COVID-19 Impacts on Primary Care Clinic Care Management Processes

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ABSTRACT

PURPOSE To learn whether the COVID-19 pandemic's disruptions and associated reduced health outcomes for people with chronic conditions might have been caused by a decrease in care management processes (CMPs) in primary care clinics

METHODS Longitudinal cohort design with repeated survey-based measures of CMPs from 2017, 2019, and 2021 in 269 primary care clinics in Minnesota.

RESULTS There were only small differences in organizational characteristics and no differences in overall CMPs between the 269 clinics analyzed and the 287 that only completed surveys in 1 or 2 years. Overall CMP scores rose by similar amounts (1.6% and 2.1%) from 2017 to 2019 and from 2019 to 2021. In 2021, CMP scores were lower in small medical groups than in large medical groups in 2017 (66.1% vs 78.5%, P <.001), a similar difference to that in 2017. Care management process scores were also lower in clinics in urban areas compared with rural areas (73.9% vs 79.0%, P <.001), but overall scores in all subgroups were higher in 2021 than in 2017. This improvement occurred despite reports from 55% of clinic leaders that the pandemic had been very or extremely disruptive.

CONCLUSIONS Although quite disrupted by the pandemic, care management processes for chronic disease care in these resilient primary care clinics actually increased from 2019 to 2021, at least in clinics that were part of large organizations. However, that was not true for clinics from smaller groups and perhaps for other areas of care.

INTRODUCTION

Over the past 2 years (2020, 2021), the COVID-19 pandemic has disrupted nearly every sector of the United States and world economy and everyone's lives. It has been particularly hard on health and health care with extensive deaths, decreased quality of life, forgone health care, and worsened inequities at the same time that hospitals and clinics have been overwhelmed with infected patients and fewer staff.[1-5] There have been substantial disruptions to primary care, especially for those with chronic conditions like diabetes and cardiovascular disease.[6-8]

Although there are early reports of decreased performance measures of disease control and preventive services for patients with chronic conditions during the pandemic, little is known about the mechanisms underlying these effects.[9,10] Until we know whether it is due to the increased risk of contracting severe COVID-19 infection, patient fear of coming to care sites, restrictions on social and business life, decreased patient adherence to health promotion and disease control, or dysfunction of clinic care systems, it will be difficult to recover.[6-8,11]

We measured the presence and functioning of care management processes (CMPs) for chronic diseases among most of the primary care clinics in Minnesota using surveys conducted in 2017, 2019, and 2021.[12-14] This allowed us to determine whether the clinics experienced a decrease in the presence or functioning of their systems of care for these patients, many with multiple morbidities and at high risk for severe illness and death. We report our findings from the repeated measures and from a few questions added in 2021 about primary care clinic use of telehealth care and perceptions of COVID-19–related disruptions on the organizations. Our hypothesis was that the survey in 2021 would demonstrate decreased presence of CMPs because of the disruptive effects of the pandemic.

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METHODS

Design

This study used a repeated measures longitudinal cohort design to identify evidence for deterioration in CMPs after 2 years of the extensive disruptions and stresses associated with the COVID-19 pandemic from 2020 to 2022 in comparison with 2017 to 2019.

Participants

Approximately 600 primary care clinics, serving adults in 100 care systems in Minnesota and border areas of neighboring states were recruited in 2017, 2019, and 2021 to participate in this observational study of quality of care for patients with chronic conditions. Our sample focused on primary care clinics so that the scope of services was comparable. Specialty practices such as endocrinology clinics were excluded. Clinics were recruited through the leadership of each care system who were asked to endorse the survey and provide contact information at the clinic level. Each year, participation involved completion of a survey by each clinic and interviews with some clinic leaders. The geographic location of clinics was dichotomized by rural or urban based on the Rural-Urban Commuting Area categorization of zip codes by the US Census Bureau. We arbitrarily considered care systems to be large if they had 12 or more primary care clinics. The number of clinicians (physicians, nurse practitioners, and physician assistants) in each clinic was only measured in 2021. Clinics were considered to be large if they had 10 or more clinicians in 2021. Clinic size in 2017 and 2019 was imputed based on the 2021 response.

