

Pharmacist involvement in a comprehensive remote monitoring and telemanagement program

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Purpose. To describe the role of the pharmacist in and initial outcomes of a remote monitoring and telemanagement program implemented to proactively provide outreach to high-risk patients during the coronavirus disease 2019 (COVID-19) pandemic.

Summary. A remote monitoring and telemanagement program was developed at a large, nonprofit, multicenter, academic health system as an innovative way to manage patients at risk for decompensation of their chronic diseases in the midst of the COVID-19 pandemic. The program mobilized an interprofessional workforce including nurses, medical assistants, social workers, virtualists, patient schedulers, and ambulatory care pharmacists. Patient outreach included a combination of telephone calls and digital outreach. The goal was to monitor patients' health status remotely and assess for early signs of decompensation. Pharmacists conducted telephone outreach to answer patients' medication questions and address signs and symptoms of worsening chronic conditions. Pharmacists were able to utilize an existing collaborative practice agreement (CPA) to adjust medication therapy and order laboratory tests as needed for safety and efficacy monitoring. Since the program's inception in April 2020 through January 2021, pharmacists have addressed over 1,600 medication questions or instances of worsening clinical signs and symptoms.

Conclusion. A comprehensive remote monitoring and telemanagement program utilized a multidisciplinary team to monitor high-risk patients during the COVID-19 pandemic. Pharmacists contributed to chronic disease management via the use of a comprehensive CPA, allowing medications to be started, stopped, or adjusted on the basis of patients' needs, to improve population health management and reduce workload for primary care providers who were addressing new and emerging issues during the pandemic.

Keywords: chronic disease, COVID-19, interprofessional, pharmacist, remote, telemedicine

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Coronavirus disease 2019 (COVID-19) has challenged health systems to be innovative in addressing increased patient volume due to suspected or confirmed positive cases of the virus while continuing population health efforts, chronic disease management (CDM), and acute care. The volume of COVID-19 cases has been unprecedented, with the Centers for Disease Control and Prevention reporting over 43.4 million cases of COVID-19 in the United States as of October 2021.¹ Unfortunately,

maintaining traditional CDM services has proven difficult during the pandemic.²⁻⁴ In a survey conducted from May 29 to June 1, 2020, 79% of primary care clinicians reported limited numbers of well and chronic care visits.² In addition, health systems had to quickly adapt workflows to include telehealth-based services, social distancing implementation, and redeployment of healthcare personnel.^{3,4} A cross-sectional analysis of the US National Disease and Therapeutic Index comparing the second quarters of

2018 and 2019 to the second quarter of 2020 found that the frequency of office-based visits decreased 50.2% while that of telemedicine visits increased from 1.1% to 35.3%.⁴ Although the pandemic has constrained resources and caused upheaval to traditional models of care, the rapid expansion of telehealth services has provided a unique opportunity to create innovative service lines.

Pharmacists have demonstrated the ability to successfully manage chronic diseases, such as hypertension and diabetes, through remote monitoring and telehealth.⁵⁻⁹ In a study conducted by Ralston et al,⁵ web-based pharmacist care for hypertension improved blood pressure control as compared to usual home blood pressure monitoring. The web-based pharmacist care arm included home blood pressure monitoring, secure messaging at least once every 2 weeks through a patient website, and medication intensification.⁵ Patients in the web-based pharmacist care group were more likely to have blood pressure at goal after 12 months than those in the group with only home blood pressure monitors (55% vs 37%, $P = 0.001$).⁵ Another study by Maxwell et al⁹ found that pharmacist-led, clinic-based video telehealth resulted in a significant decrease in glycosylated hemoglobin (HbA_{1c}) levels of 2 percentage points from baseline over a 6-month period. Capitalizing on the expertise of ambulatory care pharmacists is one way to address the need for CDM during the pandemic.

