

ORIGINAL RESEARCH

Practice Adjustments Made by Family Physicians During the COVID-19 Pandemic

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Introduction: COVID-19 pandemic-related health care disruptions necessitated rapid adaptation among family physicians to safely meet patient needs while protecting themselves and their staff. On April 1, 2020, the American Board of Family Medicine (ABFM) introduced a COVID Performance Improvement (PI) activity for physicians to report on and receive Family Medicine certification credit for practice adjustments they made during the early stages of the pandemic. We aimed to understand the types of interventions implemented, and lessons physicians learned from the efforts.

Methods: We analyzed data from COVID-PI activities submitted by self-selected family physicians between April 1 and June 30, 2020. We summarized the COVID-related topics chosen for improvement and performed a qualitative content analysis on a random sample of open-text responses about lessons learned.

Results: The most common practice changes among 1259 unique COVID-PI activity submissions related to virtualization of patient visits, implementing new workflows, developing screening protocols, and obtaining and preserving personal protective equipment. We identified 12 themes regarding lessons learned, most commonly regarding patient and staff safety, modified practice processes and workflows, positive perceptions of and future plans for virtual visits, access to care, and patient satisfaction. Most submitters noted early successes with their interventions.

Conclusion: A PI activity template designed for continuous board certification allowed family physicians to report on how they successfully implemented short term practice changes during the early stages of the COVID-19 pandemic. Reflections from this subset of physicians regarding lessons learned may prove useful in informing future COVID-19 related practice changes. (J Am Board Fam Med 2022;35:274–283.)

Keywords: Certification, COVID-19, Family Medicine, Family Physicians, Health Services Accessibility, Pandemics, Workflow

Introduction

The COVID-19 pandemic has caused massive disruptions in health care delivery, including at the level of the primary care practice. In the early phases, face-to-face office visits were dramatically

decreased or suspended as care became focused on emergency, inpatient, and critical care services in response to dramatic increases in hospitalizations. Ambulatory care visits declined 50–60% from February through April 2020;^{1,2} as of August 2020, in-person visits remained 10% below prepandemic levels.² These significant decreases in visit volumes resulted in an increased level of unpaid work; furloughs and layoff of staff; early retirements; and both real and threatened practice closures.^{3,4} These changes have also been associated with increased levels of burnout, depression, anxiety, and stress among family physicians.⁵ These impacts are likely to produce long-lasting effects on the primary care workforce, the delivery of preventive, acute, and chronic disease care provided by family physicians, thus potentially impacting the health of the population.^{6,7,8}

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In the United States, as well as many other countries, primary care practices rapidly increased the amount of care delivered remotely by telephone, e-mail, and videoconferencing.^{29,10,11,12} Practices also needed to develop and implement new workflows for screening and triage of patients, including those potentially infected with COVID-19, while implementing safety precautions for protecting physicians, staff, and other patients.^{13,14,15,16} Family physicians working in the urgent care, emergency department, hospital, and long-term care settings were also forced to respond in unique ways.¹⁷

Assessment of performance in practice has been part of the American Board of Family Medicine (ABFM) recertification program since the board's inception in 1969. Article-based practice audits were replaced by online topic-based performance improvement (PI) activities in 2003. In an effort to provide a pathway for physicians to report on the improvement efforts they are already doing in practice, ABFM introduced a template for data-driven self-directed PI activity in 2014. The self-directed option provides additional opportunities for physicians across practice types, locations, and scopes of practice to earn certification credit for improvement work relevant to their needs and the needs of their patients. A streamlined self-directed activity template has been online since 2018.