Data Collection

A leader in each clinic was asked to complete a survey inquiring about the presence and functioning of CMPs important for consistent quality care for chronic diseases and preventive services, and CMP scores were developed as the percentage of CMPs reported present by the respondent clinic leader. Table 1 provides examples of these questions, focusing on those with the strongest evidence for a relationship to quality outcome measures. The survey, Physician Practice Connections Readiness Survey (PPC-RS), was originally developed by the National Committee for Quality Assurance as a way to assess the presence of functions of the Chronic Care Model of Wagner et al.[15] Because PPC-RS scores have been associated with quality measures for patients with depression or diabetes, it has been used in many federally funded research projects.[15-18] For the third round of surveys, completed in early 2021, we added 3 questions about the presence of CMPs for proactive outreach to patients, functions that we learned in earlier work were key to exceptionally high performance.[19] We also added questions about the degree of CMP disruption clinics had experienced during the pandemic, the proportion of visits using telehealth media before,

during, and after the pandemic peak in 2020, and when they had adopted technology for conducting video visits. The disruption question focused on diabetes care management, as one of the best examples of processes that are needed to provide quality care for chronic conditions, and because during the pandemic it was difficult to assess blood glucose control in patients due to inconsistent collection of blood samples for hemoglobin A_{1c} measurement.

Analysis

Statistically significant differences in CMP scores by subgroup were computed using ANOVA tests, controlling for time trend. Differences in responses to the COVID-19 supplement questions by subgroup were tested using an ordered logit framework. These methods inherently account for the fact that the sizes of the subgroups were not balanced.

We also compared the CMP scores of our study sample of 269 continuously participating clinics to the scores of the 287 that completed the sample in only 1 or 2 years to check for response bias. This comparison was completed using linear regression, controlling for time trend, system size, clinic size, and rural/urban geography.

RESULTS

The clinic response rates for each round of surveys were 71% in 2017, 72% in 2019, and 68% in 2021. This resulted in 416

Table 1. Example Care Management Process Questions With Strong Evidence for an Association With Quality Outcomes

Does your clinic:

1. Have a system for tracking laboratory tests until results are available to the clinician?

2. Manage patient care using checklists of tests or interventions that are needed for prevention or monitoring of diabetes?

3. Have a systematic approach to identify and remind patients with chronic illnesses who are due for testing (eg, LDL test or dilated eye exam)?

4. Routinely provide after-visit follow up as a component of care management to your patients with diabetes by someone other than a physician, PA, or NP?

5. Have guideline-based reminders for age-appropriate preventive services (eg, influenza immunizations) the patient should receive during patient appointments?

6. Have a systematic process to screen or assess patients for alcohol/ substance abuse?

7. Provide or refer patients to formal support programs for weight loss management to assist in self-management for conditions or age-specific risk factors?

8. Routinely provide written materials that explain recommended medical care guidelines for their illness to encourage patient self-management?

9. Have systems to encourage patient self-management for diabetes?

10. Have a formal process (ie, a written plan with a set of procedures and defined end points for accountability) for measuring performance for individual physicians or for the clinic site?

LDL = low-density lipoprotein; NP = nurse practitioner; PA = physician assistant.

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clinic respondents from 64 systems in 2017, 451 responses from 76 systems in 2019, and 407 responses from 61 systems in 2021, for a total of 556 unique clinics over those years. Since our study goal was to assess changes in CMP scores over time in the same set of clinics, we focused on the data for the 269 clinics that had completed each of the 3 PPC-RS surveys. That left 287 clinics that only responded to 1 or 2 of the 3 biennial surveys. One reason some previously participating clinics were not included in the 2021 survey was that they had closed during 2020, primarily due to pandemic disruptions.

