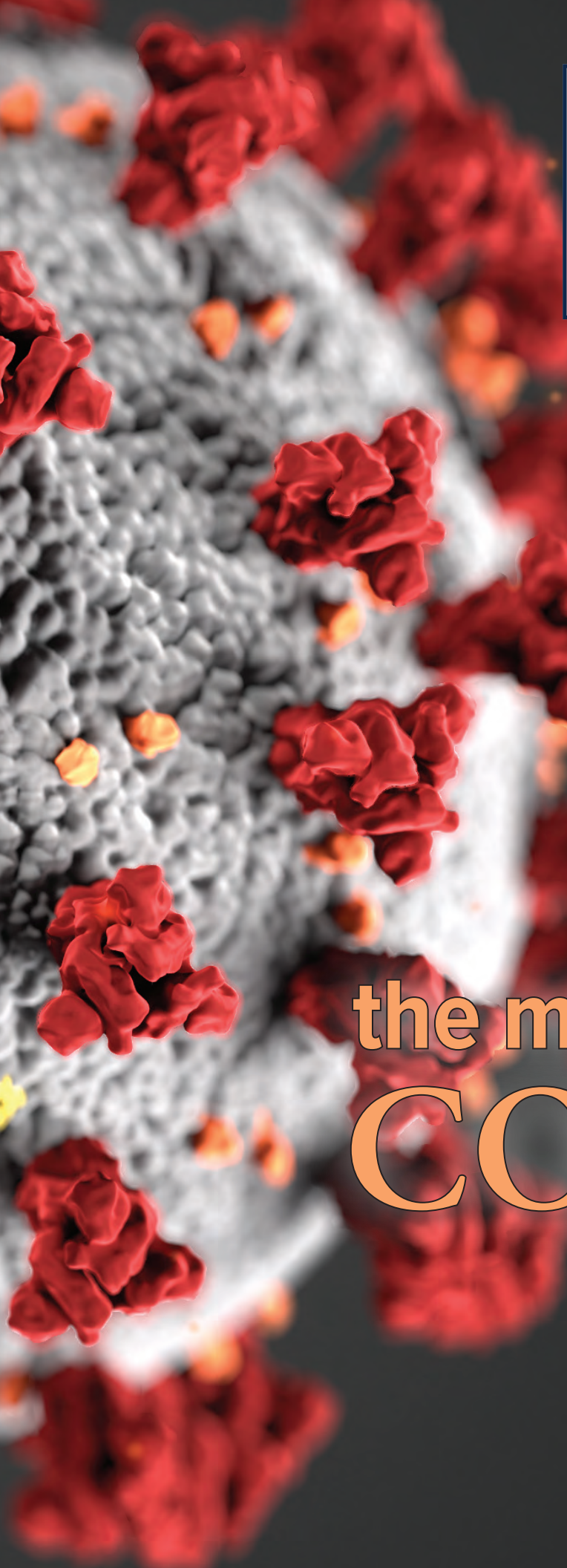

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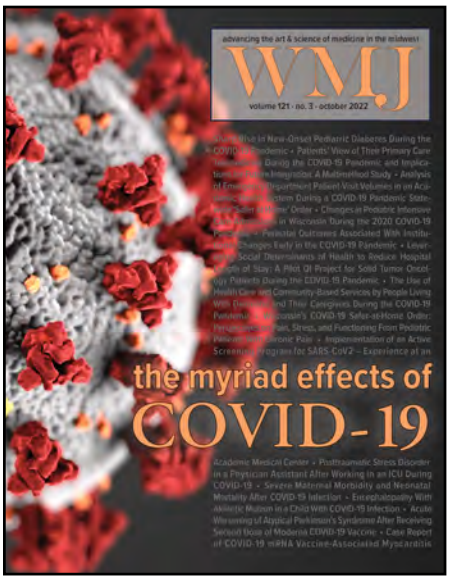