Within days of COVID-19 being declared a pandemic, primary care leadership at a large, nonprofit, multicenter, academic health system rapidly prepared for a possible surge in acutely ill patients. A proactive, interdisciplinary, telephonic community monitoring program was developed to ensure that patients at high risk for complications from COVID-19 continued to be monitored appropriately despite potential provider scarcity. This outreach service, referred to as the in-Sight Community Outreach Program, mobilized the healthcare workforce to proactively contact high-risk patient

KEY POINTS

- Comprehensive remote monitoring and telemanagement programs can be introduced to advance population health capabilities during the coronavirus disease 2019 pandemic via proactive patient outreach.
- Health systems can utilize an interprofessional team to manage acute and chronic conditions to reduce the workload of primary care providers who are addressing new and emerging issues caused by the pandemic.
- Pharmacists can contribute to disease management telehealth efforts through the utilization of a comprehensive collaborative practice agreement, allowing medications to be started, stopped, or adjusted based on patients' needs.

populations to monitor their health status and to assess for early signs and symptoms of decompensation. in-Sight aimed to maintain management of chronic diseases during the pandemic to decrease preventable utilization of emergency department and inpatient services. The purpose of this article is to describe how ambulatory

care pharmacists used a collaborative practice agreement (CPA) and drug information skills in a novel way through the inSight program to support patient care during the pandemic. Formal review was performed by the health system's institutional review board, from which a waiver of exemption was obtained.

Program description

Early program design. The in-Sight community monitoring program aimed to provide scalable, seamless care coordination between the patient, their primary care team, and specialty providers. The program consisted of 3 separate arms that provided outreach to the following populations:

- 1) Patients with certain chronic disease conditions, identified as being at high risk of acquiring and experiencing complications from COVID-19 or chronic disease decompensation (referred to as the CDM arm)
- 2) Patients being discharged from a health-system hospital for any reason (referred to as the transitional care management [TCM] arm)
- 3) Patients who tested positive for COVID-19 (referred to as the COVID home monitoring arm)

Pharmacists participated in the CDM and TCM arms. High-risk CDM patients are described in [Box 1](#); patients with cancer, a positive COVID-19 test, or on dialysis were excluded from CDM

Box 1. Definition of High-Risk Chronic Disease Management Patients

Male, age 50-59 years, with CAD, CHF, DM, HTN, COPD, or asthma
 Female, age 60-69 years, with CAD, CHF, DM, HTN, COPD, or asthma
 Male, age 60-69 years, with 3 or more of the following conditions: CAD or CHF, DM, HTN, and COPD or asthma
 Age 70-79 years with 3 or more of the following conditions: CAD or CHF, DM, HTN, and COPD or asthma
 Age 80+ years with 2 or more of the following conditions: CAD or CHF, DM, HTN, and COPD or asthma

Abbreviations: CAD, coronary artery disease; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; HTN, hypertension.

outreach. TCM and COVID-19-positive patients were included in outreach if they received primary care services from a provider affiliated with the health system.

Telephone outreach to patients in the TCM and CDM arms started in April 2020. At that time, CDM patients were contacted once weekly by members of a labor pool that consisted of clinical and nonclinical staff, including nurses, medical assistants, and patient schedulers. Health assessments were conducted using a predetermined set of questions intended to detect worsening chronic conditions, identify patients' questions about their medications, and assess social and behavioral needs. Patients could choose less frequent outreach or opt out of the monitoring program altogether. In the TCM arm, patients were contacted via telephone within 48 hours of discharge as part of a routine pre-COVID-19 transitional care workflow. If these patients expressed medication questions during routine transitional care outreach, their cases were escalated to the TCM pharmacy inSight team for follow-up. For TCM patients, the primary care provider (PCP) team was encouraged to conduct follow-up within 7 to 14 days of discharge. For more concerning symptoms identified during the outreach calls (such as new cough, shortness of breath, or diarrhea), a virtualist provider (physician or advanced practice provider) was paged who could urgently address patient symptoms via telephone or virtual visit.

Pharmacy interventions. Since the inception of inSight, ambulatory care pharmacists have assisted with the high-risk CDM and TCM patient outreach groups. The team of pharmacists involved in the inSight program included 22 primary care pharmacists at 19 primary care offices throughout the region and 9 transitional care pharmacists working remotely. Primary care pharmacists work in outpatient offices with specialized training in the management of chronic diseases. Their principal role is comprehensive medication management under a CPA with

primary care physicians. The CPA allows primary care pharmacists to start, stop, and adjust medications for CDM and to order laboratory tests as needed for safety and efficacy monitoring. The 9 transitional care pharmacists connect with patients by telephone to perform medication reconciliation and answer medication questions during transitions of care between healthcare settings and home.