In the spring of 2020, several ABFM diplomates began using the self-directed template to submit COVID-19 related practice changes to meet their PI activity requirement. In response, ABFM developed a modified version of its self-directed activity template to help more family physicians capture their learnings and earn continuing certification credit for rapid and ongoing COVID-19 related practice adjustments. Rather than focusing on a single change such as tele-visits, the COVID-PI template provided flexibility to help diplomates identify and test many types of practice changes that could evolve throughout and beyond the pandemic. Although baseline measurement was encouraged, it was not required for testing of interventions that were never or seldom used before the pandemic. Thus, the template facilitated quicker implementation and streamlined the reporting of COVID-related interventions. The process recognizes the challenges family physicians faced during this crisis; provides value in the form of certification credit while minimizing reporting burden; and helps ABFM identify and curate learnings and successful

practices as a resource to help other physicians who desired to make similar practice changes. The COVID-PI activity was launched on April 1, 2020 and was rapidly adopted by a large number of diplomates. In this article, we report findings from a sample of submissions from self-selected diplomates through June 30, 2020, aiming to understand the types of interventions implemented and lessons physicians learned from the efforts.

Methods

The ABFM COVID-19 self-directed clinical pilot activity template asked physicians to identify the need(s) for adapting their practice to the pandemic; select improvement topic(s) from a checklist; identify practice gaps, measures, and aim statements for their improvement; describe their intervention; submit follow-up and baseline data when available; and describe lessons learned from the effort.

Data from the online templates were compiled into a Microsoft Excel spreadsheet for analysis. Duplicate submissions were removed. Submissions were cross-referenced with other ABFM data to assess certain demographic and practice characteristics of diplomates who submitted performance improvement activities using the COVID-PI template from April 1 through June 30, 2020.

We compiled frequencies of the checklist improvement topics selected by these diplomates. We used a team-based inductive approach to thematic analysis¹⁸ in an exploratory analysis to characterize free text comments physicians made regarding lessons learned from completing the PI activity. Using Microsoft Excel (Microsoft Corporation, Redmond, Washington), 2 researchers (DP and AE) first read through a random sample of 250 comments to identify key words and initial themes. Four authors (DP, AE, EB, and AW) then met to refine and finalize the codes and their definitions, and to ensure that the codes could be accurately applied to the comments by all team members. An additional random sample was extracted, and a total of 633 comments (half the total sample) were analyzed. Each comment was read and coded by 1 team member, categorized into at least 1 code. Open-text comments that contained multiple themes were assigned more than 1 code. A second coder checked a random sample of comments to ensure inter-rater agreement. The team determined that thematic saturation was achieved after reviewing this half of the sample. Theme frequencies were

calculated to provide a sense of the most commonly cited lessons learned.

Diplomate demographic information was determined from the ABFM physician portfolio. Practice characteristics were gathered from a survey completed by diplomates before ABFM examinations; due to different survey versions, data were only available for diplomates whose most recent examination occurred after 2017. Ethical approval was granted by the American Academy of Family Physicians Institutional Review Board.

Results

Between April 1 and June 30, 2020, a total of 2054 COVID-PI activity submissions were submitted. After removing 267 duplicate single diplomate submissions and 528 duplicate group activity submissions, 1259 submissions were included in the analytic pool. Submitting diplomates were more likely to be female compared with nonsubmitting ABFM diplomates. diplomate years of experience, faculty status, primary practice site, practice size, specialty mix, and practice ownership were similar between submitting diplomates compared with the general population of ABFM diplomates. (Table 1).

The most common COVID-PI activity chosen for practice change (Figure 1) related to virtualization of patient visits ($n = 935$), followed by adaptations in practice workflow ($n = 583$). Other commonly identified areas included COVID-19 screening ($n = 452$) and obtaining and maintain supplies of personal protective equipment ($n = 418$). Areas selected less frequently by diplomates included hand hygiene ($n = 262$), COVID-19 diagnosis ($n = 183$) and treatment ($n = 159$), and home visits ($n = 35$). 641 of submissions (50.9%) included 2 or more topic areas. Virtual visits was the topic most often chosen alone (67% of 618 single topics). Furthermore, 44.3% of the 943 virtual visit submissions did not include other topics.