COVER THEME

The Myriad Effects of COVID-19

Since the beginning of the COVID-19 pandemic, its impact on the health care landscape has been widespread. This issue of WMJ *includes a collection of papers that explore many of the myriad ways COVID-19 has affected the delivery of care, various health conditions and outcomes, clinician mental health, and more.*

Cover design by Kendi Neff-Parvin

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BRIEF REPORTS

CASE REPORTS*

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Promoting Mentorship and Scholarship Among Underrepresented Minority Medical Students

Dear Editor:

Mentorship and scholarship are crucial for success in academic medicine. Previous literature has shown that underrepresented minorities in various disciplines of medicine often have difficulty finding adequate mentorship support to aid in their scholarly productivity and professional development. This challenge has been compounded by the COVID-19 pandemic as students cannot connect with mentors in traditional ways. Acknowledging the value of mentorship and the challenge that underrepresented minority (URM) medical students face, we sought to create a platform to provide them with early research and medical writing opportunities to get easy access to dedicated mentors devoted to their academic success and to receive support for their overall success in medical school and beyond.

This innovative virtual program included URM medical students, faculty, and other medical students at the Medical College of Wisconsin (MCW). A pilot program led by the primary and senior authors was completed successfully in the 2020-2021 academic year. Two faculty (primary and senior authors) and 2 peer mentors were connected virtually with 4 URM medical students who completed a survey prior to the session indicating their past research experience and their expectations for the program. Faculty were recruited based on their interest in mentoring URM medical students. A virtual workshop was held to introduce the cohort of students to the platform and explore the various means of scholarship, including writing case reports and letters to the editor. The URM medical students completed 3 case reports that were presented at a national conference and 1 letter to the editor during the 2-month pilot program.

Based on program feedback, we expanded it to the 2021-2022 academic year. After holding an initial workshop, we created a mentor-mentee model where medical students in the first and second year were paired with a peer medical student mentor from the third or fourth year. Participants included 16 URM medical students with 6 student peer mentors and 9 faculty mentors. URM medical students were involved in at least 1 scholarly project, and this program was successful in having more than 15 accepted case reports to 3 national meetings (American College of Physicians, Society of Hospital Medicine, Society of General Internal Medicine). Using the resources provided by the cohort, URM medical students were able to secure research opportunities. Scholarly productivity was 5 times greater than the previous year.

The URM medical student mentorship program has highlighted the crucial role of structured mentorship platforms in promoting scholarly productivity among this population. The next steps for our project will be to pursue additional institutional funding and expanding our mentor base with faculty from varied disciplines. The program's success will be assessed by the number of scholarly projects presented at meetings and published in peer-reviewed journals, along with survey results from participants about the program's effectiveness.

—Sonal Chandratre, MD; Gifty Marfowaa, BS; Abdul-Rahman Abdel-Reheem, BS; Pinky Jha, MD

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Health Illiteracy: The Crisis in Rural America

Dear Editor:

Health literacy is defined as "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."[1] Despite the gravity of these essential skills, the health literacy competency rate in the United States is only 12%.[2] It is no secret that rural America disproportionately suffers from low health literacy, as evidenced by its high rates of poor health and chronic disease. There are many factors attributed to these disparities; however, health literacy is our primary focus in that it is a fundamental and rooted explanation for health trends across rural America.

Literacy is commonly conceptualized as reading and writing; however, literacy embodies numerous aspects of life. As aspiring physicians and recent graduates of the Community Health Internship Program through the Area Health Education Center in Wisconsin, we developed and transformed our understanding of rural medicine. We witnessed the struggles many people endure to obtain adequate health care in a rural setting, including transportation issues, lack of access and understanding of health insurance, and the absence of urgency for regular doctor visits. Our initial first-hand experiences with Afghan refugees revealed the desperate need for health literacy. Each week of our program, we tutored refugees navigating their new environment and quickly discovered they were entirely uneducated regarding matters of our health care system.