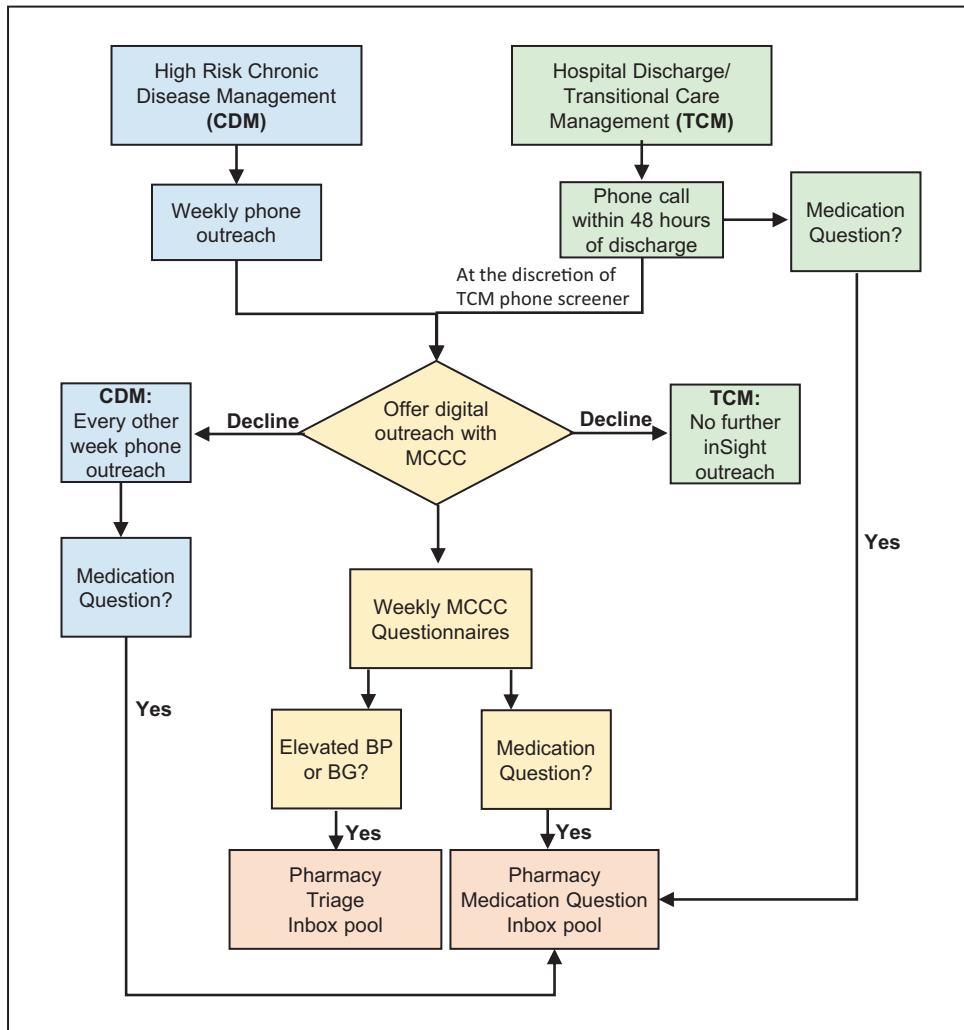
If a patient identified any clinical symptoms or medication questions during a CDM or TCM outreach call, the telephone screener documented this in a telephone encounter and routed it via the electronic health record (EHR) to a pharmacist-managed shared inbox pool (Rx Clinical Triage for clinical symptoms and/or Rx Medication Question). See [Figure 1](#) for an overview of the pathway to pharmacist intervention. In the initial inSight program workflow, primary care pharmacists were responsible for assessment and management of all encounters routed to these EHR pools; transitional care pharmacists were added to the team later. A minimum of 2 primary care pharmacists at a time monitored the EHR pools during normal business hours Monday through Friday. Pharmacists called patients to triage their symptoms (and manage symptoms as allowed per the CPA) and answer medication questions as appropriate. Pharmacist interventions included adjusting medications, scheduling follow-up for ongoing CDM with primary care pharmacy if needed, coordinating care with the patient's PCP, and answering any patient questions. If the reported symptom required more comprehensive, physical assessment or did not fall within the pharmacist's scope of practice, the encounter was routed to a scheduler to arrange an appointment at the PCP's office or with a virtualist, as determined by schedule availability and need for timely evaluation.