We identified 12 cross-cutting themes about lessons learned, regardless of PI activity topic selected. While challenges and concerns were noted, most reflections were positive about the initial practice adaptations. Some comments were specific to a unique theme. Comments that contained elements of more than 1 theme (for example, safety and workflows or virtualization and access to care) were counted in each applicable category. Thus, the total frequency of themes exceeds the total number of

comments. Below, we present comments illustrating 4 of commonly identified themes: patient/staff/personal safety, intent to continue virtual visits, continuing to adapt workflows, and patient satisfaction.

Patient and staff/personal safety was the most common theme found in diplomate reflections on lessons learned from participating in the COVID-PI activity. Submissions included keeping patients safe at home (virtualization), safe in the office, and self and staff protection (PPE, workflow changes, and hand hygiene). One diplomate wrote that “[t]hese changes significantly improved our ability to deliver safe and effective [care] but [*sic*] limiting exposure from staff and patients who may be likely to spread COVID-19 to our most vulnerable patient population.”

Many diplomates noted intention to continue to offer virtual visits to patients after the pandemic, as exemplified by the following reflection: “We hope to keep this going forward for patients with transportation issues, who cannot take off work or who need a family member present.”

As stressful as these initial change processes were, there was evidence of the resilience of family physicians on the frontlines of care. The necessity to continue process and workflow adaptations after initial changes were made was also a commonly cited lesson learned:

We have had ups and downs determining what appointments/concerns are best suited for remote visits—some have needed to be changed from a scheduled Telehealth visit to an in-person visit—remotely as well as patients resisting our requests to have them seen in person for more severe illnesses. We are learning!

Indeed, patient satisfaction with implemented practice changes, especially virtualization, was another common theme, and demonstrated patient willingness to adapt to pandemic safety:

Patients felt they were able to reach their providers and felt more comfortable knowing they were not stranded or having to jeopardize their own health to reach us. I learned to roll with changes and that patients are willing to adapt as needed.

In addition, the uncertainty and rapidity with which large scale changes were required was felt to have brought physicians, their staff, and in some cases their employer or affiliated organization, closer together as a team and resulted in enhanced communication:

We learned that during a pandemic we must slow down. We must work as a team to look at the details of our process in order to keep everyone

Table 1. Characteristics of Diplomates Submitting COVID-PI Activities, April 1–June 30, 2020 (n = 1259)

Characteristics	Submitting diplomates (n, %)	All ABFM diplomates (n, %)
Gender		
Male	515, 40.91%	54102, 53.58%
Female	744, 59.09%	46868, 46.42%
Time since initial certification		
<5 years	177, 14.06%	18022, 17.85%
5 to 10 years	313, 24.86%	19387, 19.20%
11 to 20 years	332, 26.37%	27042, 26.78%
>20 years	419, 33.28%	36519, 36.17%
Not currently certified*	18, 1.43%	0, 0.00%
Practice characteristics		
Solo	34, 2.70%	2735, 2.71%
2 to 5 providers	135, 10.72%	8477, 8.40%
6 to 20 providers	105, 8.34%	8111, 8.03%
>20 providers	85, 6.75%	6459, 6.40%
No data available [†]	900, 71.49%	75188, 74.47%
Faculty (medical school and/or residency)		
No	294, 23.35%	21242, 21.04%
Core/salaried faculty	34, 2.70%	2930, 2.90%
Volunteer/clinical faculty	83, 6.59%	6110, 6.05%
No data available [†]	848, 67.36%	70688, 70.01%
Primary practice site		
Hospital-/health system-owned medical practice (not managed care or HMO)	145, 11.52%	8925, 8.84%
Independently owned medical practice	105, 8.34%	7685, 7.61%
Managed care/HMO practice	20, 1.59%	1602, 1.59%
Academic health center/faculty practice	20, 1.59%	2006, 1.99%
Federally qualified health center	13, 1.03%	1641, 1.63%
Rural health clinic (federally qualified)	3, 0.24%	564, 0.56%
Indian Health Service	3, 0.24%	157, 0.16%
Government clinic, nonfederal (eg, state, county, city, maternal/child health, public health center)	7, 0.56%	415, 0.41%
Military, Veterans Administration, Department of Defense	19, 1.51%	1079, 1.07%
Workplace clinic	3, 0.24%	470, 0.47%
Other	21, 1.67%	1240, 1.23%
No data available [†]	900, 71.49%	75186, 74.46%
Specialty mix		
Family medicine only	175, 13.90%	12035, 11.92%
Primary care specialty mix (family medicine, internal medicine, and/or pediatrics)	80, 6.35%	6516, 6.45%
Multiple specialties (not only primary care)	73, 5.80%	5345, 5.29%
No data available [†]	931, 73.95%	77074, 76.33%
Site ownership		
No official ownership stake (100% employed)	356, 28.28%	26950, 26.69%
Sole owner	37, 2.94%	3110, 3.08%
Partial owner or shareholder	56, 4.45%	5747, 5.69%