We further learned from several local nonprofit organizations and involved community leaders of the hardships associated with rural health. We found that there is a health professional workforce shortage, limitations of rural health training opportunities, population health challenges, delay of care, and low health literacy prevalent in rural health care. We discovered that most patients gravitate toward emergency department or short-stay models of care. Additionally, the patients tend to be older, sicker, and less well-insured.

The solutions for addressing these concerns rely both on the individual health consumer and major community structures, such as health care systems, educational institutions, and the media. A starting point to improve this problem is to make health information easier to understand (print, oral, or electronic), improve education on these literacy skills, and reform health care delivery to a more patient-centered focus.

To help expand health care knowledge in rural communities, we created a handbook that includes step-by-step instructions on how to schedule a medical appointment, how to establish a provider, easy health insurance information, and many other resources in and around the community of Wausau, Wisconsin. This handbook can be accessed at the Marathon County Literacy Council or online at https://mclitofwausau.org/. It is our hope that with similar resources many rural residents will better understand health care.

Conquering these challenges will require determination and a willingness to create solutions. Rural health illiteracy is a public health crisis, and it is time to address it.

—Mario Duwe; Megan Lechleitner

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Fahad Aziz, MD, FASN

All Clinicians Communicate With Patients, But Too Few Connect

Fahad Aziz, MD, FASN, *WMJ* Editor-in-Chief

As clinicians, we know that "connecting" with our patients is a powerful tool. However, not all clinicians are able to establish this level of rapport. I faced the same problem early in my career as a resident in internal medicine, then as a nephrology and transplant trainee. My medical knowledge was excellent, and I could formulate strategic management plans for my patients; I used to discuss these plans with my attendings and colleagues, who frequently agreed with them. For these efforts, I was awarded the "Best Educational Resident" of the year for two consecutive years. However, despite these efforts, I never had good patient satisfaction scores, and it was an extremely frustrating feeling. But then, an incident changed my life.

I was reading John Maxwell's book *Everyone Communicates, Few Connect,* in which he quotes Zig Ziglar: "If you help people in getting what they want, they will help you in getting what you want." With this powerful statement in my mind, I reexamined what patients want and need in their relationship with their clinician. I looked around and found several excellent physicians who have an outstanding ability to connect with their patients: my cardiology attending at Jersey City Medical Center, Dr. Ameen Abdul Aleem; my nephrology fellowship chair Dr. Ramesh Khanna; and my mentor in transplant medicine, Dr. Arjang Djamali. It was astonishing to see how they established a "connection" with their patients, which was much more than just "communication." I witnessed how several patients were sad and tearful at the news of Dr. Djamali's move from the University of Wisconsin to Maine Medical Center. By carefully reviewing the qualities of these extraordinary physicians, I found that they all shared some unique attributes that set them apart from their colleagues. The first two qualities are essential to establishing a connection with patients, and the others are imperative for maintaining it.

To truly establish a connection, it is essential to learn more about a patient than what is included in their medical history.

ESTABLISHING A CONNECTION

Get to Know Them

To truly establish a connection, it is essential to learn more about a patient than what is included in their medical history. A few examples include learning the patient's profession, hobbies, interests, and their spouse's name. Knowing such simple things helps establish a good rapport, and starting a patient encounter by asking about their general well-being and interests offers a bridge for clinicians and patients to connect. It helps builds the patient's confidence in their clinician, as they consider them someone who is genuinely interested in them and, in turn, their health-related issues. The clinicians who begin their conversations with direct medical questions are less likely to be able to forge this connection.

Listen to Patient Concerns

One of the most critical components of connection is listening. There is an old saying: "Fifty percent of medical problems would be cured if your physician just listened to your problems." I have found this statement very accurate. With their busy schedules, many clinicians don't have much time to listen to all of their patient's concerns, and patients often feel rushed through their visits. Patient encounters are part of a clinician's daily routine; however, one crucial thing we forget is that a brief patient encounter may be the single most important aspect of that patient's whole day. They will think about each word their clinician says, and they will likely discuss it with their friends and family. To be "connecting" clinicians, we need to understand the importance of listening to our patients and the concerns they have.