Program assessment and remodeling. By week 3 of inSight, the volume of clinical symptom encounters routed to the EHR pharmacy pools had exponentially increased to an average

of 57 per day. To address the increasingly high volume of encounters routed to the pharmacy pools, the transitional care pharmacist team was recruited in May 2020 to manage encounters routed to the Rx Medication Question pool. In addition, a retrospective review of clinical symptom escalations to the Rx Clinical Triage pool was conducted and revealed that the primary care pharmacy team performed outreach and addressed 43% of cases; the remaining 57% of cases were immediately escalated, without any pharmacist outreach, for symptom management, care coordination, and follow-up for patient needs that fell outside of the pharmacist CPA scope of practice. Of the 43% of encounters addressed by pharmacists, the most common intervention (40%) remained routing the patient to a scheduling team to make a follow-up appointment. The top 3 patient-reported symptoms were pain (24%), shortness of breath (10%), and swelling (9%), and management of these symptoms often required further workup outside of the CPA scope of practice. To avoid delaying delivery of care, it was determined in June 2020 that a nurse outreach step would be added before pharmacy escalation to better triage symptoms and decide which cases would be most appropriate for a pharmacist to manage based on the CPA vs an alternative next step in care. This new workflow reduced unnecessary calls to patients and optimized use of pharmacists' time and skills.

Expansion into digital outreach. Telephonic care, while personal and direct, requires both the patient and caregiver to have concurrent available time for the communication exchange to occur. To expand outreach and time efficiency, it was decided to incorporate digital outreach in the form of the MyChart Care Companion (MCCC). MyChart (Epic Systems Corporation, Verona, WI) is an electronic application that offers patients personalized and secure online access to portions of their medical records, including medications, test results, and upcoming and past

Figure 1. Pathway to pharmacist intervention. BG indicates blood glucose; BP, blood pressure; CDM, chronic disease management; MCCC, MyChart Care Companion; TCM, transitional care management.



appointments, and functions as a platform to send messages to their healthcare providers. Care Companion is an extension of the MyChart patient portal, which can be used to provide coaching, education, reminders, or questionnaires to patients to help them manage their health conditions.

During weekly screening calls, CDM patients were encouraged to download the MyChart application and use the Care Companion extension in place of weekly telephonic monitoring. Patients from the TCM arm with lower risk for readmission (0%-19%) were also offered MCCC at the discretion of the telephone screener if they believed a patient would benefit from ongoing communication

with their healthcare team. After registering for Care Companion, patients were prompted to complete a weekly electronic “inSight Monitoring” questionnaire in MyChart. An example of the questionnaire sent to patients in the high-risk CDM and TCM arms can be found in Figure 2. Questionnaires included a series of questions to screen for chronic disease decompensation and assess needs. Depending on patient responses, notifications were sent automatically to corresponding healthcare teams in the EHR to trigger further telephonic outreach and discussion with the patient.

The pharmacy team received MCCC notifications via the EHR

pharmacy pools if a patient reported worsening of home monitoring values (blood pressure or blood glucose) or had a medication question. Cases of worsening home monitoring values were sent to the Rx Clinical Triage pool staffed by primary care pharmacists, and medication questions were sent to the Rx Medication Question pool staffed by TCM pharmacists. In the event that the patient reported worsening home monitoring values and medication questions, to ensure that multiple pharmacy team members were not contacting the patient simultaneously, the pharmacist covering the Rx Triage Pool would contact the patient to address both

Figure 2. Example MyChart Care Companion questionnaire. PCP indicates primary care provider.

R Questionnaires
Close

For the questionnaire series **inSight Monitoring**

Thank you for allowing us to check in with you. We want to support you and partner with you to help you manage your health. Please complete the following questions:

* Do you feel your health is better, same or worse as compared to usual?

Better
Same

Worse

* Are you having any new symptoms that your PCP needs to know about?

Yes
No

* Do you check your blood pressure at home?

Yes
No

* On average, have your blood pressures been

Worse
Better or Same

* Do you check your daily weight at home?

Yes
No

* Is your weight

Stable
Increasing

Decreasing

* Do you check your blood sugars at home?

Yes
No

* On average, have your blood sugars been

Worse
Better or Same

* Do you have any questions about taking your medications or which medication you should be on?

Yes
No

* We would like to make sure you have what you need so that your basic needs are met-including your personal safety, food, housing and medications. Would you like to speak with a social work team member to help give you support for any of these needs?

Yes
No

* It can be normal to feel anxious or down during a time like this. Would you like to talk to a mental health professional about how you have been feeling?