Table 2 compares the 269 clinics analyzanaed with the 287 that only completed surveys in 1 or 2 years in terms the size of the care group, clinic size and urban vs rural location. Group size changed over the study time period due to acquisition of smaller groups by larger ones. Reflecting the long-standing evolution of medical groups in Minnesota, three-quarters of both samples were in large care groups. Clinics in the analysis set were slightly more likely to be in large groups and were 8% more likely to be urban. In terms of scores on the PPC-RS, however, there were no statistically significant differences between the 2 samples in either overall score or scores on 5 of the 6 sub-domains after controlling for time trend, group size, and rurality.

Table 2 also compares the smaller group of 59 clinics that participated in 2017 and 2019, and dropped out in 2021 (not due to closure). It is clear that these dropout clinics are similar in group size and geography to the group that participated continuously. We found no statistically significant difference in the 2019 PPC-RS scores after controlling for group size and rurality.

In Table 3, the overall scores increased in each year for the clinicis analyzed by at least as much from 2019 to 2021 as they did from 2017 to 2019. However, the score for 2 domains decreased in 2021—performance measurement and management of high-risk patients and hospitalizations. When focused on clinic characteristics, the size of individual clinics appears to make no difference in either overall score or any domain score, while group size and urban/rural location do appear to matter. On average, clinics in large groups had much higher scores, both overall and in each domain. They also tended to change scores between 2019 and 2021 the same as the overall sample, while clinics in small groups experienced a decrease in 2021, both in total score and in 4 of 6 domains. Finally, rural clinics tended to have slightly higher scores in each year than their urban competitors, decreasing in 2021 only in the same 2 domains as the overall sample— performance measurement and high risk patients/ hospitalizations.

When asked specifically about how disruptive the pandemic had been for diabetes care management (Table 4), 55% of clinics reported it had been extremely or very disruptive and another 32% said it

was moderately disruptive. Medical group size made no difference in this response, but urban clinics found it somewhat more disruptive than rural ones (26% vs 19% said extremely). Telemedicine visits were estimated to constitute 0% of visits (by 58% of clinics) or 1% to 20% (by 36% or clinics) before the pandemic. At the 2020 peak of the pandemic, 30% of clinics said that more than 60% of visits were by telemedicine and another 50% of clinics said they made up from 20% to 60% of visits. In 2021, however, 67% said they were back to less than 20% virtual visits and only 2 clinics reported rates above 60%. Finally, only 20% of these clinics reported having video visit technology before the pandemic.

DISCUSSION

Although the surveyed clinic leaders reported substantial disruption of their care management processes by the pandemic, their responses to the final (third) iteration of the survey in 2021 suggest that the damage may have been short lived. This study, of the presence of care management processes (CMPs) for chronic conditions, was conducted from February through July of 2021 so results might have been different if it had been conducted in the summer of 2020. The third survey was conducted, however, shortly after the largest surge of cases and deaths in the United States (winter of 2021), during the early phase of mass vaccinations, and before the omicron variant surge.

It is interesting that results show the overall number of CMPs was actually higher in 2021 than in 2019. Only the domains of performance measurement and high-risk patients and hospitalizations were a bit lower in 2021. It is understandable that performance measurement might be viewed as a luxury during this stressful time, but one could also think it

Table 2. Clinic Characteristics by Survey Participation Years (2017, 2019, 2021)

Characteristic	1-2 Surveys, Any Years	2 Surveys, 2017 and 2019	All 3 Surveys
Clinics, No.	287	59	269
Current System Size, No. (%)[a]			
1-11	72 (25.1)	16 (27.1)	59 (21.9)
>12	215 (74.9)	43 (72.9)	210 (78.1)
Clinic Size, No. (%)[b]			
1-9	...	...	139 (51.7)
>10	...	...	118 (43.9)
Unknown	...	...	12 (4.5)
Clinic Location, No. (%)			
Rural	130 (45.3)	21 (35.6)	100 (37.2)
Urban	157 (54.7)	38 (64.4)	169 (62.8)

[a] System size (number of primary care clinic locations) changed over time due to acquisition of small health care systems by larger systems.