MAINTAINING THE CONNECTION

Communicate Clearly and Share Honest Opinions

Sharing your expert, honest opinion with patients helps to strengthen your connection with them but communicating complicated information in a way that's understandable can be difficult. To help, I have seen outstanding physicians using a paper and pen or whiteboard while discussing complex issues and possible solutions with their patients. Difficult medical decisions are easier to make when the patient understands the problem and can share in decision-making. It's human nature for them to accept the decisions where they have ownership.

Make Time to Answer Concerns

Another critical component of maintaining a connection with patients is giving them time to think through the issue and then making yourself available to answer any questions. It's important to remember that all questions are valid. Patients should be encouraged to ask anything, no matter how minor or straightforward it may seem. Making them feel comfortable and answering their questions helps patients develop confidence in their clinician—and it's a crucial component of maintaining an already established connection.

Spread Hope

I firmly believe that hope is life. While clinicians must be honest with their patients, they should also try to convey to them any "silver linings" in difficult situations. Doing so can help patients find hope and strengthen an already established connection. I have seen firsthand that clinicians maintaining a positive attitude toward their patients is contagious, and miracles can happen with hope.

If we wish to be "connecting" physicians, it's essential that we put extra effort into this vital relationship and that we also demonstrate the power and importance of connecting with patients with future health care professionals.

Can Technology Improve Participation From Underserved Children and Families In Rehabilitation Research?

Samuel T. Nemanich, PhD, MSCI; Bernadette T. Gillick, PhD, MSPT, PT; Theresa Sukal-Moulton, DPT, PhD; Sheikh Iqbal Ahamed, PhD

Rigorous translational research for children with disabilities is essential for providing evidence for early detection and intervention and to continue to bridge the knowledge-practice divide.[1,2] Moreover, incorporating key stakeholders—mainly children and families—is pivotal for conducting family-focused research that is generalizable and directly informs clinical practice. Because a large percentage of research requires in-person visits and interaction with research staff, the interruptions caused by the COVID-19 pandemic have provided an opportunity to reflect and reevaluate on how and where research can and should be conducted. As pediatric rehabilitation researchers working in a variety of geographic settings across Wisconsin and Illinois drawing upon prior literature and lessons learned from the pandemic, we propose that technology can help establish a "new normal" for conducting equitable and inclusive rehabilitation research amid a global pandemic.

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IN-PERSON RESEARCH LIMITATIONS

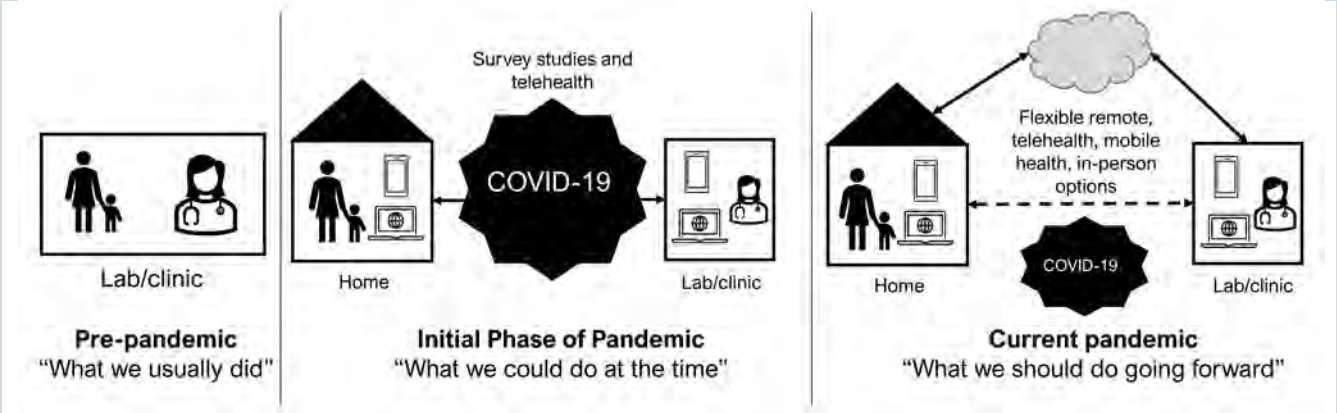
In-person research is comfortable and familiar to most researchers. Historically, however, this approach has several limitations that were further magnified during the pandemic. First, and perhaps most obvious, in-person research is not feasible when physical interaction is restricted by public health guidelines. During the pandemic, many learned that most daily activities and functions could be adapted to reduce in-person interaction (eg, goods and services delivery, telecommuting, virtual education). Influenced by these new options, many research participants also may expect alternative options to in-person research. Stakeholders feel that remote methods save time, effort, and money for travel costs.[3] While some research protocols require specialized procedures and must be performed in-person, there are also many protocols, or portions of protocols, that could be modified to be performed remotely, such as obtaining informed consent. Such modifications do require compliant preparation with appropriate oversight and approval but can offer added benefit to prospective participants.