Yes
No

CONTINUE

CANCEL

Thank you for letting us check in with you. We will continue to offer this check-in weekly. We appreciate the opportunity to work together with you to care for your health.

concerns. Pharmacists subsequently conducted telephone outreach and medication management as needed. If the patient was not reached by the pharmacist on the first outreach call attempt, a second outreach call attempt was made the following day. If the patient was not reached on the second attempt, the patient's PCP was notified of the reported symptoms and/or medication questions, if appropriate.

Program results

Demographics. Since the incorporation of MCCC digital outreach in May 2020 through January 2021, a total of 7,313 questionnaires (4,156 high-risk CDM and 3,157 TCM) have been completed by enrolled patients. Demographics for patients who completed questionnaires are displayed in Table 1. Patient demographics were partially driven by the inclusion criteria for the high-risk CDM arm of

the program, such as patient age. The majority of questionnaires were completed by patients 71 to 75 years of age (24%), followed by patients 81 to 85 (22%) and 76 to 80 (16%) years of age. Most patients were retired (54%) or not employed (36%).

Pharmacy escalations. Responses to the 3 MCCC questions that resulted in escalation to the EHR pharmacy pools were tracked with internal dashboards from March 2020 through

Table 1. Demographics of Patients Who Completed MyChart Care Companion Questionnaires

Characteristic ^a	High-Risk	
	CDM	TCM
Age, years	0	0
21-30	0	3
31-40	0	6
41-50	0	11
51-60	1	17
61-65	9	12
66-70	13	15
71-75	24	15
76-80	16	11
81-85	22	5
85+	14	4
Sex		
Female	36	55
Male	64	45
Employment status		
Full time	8	27
Not employed	36	36
Retired	54	31
Part time	1	4
Self-employed	2	2
Marital status		
Married	63	58
Single	11	23
Divorced	8	8
Widowed	16	10
Race		
White	88	80
Black	8	15
Multiracial	1	2

Abbreviations: CDM, chronic disease management; TCM, transitional care management.

^aData shown as percentage of patients.

January 2021. All patients who completed a questionnaire were asked whether they checked their blood pressure at home; 65% of patients reported checking at home, with 3%

Table 2. Volume of Patient Cases Escalated to Pharmacists

Case Type	No. of Escalations
MCCC	
Worsening blood pressure	193
Worsening blood sugar	224
Medication questions	358
High-risk CDM telephone outreach	
Medication questions	102
TCM	
Medication questions	758
Total	1,635

Abbreviations: CDM, chronic disease management; MCCC, MyChart Care Companion; TCM, transitional care management.

(*n* = 193) indicating “worse” readings on average. Of the patients who completed a questionnaire, 49% had a diabetes diagnosis and were asked whether they checked their blood sugar level at home; 38% reported checking at home, with 3% (*n* = 224) indicating “worse” readings on average. All patients were asked whether they had any questions about taking their medications or which medications they should be on; 5% (*n* = 358) indicated that they had a medication question. Additional medication question escalations from telephone screeners for the TCM and high-risk CDM arms of the program were also addressed by the pharmacy team. Over the same time period, a total of 758 medication questions from the TCM telephone screeners and 102 questions from the high-risk CDM telephone screeners were addressed by the pharmacy team (Table 2).

A survey was administered to the pharmacists addressing medication questions to better categorize the types of questions that were received. The most common type of medication question reported was related to

discharge medication instructions, followed by questions related to logistics with medication procurement, such as an order being needed or cost concerns, and general medication questions, such as inquiries about proper timing or method of administration.

Utilization outcomes. Inpatient utilization data were collected for the high-risk CDM arm of the program. Review of tracking data from project inception in March 2020 through October 2020 revealed that there was a 35% reduction in the rate of inpatient admission due to any cause for patients who were successfully reached at least once via telephone or completed at least one MCCC questionnaire (*n* = 12,953) when compared to an age- and risk-matched cohort (*n* = 6,000). An inverse relationship was also seen between consistent and successful outreach and patient admission.

