimize length of stay. By having our tele-presence and the protocol for admitting stroke patients, we were able to show that the median length of stay was 2 days and the median age of patients was 71. Resourceful use of diagnostics and clinical acumen, along with detailed education and follow-up plans, helped achieve this metric.

Stroke etiology plays a major role in determining secondary prevention of stroke or cardiovascular events. In our study, major etiology of stroke was either cardioembolic (12/ 44) / embolic stroke of unclear source (13/44) which explains, given as our protocol, we didn't admit vasculopathy (like major brain vessel narrowing pathology) in our community hospital for the potential need to undergo intervention, which would require transfers and would not serve the purpose of managing the patients as locally as possible. Other common etiology was lacunar or small vessel disease pathology (6/44), which is, again, expected given the comorbidities of medical problems and age of our population. Others were noted to have no clear cause despite full workup and required long-term monitoring and follow-up.

Conclusion

The OhioHealth Vascular Neurology Group has utilized telehealth for 7 years and has identified outstanding benefits in providing stroke care to reach the community. The patients in this study received treatment for acute stroke care in inpatient and outpatient settings in a time period of 2 years, which spanned the COVID-19 pandemic and public health emergency.

Utilizing telehealth in this way allowed the physicians to treat patients immediately, and to avoid transfer in almost all cases, which was essential during the overwhelmed emergency, but has benefits during any time, in improving patient experience, and limiting exposure and risk for complications associated with transfer. Our initial findings suggest that we can implement stroke telehealth and provide quality stroke care with our protocols and improve secondary prevention of the cerebrovascular events.