Before the pandemic, more common factors that limited in-person interaction included time and travel barriers. These problems are intertwined with issues of diversity and inclusion of research participants. Underrepresented racial and ethnic minority groups are less likely to have flexible work schedules or paid time off to participate in studies.[4] For those with availability, travel becomes problematic if there is limited access to transportation to reach research locations. Furthermore, both time and travel are barriers for families in rural areas who do not live near a research site, which are typically in large exurban and urban areas. Remote research offers the benefit of eliminating time and travel barriers to reach a broader and more representative population of research participants.

> The effects of the pandemic require that we strive for a "new normal" to improve how we conduct research and interact with families.

There are other scientifically relevant reasons to move toward remote research methodologies. Traditional in-person research designs capture information over a relatively small window of time and do not measure day-to-day or week-to-week changes that reflect the variability and heterogeneity of behaviors that exist across different time scales and in different environments, resulting in limited generalizability of the findings.[5] Remote research would facilitate longitudinal designs in ecologically relevant contexts that would address otherwise unanswered questions. For example, the stability and long-term effects of many physical and occupational therapy interventions are not well

Figure. Model of Past and Proposed Future Changes to Pediatric Rehabilitation Research



Before the pandemic, traditional research usually consisted of in-person visits to a laboratory or clinic. This was done to maintain control of experimental conditions and because specialized equipment or technology was present in the laboratory. During the initial phase of the pandemic, researchers were limited to performing survey studies with limited technology as most were not prepared to perform rigorous remote research. Now, moving forward with COVID still present in our daily lives, researchers should consider remote, telehealth, and in-person formats when designing future studies. With this approach, families will spend less time traveling to research facilities, and longitudinal work and follow-up work may be more feasible. Remote research is facilitated by the ubiquity of computers and mobile devices and broadband internet.

understood. Knowledge of longevity and stability of treatments would help clinicians better understand prognosis and long-term outcomes.

In-person research also captures a participant's performance and abilities in a specialized laboratory environment that may not translate to other settings or contexts. For example, in adults with stroke, prior work has shown there is a significant difference between the quantity a person moves in a clinical setting compared to a home or community setting.[6] This study clearly outlines a need to understand phenomena—like motor skill development and recovery from injury—from a broader perspective and to consider the contextual and environmental factors that drive these differences in behaviors. Understanding how individuals behave in the home is even more important because it is where people spend more time due to adjustments made during the pandemic. Future work that can gather valid data in various environments could provide a unique window into individual behaviors in nontraditional research settings.