[b] Clinic size (number of clinicians) was captured only in 2021. On average, in small clinics 42% of clinicians were advance practice providers (nurse practitioners, physicians assistants), and in large clinics 30% of clinicians are advance practice providers.

Table 3. PPC-RS Trends in Total Score and the Subgroups, System Size, and Geography (N = 269)

Survey Domains	Survey Items, No.	All Clinics, %	Current System Size[a]			Geography		
			<12 Sites, %	≥12 Sites, %	P Value[b]	Rural, %	Urban, %	P Value
Information & Tracking	6				.084			<.001
2017		80.5	77.4	81.3		2.7	79.2	
2019		82.7	85.3	82.0		8.8	79.1	
2021		83.1	75.7	85.2		6.5	81.2	
Chronic Disease Management	65				<.001			<.001
2017		68.5	59.6	71.0		0.5	67.3	
2019		69.9	64.9	71.3		4.9	66.9	
2021		72.5	61.7	75.6		5.5	70.8	
Patient Self-Management	25				<.001			<.001
2017		77.8	70.6	79.9		9.4	76.9	
2019		78.6	75.3	79.5		1.8	76.7	
2021		80.8	73.5	82.9		4.2	78.9	
Care Plans, Shared Decisions	6				<.001			.069
2017		65.6	54.2	68.8		7.8	64.3	
2019		70.1	58.8	73.3		1.5	69.3	
2021		73.4	62.7	76.4		8.3	70.5	
Performance Measurement[c]	3				<.001			.023
2017		93.4	88.1	94.9		4.0	93.1	
2019		94.4	91.5	95.2		6.0	93.5	
2021		89.3	81.4	91.6		3.3	87.0	
Managing High Risk Patients	2				<.001			.780
2017		82.2	62.7	87.6		7.0	85.2	
2019		86.1	76.3	88.8		8.5	84.6	
2021		83.6	77.1	85.5		7.5	81.4	
Overall Survey[c]	107				<.001			<.001
2017		72.1	63.8	74.5		3.9	71.1	
2019		73.7	69.1	74.9		8.0	71.1	
2021		75.8	66.1	78.5		9.0	73.9	

CMP = care management process; PPC-RS = Physician Practice Connections Readiness Survey.

Note: Data only for clinics completing all 3 surveys in 2017, 2019, and 2021. Results presented as the average percentage of CMPs present at the clinics.

[a] System size (based on number of primary care locations) changed over time due to acquisition of small health care systems by larger systems.
[b] Statistical significance of system size, clinic size, or geography, computed using ANOVA test, controlling for time trend.
[c] Only includes items present in all 3 years of the survey.

might require a renewed focus on the processes for consistent care of high-risk patients. It is possible that the disruptions during the early phase of the pandemic, especially the inability or unwillingness of patients to come to the clinic for care and monitoring tests, forced the need for more systematic approaches to patient outreach and care.

Our approach to measuring the presence of important infrastructural care management processes parallels work done over the past 18 years by Shortell and colleagues in a large sample of US group practices of various sizes. In 2003, they found a relatively low level of CMPs for chronic disease management and preventive services in most medical groups.[20] The number increased quite a bit over time, however, especially in clinics that had external incentives for quality or were acquired by hospitals or health plans.[21,22] Recently,

as part of an evaluation of the State Innovation Models (SIM), another report showed that CMPs have continued to increase, but that increase was unrelated to participation in SIM.[23] This large body of work confirms that CMPs do change over time and increases are associated with other measures of quality, especially for chronic disease outcomes.[24]

Along with the pandemic case surges, there has been a surge in studies and commentaries in the medical literature about the health and health care–related aspects of the pandemic. However, most of those articles focused on vaccines, treatments, and public health aspects of the pandemic. While a few studies measured the impact on clinical preventive services rates or other quality measures, very few measured or addressed the impact on care system function beyond marveling at the abrupt uptake of telehealth. Kyle et al conducted an