Continued

Table 1. Continued

Characteristics	Submitting diplomates (n, %)	All ABFM diplomates (n, %)
Self-employed as a contractor (including locums)	16, 1.27%	1347, 1.33%
Other	8, 0.64%	558, 0.55%
No data available [†]	786, 62.43%	63258, 62.65%

* Not currently certified: Certification lapsed after completion of activity or while in process of regaining certification.

[†] No data available: ABFM diplomate practice survey not completed since 2017.

involved safe. Small changes made an immense difference in our team’s safety.

Table 2 presents the 12 emerging themes in descending order of frequency, with definitions and illustrative quotes representing each theme.

Discussion

Practice Implications

The brisk response to ABFM’s COVID-19 self-directed clinical pilot activity opportunity potentially indicates its perceived value and relevance to diplomates during the early, confusing stages of the pandemic. Results demonstrated the creativity and flexibility of family physicians in implementing practice changes to meet their needs of their patients.

The practice improvement topics, adjustments, and reflections we identified in this cross sectional analysis are consistent with COVID-19 adaptations noted in several smaller studies.^{12–16,19} Respondents

in this study were generally successful in transitioning to telehealth. They found telehealth useful for maintaining patient access (at least in the short term) while attending to patient and staff safety. They indicated changes in office workflows and screening procedures to incorporate telehealth in their practice and mitigate COVID-19 risks from in-person visits to other patients, their staff, and themselves. Participants also noted the importance of team communication in making rapid adaptations to change.

The majority of reflections indicated that diplomates achieved some early successes with their interventions, although we did not specifically analyze the degree of improvement. While the majority of submissions commented on high patient and staff satisfaction with changes made in practice, several diplomates expressed anxiety about the impact of these changes on the longer term health of their patients or practice. Several participants commented

Figure 1. COVID-19 Performance Improvement Topic Areas From Diplomates Submitting COVID-PI Activities, April 1–June 30, 2020 (n = 1259). Abbreviation: PPE, personal protective equipment.