REMOTELY EVALUATING CHILDREN'S MOTOR DEVELOPMENT: A MODEL FOR MOVING RESEARCH OUTSIDE THE LABORATORY

For pediatric rehabilitation researchers studying children with physical disabilities, a critical area of research surrounds how motor skills are assessed and evaluated. Healthy acquisition of motor skills is a key part of a child's overall development. Motor skills are linked to academic success, enable social development, and are predictive of overall physical health and well-being.[7,8] Valid and reliable assessments of motor skills maximize the rigor of scientific studies and provide clinicians evidence-based evaluation tools to inform decision-making for children at risk for developmental differences. For families, being a part of the assessment process is important, with some families preferring assessments that don't require clinic visits.[9] Thus, exploring how assessments can be performed remotely supports a family-focused, stakeholder-driven approach to research. Still, currently available motor assessments are almost always performed face-to-face, require proprietary equipment and scoring manuals, and last upwards of 1 hour to administer. Most assessments are not designed to detect subtle or mild difficulties a child may experience, nor can they track the rapid and nonlinear changes that may occur throughout development. Accurate and timely motor assessments that can be completed in the home with or without a clinician and are linked to a child's expected development could help to fill this gap. Such information also may provide reassurance to parents about how their children are functioning and if certain behaviors are typical.[10] Altogether, there is an opportunity for improving how, where, and when assessments are administered.

TECHNOLOGY-FOCUSED SOLUTIONS

There is a range of potential solutions with varying degrees of technological sophistication. Focusing on solutions that involve readily available technology, such as mobile devices, allows for participation in any environment and also helps narrow the inequity gap: a large majority (76% and more) of Americans from different racial and socioeconomic groups own a smartphone.[11] Thus, research participation involving mobile devices does not require owning or purchasing other technology than what a participant already has. Mobile health (mHealth) solutions are advantageous because they capitalize on existing technology infrastructure (broadband and wireless internet, mobile devices, smartphones). The BabyMoves app is an example of an mHealth teleassessment solution designed to determine risk of developmental delays in newborns that is performed outside a laboratory or clinical environment.[12,13] This solution illustrates the flexibility and power of mobile devices to communicate, collect, and transmit clinical outcome data. While common in other disciplines, mHealth solutions have yet to be thoroughly explored for pediatric rehabilitation assessment research.

Moving toward more quantitative and objective motor assessments, solutions for

portable and remote movement data collection have been explored by motor neuroscience and neurorehabilitation researchers. One solution was the Portable Motor learning laboratory (PoMLab), a freely available platform that uses software applications running on smartphone or tablet devices that implement commonly used protocols for precise study of motor learning that can be performed in any environment.[14] A similar solution was proposed by Matic and Gomez-Marin, who created a customizable tablet application for measuring hand movement function.[15] The application records a cursor position of the task being performed and measures spatiotemporal variables related to movement skill and performance. One benefit to these solutions is that they use common mobile devices (smartphones, iPads) and may not require additional sensors or external equipment. Furthermore, the software is freely available and could be adapted for pediatric applications. We are exploring development of an mHealth application to collect pediatric motor performance data based on these existing technologies to address these research gaps.

CONCLUSIONS AND FUTURE DIRECTIONS

The Figure illustrates how a shift from in-person to remote research in the context motivated by the COVID-19 pandemic might impact research participation. During the early lockdown phase of the pandemic, research was suspended, leaving investigators with fewer options to continue their research, thus magnifying the limitations of in-person research. Recognizing these limitations, combined with the uncertainty of pandemic and future outbreaks, we propose that researchers should implement alternatives to in-person participation to accommodate participation, particularly those from underrepresented groups.

There are potential barriers to pivoting to fully remote approaches worth noting. Despite the ubiquity of smartphones and mobile devices, the requirement of owning a piece of technology to be included in a study may still pose an obstacle for some underserved families. Remote studies also may limit extended interpersonal interactions achieved with in-person studies that build rapport and trust between families and the research team. Such interactions are critical for continued participation and engagement in the research process. Finally, concerns of privacy and data security deserve careful consideration when health and identifiable data are transmitted remotely and stored on portable devices. Good practices for data security and confidentiality should be established before pursuing wide-scale remote research studies. Considering these potential limitations, traditional in-person research has its merits and should not be discontinued, but rather it should be complemented by including remote options supported by the technological advances capable of directly communicating with and collecting objective information from individuals within their natural environments.