Discussion

The COVID-19 pandemic caused a dramatic decline in preventative screening for and monitoring of chronic diseases. During the early stages of the COVID-19 pandemic, healthcare facilities restricted access to noncritical services and patients with chronic diseases struggled to receive routine care.¹⁰ Many outpatient visits were canceled or delayed due to a shortage of caregivers during COVID-19 surges or patients’ fears of entering a healthcare facility.⁴ For example, rates of cholesterol and HbA_{1c} testing fell by 81% to 90% and new medication initiation (statin and/or metformin) fell by 52% to 60% (*P* < 0.001) during February and March of 2020.¹¹ This added to the mounting evidence of delayed care resulting from the COVID-19 pandemic; delayed care for more severe acute indications such as stroke and myocardial infarction, cancer treatments, and childhood vaccines was also seen.¹¹ The inSight program aimed to prevent delays in care and advance population health capabilities during the pandemic via proactive outreach, prevention, and ongoing patient monitoring. Pharmacists were recruited for the

inSight program with the intent to provide coverage with an expanded scope of practice should a PCP shortage ensue. As PCP staffing levels were maintained, the pharmacists' focus shifted to a typical scope of practice, including assistance in maintaining blood glucose and blood pressure control and addressing medication questions.

Pharmacists have demonstrated the ability to manage chronic diseases through telephone and remote monitoring.^{7,9} The inSight program provided pharmacy outreach to 193 patients who indicated worsening blood pressure control and 224 patients who reported worsening glycemic control. A unique use of the progressive pharmacy CPA allowed pharmacists to manage these patients' care. The result was improved communication between patients and healthcare providers for CDM. This served as an opportunity for patients to receive ongoing, scheduled follow-up with pharmacists to ensure that therapy changes were effective and tolerated. Pharmacist-led interventions can reduce the use of healthcare services by older adults during transitions of care.¹² Over 800 patients had medication questions addressed, with many related to discharge medication instructions, which may have prevented further use of healthcare services. Before the onset of the pandemic, transitional care pharmacists participated in patient outreach and medication reconciliation services for hospital discharge patients. During the pandemic, transitional care pharmacists expanded their role and utilized their expertise to address all medication questions coming from all arms of the inSight program.

Through digital outreach, over 7,000 patients completed a questionnaire designed to detect worsening chronic conditions or address medication questions. Despite initial concerns of age-related barriers to technology access and use, adults older than 71 years were more likely to complete the inSight MCCC questionnaire than any other age group. This finding aligns with the Informatics for Diabetes Education and Telemedicine (IDEATel) study, where

the authors concluded that telemedicine was acceptable in older adult populations.¹³ The IDEATel study also found that telemedicine can be successful in both lower-socioeconomic and ethnic populations.¹³ A majority of patients who completed the MCCC questionnaire were white (88%). Future studies could investigate the barriers ethnic groups are facing with using MCCC questionnaires.

The pandemic has emphasized the crucial role pharmacists play in CDM,¹⁰ although ultimately it was the interdisciplinary healthcare team working together that allowed for the 35% reduction in inpatient admission rates seen during the initial phase of the inSight program.

Limitations. The inSight program is an ongoing service and is continuously assessed for opportunities to improve efficiency, workflow, and breadth of outreach. Even in its current state after multiple iterations, a number of limitations remain to be addressed. Because of the rapid development of this program and the need to socially distance, many caregivers participating in this program performed patient outreach from home using personal telephone numbers that were blocked or unknown to patients. Patients could have been less likely to answer calls from unknown or blocked numbers, decreasing the rate of successful outreach. Additionally, the MCCC questionnaire did not alert patients that they would receive a telephone call as a result of completing the questionnaire. The telephone call was not scheduled, was often unexpected, and rarely came from the patient's primary care facility. Patients might have been less likely to engage with a caregiver whom they had never met. Lastly, a limitation to this type of program is that patients need access to technology and sufficient health literacy to interact with digital outreach tools.

Conclusion

The COVID-19 pandemic has constrained resources and caused upheaval to traditional models of care, creating a need for rapid expansion of telehealth services to address both chronic and

acute disease management. A comprehensive remote monitoring and telemanagement program was an innovative way to connect with high-risk patients in the midst of the pandemic. Use of an interprofessional team allowed patients to be directed to the most appropriate discipline for their specific clinical needs, taking the burden off PCPs who were addressing new and emerging issues caused by the pandemic surge. Pharmacists were able to contribute to CDM through telehealth via utilization of a comprehensive CPA, allowing medications to be started, stopped, or adjusted based on patients' needs. Due to the success of programs like inSight, technology will continue to play a role in chronic disease treatment and management, even after lockdowns ease and patients become more comfortable reporting for healthcare. To provide the best care for patients in this challenging era, institutions are encouraged to share the unique care delivery processes they have developed as a result of the pandemic so that best practices can be defined.

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Disclosures

The authors have declared no potential conflicts of interest.

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