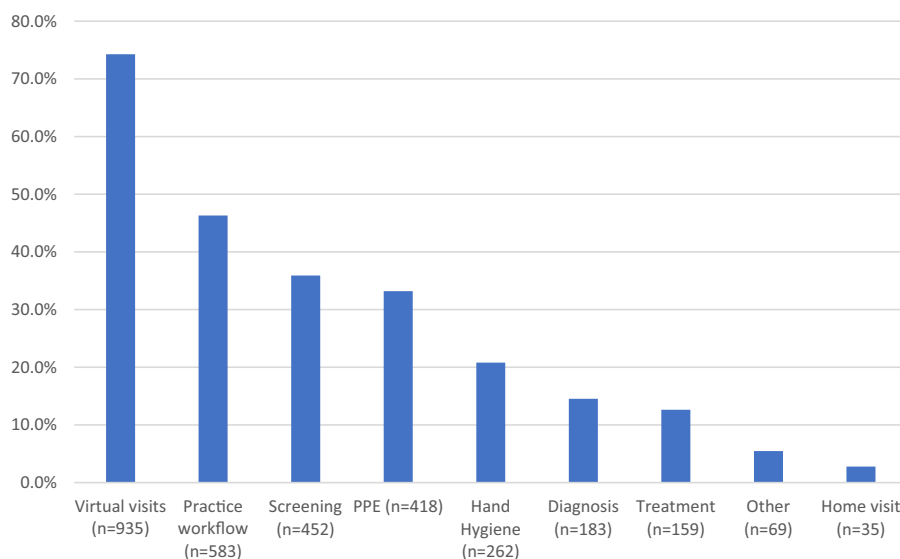


Table 2. COVID-19 Performance Improvement Lessons Learned by Diplomates Submitting COVID-PI Activities, April 1–June 30, 2020

Theme	Definition	Illustrative remarks
Safety (n = 363)	Safety or protection of patients and/or staff, including PPE and measures that helped to control spread of COVID-19 and reduce risk, and/or appreciation that these measures are necessary	<p>“In terms of minimizing risk of COVID-19 infections in our patients, I have no doubt that the move to phone visits was absolutely necessary.”</p> <p>“...the viral clinic allowed us to quickly screen patients who were symptomatic before they spent significant time in the waiting room, nearby others who did not have symptoms.”</p> <p>“All of these above interventions helped greatly conserve our PPE and make it safer for both our staff and patients. . . . Our triage nurses were able to keep most patients at home to decrease PPE use and unnecessary visits. Our virtual visits helped decrease exposure of our chronic disease patients to acute illnesses and decrease spread.”</p>
Process of care/workflow (n = 312)	Processes and workflow must evolve/adapt to meet changing context and patient needs; time related issues around patient care, practice changes, and so forth	<p>“We are steadily increasing our telemed visits although not to goal yet. I understand there continues to be changes but we will try to evolve as the changes come.”</p> <p>“We learned that the ability to deliver MRI results by phone is a practice we likely can continue post-COVID pandemic because it is an effective way to communicate and determine next steps/ follow up to save the patient time and free our staff/ schedules.”</p>
Positive view of virtualization (n = 225)*	General comments highlighting that virtual visits were helpful or benefitted patient careIndication of intent or commitment to continue virtual visits after the pandemic	<p>“[We] Learned that telehealth can be utilized for quality care.”</p> <p>“We learned that the virtual visits are an invaluable underestimated tool in primary care. Something that we plan to implement in the future as part of our regular care.”</p>
Access to care (n = 203)	Changes in patient access to care (increased access due to virtual option, or decreased access due to challenges with virtual or clinic closures/reduced hours)	<p>“Virtual visits provided excellent patient access in the setting of a pandemic.”</p> <p>“As a result of the measures taken to begin telemedicine in our practice, our clinic was able to provide over 50% of our medical care virtually. We learned that we can rapidly adapt to a pandemic situation to ensure safety of staff and clients and to ensure continuity and access of care to our patient population.”</p> <p>“One of the problems with virtual visits is that the other population that we serve do not have computers and are not able to do virtual visits due to lack of computer knowledge.”</p>
Patient satisfaction (n = 193)	Patients are happy with the quality of virtual care or appreciated access to care during the pandemic	<p>“Telehealth has and continues to have some bumps put patients like it and it provides a great way to reach patients when access is challenged. Patients really like it.”</p> <p>“I was concerned at first that quality of care would be compromised with virtual visits, but I came to learn that it was not and in many instances was enhanced. Patients were appreciative of having a way to stay connected to their physician that did not put them at risk of exposure to COVID-19.”</p> <p>“This has been a very positive activity. The patients who participated in the virtual visits had the time allotted to address their questions, review and update the medical history, and make sure that we discussed their medical conditions as well as all the medications we had listed in their chart. The patient was followed up by my office nurse with a 3-question phone satisfaction survey. The results were that they all (100%) felt that the telehealth experience was excellent. They would all (100%) have another telehealth visit in the future, and they all (100%) would recommend a telehealth visit to other patients.”</p>