Equitable recruitment and enrollment will continue to be a challenge. Given the disparities in research participation among underrepresented racial, ethnic, and socioeconomic groups, there are key questions when designing studies that deserve honest consideration: *Who will benefit from my research? How can I make my procedures more accommodating to families? Can I expand my study to a larger part of the population?* Improving diversity in research requires intention on behalf of the researcher to consider these questions and to actively work within their own communities to include community members who represent diverse groups in the research process. Overall, the effects of the pandemic require that we strive for a "new normal" to improve how we conduct research and interact with families. If properly implemented, research outcomes will be more generalizable and will help bridge the research-practice divide.

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Sharp Rise in New-Onset Pediatric Diabetes During the COVID-19 Pandemic

Aisha Ansar, MD; Tim Livett, MD; Whitney Beaton, MSN; Aaron L Carrel, MD; Mary Tracy Bekx, MD

ABSTRACT

Introduction: Recent studies report a significant impact of the COVID-19 pandemic on the incidence, severity, and management of diabetes.

Objective: To determine the incidence of new onset pediatric diabetes prepandemic versus during the pandemic and to analyze the presentation based on age, severity, HbA1c, body mass index, and COVID testing.

Methods: We conducted a retrospective review of all pediatric patients admitted with newly diagnosed type 1 and type 2 diabetes mellitus admitted to the American Family Children's Hospital (Madison, Wisconsin) from 2018 through 2021. Data included age at diagnosis, body mass index, hemoglobin A1c percent and pH at presentation, presence of autoimmune pancreatic antibodies, and COVID-19 polymerase chain reaction (PCR) results at admission in pre-COVID (January 2018-February 2020) versus during COVID (March 2020-December 2021). Statistical analysis was performed using SAS software with the incidences analyzed using univariate and multivariate Poisson regression analyses.

Results: During the pandemic, the incidence of both type 1 and type 2 diabetes mellitus increased significantly (69% and 225%, $P<0.001$, respectively), and a higher number of patients had diabetic ketoacidosis. Type 1 diabetes patients with a body mass index greater than the 95th percentile increased from 11.1% to 16.9% (OR 0.62; 95% CI, 0.29-1.29; $P=0.19$). Almost all patients were COVID-19 PCR negative at the time of diagnosis.

Conclusions: A dramatic increase in number and severity of newly diagnosed pediatric diabetes cases was seen during the pandemic. The increase was not explained by factors such as changes in referral patterns or insurance coverage. Further work is needed to understand the impact of societal factors and the direct diabetogenic effect of SARS-CoV-2.

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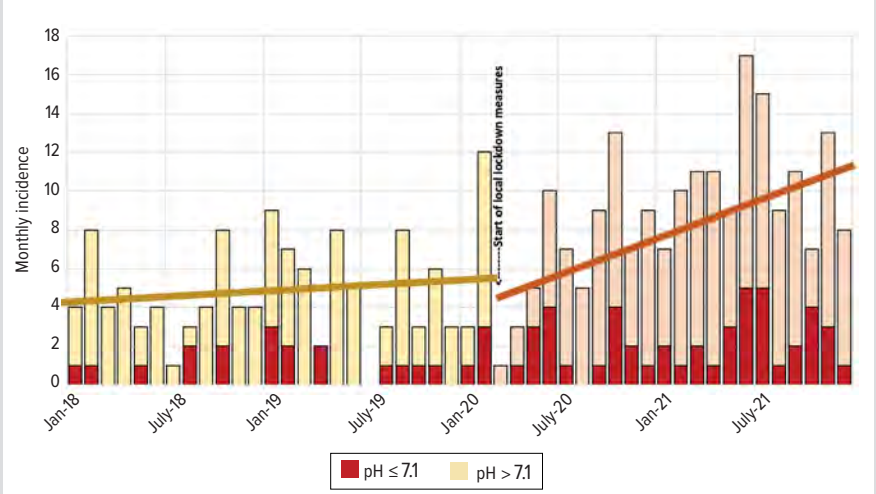
INTRODUCTION

Since the start of the COVID-19 pandemic, our institution has seen acute increases in both the number and severity of new-onset diabetes diagnoses among pediatric patients. Our study aims to better characterize this observation by comparing the presentation of newly diagnosed diabetes admitted to the American Family Children's Hospital in Dane County, Wisconsin, before and during the coronavirus pandemic.