Table 4. COVID-19 Supplement Question Responses Overall and by System Size (N = 269)

Survey Item	Overall	Current System Size[a]		P Value
		<12 Sites	≥12 Sites	
Visits by telephone/video pre-pandemic, %				.44
None	58.4	86.4	50.5	
1- 20	36.4	13.6	42.9	
≥21	2.9	0.9	6.8	
Visits by telephone/video at pandemic peak, %				<.001
None	0.4	0.0	0.5	
1-20	18.2	27.1	15.7	
21-40	27.5	23.7	28.6	
41-60	22.7	20.3	23.3	
61-80	19.0	18.6	19.1	
81-100	10.4	10.2	10.5	
Visits by telephone/video in 2021, %				.31
None	0.4	0.0	0.5	
1-20	66.2	76.6	63.3	
21-40	27.1	20.3	29.1	
≥41	4.4	3.4	4.8	
How disruptive has the pandemic been to diabetes care management?, %				.13
Not at all	0.0	0.0	0.0	
Slightly	10.4	8.5	11.0	
Moderately	32.0	27.1	33.3	
Very	32.0	43.4	29.1	
Extremely	23.4	22.0	23.8	

Note: Data only for clinics completing all 3 surveys in 2017, 2019, and 2021.

[a] System size (number of primary care clinic locations) changed over time due to acquisition of small health care systems by larger systems.

interesting study of primary care access in 4 states during the pandemic, confirming the ability of most primary care clinics to provide timely new patient appointments as well as direct care for patients with definite or suspected COVID-19.[25] Matenge et al reported in a systematic review on changes in the provision of routine primary care services during the early pandemic.[7] This review did not get much beyond noting that acute and urgent care were prioritized, while chronic disease management and preventive care were disrupted, but they did find evidence for financial solvency problems and the problems some clinics had because of limited resources and support. Similarly, Kendzerska et al used a narrative review to evaluate how the health system response to the pandemic affected chronic disease management.[6] They concluded that patients with chronic diseases faced disproportionately greater barriers to both primary and specialty care during the pandemic and called for better chronic disease management strategies moving forward.

This may be the first in-depth study of how specific care management processes for chronic disease changed during the first year of the pandemic (2020). Since 55% of clinic leaders reported very or extremely large disruptions in diabetes care management (and another 32% said it was moderately disrupted), it is interesting that these care systems appear to have recovered their balance fairly quickly (at least for these care processes). By 1 year later, the presence of important processes for quality care were largely the same or better than before the pandemic, although mainly at large organization clinics. It seems likely that this capability was due to the high degree to which Minnesota clinics have adopted systematic approaches to ensuring care quality. Smaller organizations were much more affected, however, with decreases in both overall and 4 of 6 domain scores 1 year after the main impact of the pandemic. There may have been lower levels of CMP function and other unmeasured aspects of overall diabetes care with greater impact on performance, so it is possible there are other explanations for the apparently minimal impact on this measure of presence of CMPs in large organizations.

The strength of this study is in its unique ability to report on specific care process changes over time, using the same established survey measure of process presence for a large portion of primary care clinics in 1 state. However, we do not have comparable data on clinic performance measures for 2021 yet, so we cannot report on the extent to which those processes seem to be affecting patient outcomes. There may be unmeasured differences between clinics that completed the survey in each year and those that did not, differences that may have led to greater impact on patients.

Although nearly 90% of the primary care clinic leaders participating in this study report moderate to extreme disruptions in their approach to care, those same leaders documented that the CMPs important for chronic disease management had not only recovered by 1 year later, but were actually better than before. This important trend was the inverse of what they reported for the use of telehealth, going from nearly zero pre-pandemic to a large share of visits during 2020, but dropping back to a low level again in 2021. The pandemic experience has been very stressful for patients and health care professionals alike, but the health care system in Minnesota appears to be resilient. The continued introduction of more highly organized care management may be an important step in recovering from any losses in quality.

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