Continued

Table 2. Continued

Theme	Definition	Illustrative remarks
Team (n = 113)	Importance of the healthcare team working together to accomplish goals; comments on the educational needs or shifting/evolving of team roles in response to the pandemic	<p>“I learned that many visits can be done virtually and that teamwork was more important than ever to quickly adapt to a changing healthcare world.”</p> <p>“Patients and staff felt safe and comfortable in managing patients and we were able to provide continuing care for our patients. This does require ongoing education for the staff and patients, as we assure patients the distance and masks are for their and our protection.”</p>
Patient/physician communication (n = 87)	Comments about the quality and/or frequency of communication with patients	<p>“Possible decrease transmission but decreased quality of interaction.”</p> <p>“I learned that patients are much more comfortable at home and were more talkative, less nervous than in the office. It was also insightful seeing their home environment.”</p>
Quality of care (n = 85)	Potentially improved, maintained, or decreased quality of care	<p>“By implementing the above changes and using Telehealth more effectively we found no significant difference in quality of care or patient satisfaction compared to face to face visits.”</p> <p>“I do feel there is some risk involved in doing alternate type visits since we cannot get vitals/do any physical exam.”</p>
Technology (n = 79)	Patients struggle with or lack of access to technology; issues implementing or integrating new technological platforms in practice	<p>“At the beginning of the pandemic, CMS only was approving telehealth visits via audio-video, but many of our geriatric and disabled population do not have access or know how to use this technology. Or they need help to use it, and in getting help, may end up divulging sensitive personal information in order to be able to get quality health care. This is not right and must change. We are looking at how to restructure/better structure a home health/visit program for this population.”</p> <p>“I also learned the necessity of a good telemedicine platform that is user-friendly so that some of these visits could be completed virtually.”</p>
Patient visit volume (n = 58)	Changes (or stability) in patient volume due to QI intervention	<p>“We learned that virtual visits enabled us to conduct not just a portion but close to our usual office volume of visits, in the setting of a global pandemic.”</p>
Coding/reimbursement/regulatory issues (n = 37)	Challenges with billing or reimbursement. Challenges with or learning new ways of coding	<p>“Overhead increased and revenue plummeted, and we have yet to see insurance reimbursement on the telemedicine.”</p> <p>“Our providers learned many lessons and developed new skills, including... coding telehealth visits with the use of appropriate E and M codes.”</p>
Stress–burnout (n = 12)	Toll on physicians, staff, practices of dealing with changes/pressures brought by COVID-19	<p>“We have asked staff to participate in stress control as well as many of us have suffered from profound fatigue with the constant amount that we feel we have to read to keep up to date and able to care for our friends and families.”</p>

* Of these reflections, 93 (41.3%) indicated an intent to continue offering some virtual visits after the pandemic. Abbreviations: PPE, personal protective equipment; QI, quality improvement.

on practice or patient challenges in implementing and adapting to new technology. Others expressed concerns about challenges in obtaining vital signs or conducting physical examinations, highlighting possibilities for future physician, staff, or patient education as tele-visits evolve. Only 12 of the 1259 submissions noted concerns about stress or burnout. Prepandemic concerns about physician burnout and reported increases during the pandemic⁵ are likely a

reflection of the self-selected nature of respondents and their focus on early response during the initial phase of the pandemic.

Implications for Board Certification

In recent years, the value of including performance improvement as a part of Board Certification has been questioned by some.^{21,22} The COVID-PI activity has been one of the most popular PI activities

in ABFM history; its rapid, broad, and continuing uptake demonstrate the power of being relevant to what family physicians are facing in practice. Our pilot demonstrates how board certification activities can be aligned with physician needs to address contemporary, critical health care issues. The activity's flexibility—allowing diplomates to choose their target—has been very important. The breadth of subject and ideas has been impressive, as family physicians applied the module to very different communities and aspects of care. Target options and flexibility are also emphasized in ABFM's self-guided and health equity PI activities. This flexibility, which supports diplomate's intrinsic motivation to improve areas they have prioritized, has important implications for the design of future PI activities. In addition, lowering burden by not requiring an audit before starting telehealth seemed important, even though most diplomates did. Some structure is necessary for learning and improvement and to avoid “check-boxism”—but just enough. These lessons may represent a foundational principle for the next generation of PI work by the ABMS boards community: adapting principles of quality improvement by increasing flexibility and reducing administrative burden can facilitate relevant and timely participation and meaningful learning from improvement activities by large numbers of physicians across different practice settings.

Limitations

We did not use intentional representative sampling in our study. Our sample consisted of family physicians participating in continuous certification who self-selected and voluntarily completed and submitted a PI Activity to ABFM. However, the size, national reach, and variety of different family medicine practices in our sample suggests that our findings may be applicable across a variety of primary care practices. Due to participation bias, our results should not be interpreted as generalizable to all family physicians, especially since many practices, physicians, and staff are known to have struggled in adapt during early stages of the pandemic.^{3–8} Rather, they are best viewed as examples of positive deviance²⁰ which can provide a road map for other practices considering undertaking these types of changes.

Future Directions

Virtual visits may continue to serve as an important means of providing patient access to primary care

services in small or large practices. We believe the learnings from responding diplomates, particularly learnings around flexibility and team communication in the face of practice change, may be relevant in the post-acute phase of the pandemic, and can inform potential future, sustainable practice improvements.

At the time of this writing (September 2021), ABFM has received over 15,000 submissions reporting on practice changes related to COVID-19, including return to practice with a hybrid of in person and remote care, as well as vaccine promotion and administration. We intend to analyze these later submissions to describe how initial changes evolved over time and attempt to compare these practice changes with quality measures from registry data. Analysis of later submissions will also allow us to identify other new adaptations as the pandemic evolved, potentially including family physicians' role in purveying accurate scientific information to patients and communities, combatting COVID-19 misinformation, providing COVID-19 vaccinations and addressing vaccine hesitancy, and ongoing education about the role of nonpharmacologic means (masking, physical distancing) of COVID-19 mitigation. It will also be important to monitor and explore ongoing challenges (particularly stress and burnout), or the emergence or of new barriers to future practice adaptations in later stages of the pandemic. Analysis of practices who were unable to quickly adapt to the pandemic may also be instructive.

The COVID-PI activity form was structured to collect information about the focus (topics) of attempted interventions, and high-level reflections on diplomate learning. Given the importance of minimizing reporting burden during a highly stressful time, we did not ask respondents to extensively comment about the specifics of how they implemented changes or overcame barriers. Further elucidation of the specifics of how diplomates implemented their adaptations and overcame barriers to change could help others translate the learnings into practice.

Conclusion

The ABFM COVID-19 self-directed clinical pilot activity provided a mechanism for family physicians to reflect on short-term practice changes they implemented during the early stages of the COVID-19 pandemic. It also provided a means for ABFM diplomates to earn continuous certification credit for the relevant, immediate process changes they were

making to provide safe, continuous, compassionate care to their patients under extreme circumstances.

Diplomate reflections may prove useful in informing future COVID-19 related practice changes. Preliminary learnings may inform the post-COVID-19 role of virtual care. Early improvements in team communication and function, workflows, and, and safety practices should be built on and sustained. We believe lessons learned from diplomate submissions can apply to small and medium sized independent practices and larger health system networks. They can also inform learning collaboratives for physicians to receive feedback and more widely share successful practices.²³ Hopefully, these efforts will lead to continued improved and satisfying care delivery long after the COVID-19 pandemic has passed.

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To see this article online, please go to: <http://jabfm.org/content/35/2/274.full>.

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