The United States remains one of the countries most affected by the COVID-19 pandemic, with over 46 million cases reported and 25% of those cases in children.[1] Although severe illness in children is relatively rare,[2] it is imperative to further analyze the long-term effect of the pandemic on children's health.

The relationship between COVID-19 and diabetes has sparked interest since early in the pandemic. There are reports of an increase in pediatric new onset type 1 diabetes mellitus (T1DM) in areas heavily affected by the pandemic, with concern that a higher number are presenting in severe diabetic ketoacidosis.[3-6] The cause of this increase is not clear. Prior to the COVID-19 pandemic, research in related coronaviruses suggested that SARS-CoV-2-like viruses could increase the risk of diabetes due to its direct impact on beta cell function.[7,8] Reports of increased diabetic ketoacidosis presentations may suggest that effects of the pandemic led to delayed care.[9,10] This is in contrast to previous

Figure. Monthly Incidence Rates for Types 1 and 2 Diabetes Before and During the Pandemic, With Linear Regression Trend Lines of Pre- and During COVID Incidence



Pre-COVID: slope = 0.02 (P = 0.738); during COVID: slope = 0.27 (P = 0.024).

Table. Analysis of Diabetes Incidence Rate in Pre-COVID and COVID Periods

	Pre-COVID	During COVID	Rate Ratio	*P* value
Mean monthly total	4.88	8.95	1.83	< 0.001
Mean monthly type 2	0.46	1.50	3/25	0.001
Mean monthly type 1	4.42	7.45	1.69	0.001
Mean monthly with pH ≤ 7.1	0.85	2.14	2.52	< 0.001
Mean monthly with pH > 7.1	4.04	6.82	1.69	< 0.001

All reported *P* values are 2-sided.

studies reporting a decrease in the rate of diabetic ketoacidosis at the time of diagnosis of T1DM from 38% in the late 1990s to 29% in 2010-2013.[11]

This study examines the number of cases of both type 1 and type 2 diabetes mellitus and severity of presentation prior to and during the pandemic through the end of 2021, thus allowing us to investigate the perceived increase and severity of the new-onset cases of diabetes.

METHODS

This is a retrospective study of pediatric patients admitted with newly diagnosed diabetes (type 1 or 2) to our institution from January 2018 through December 2021, comparing pre-COVID (January 2018-February 2020) to COVID (March 2020-December 2021). Data collected included age, date of admission, serum pH, antibody testing results for T1DM, body mass index (BMI), and hemoglobin A1c. T1DM was defined when any of the autoantibodies (islet cell antibody, 65 kDa glutamic acid decarboxylase, insulinoma-associated protein 2, or zinc transporter 8) were positive or BMI was greater than the 85th percentile, with polyuria and polydipsia. T2DM was defined if all pancreatic antibody testing was negative and BMI was greater than the 85th percentile. At our institution, all children with new-onset T1DM are admitted for initiation of insulin and education. For those with T2DM, only those in diabetic ketoacidosis or a significantly elevated A1c requiring insulin initiation are admitted. Incidence of T1DM and T2DM were analyzed using univariate and multivariate Poisson regression analyses. In order to account for potential confounding effects, age, BMI, and pH values at diagnosis were included as covariates in the multivariate analyses. Collinearity was evaluated by examining variance inflation factors. The comparison of pre-COVID-19 versus during COVID-19 was quantified by calculating the rate ratios of the monthly incidence rates and reported along with the corresponding 2-sided 95% confidence intervals. Monthly incidences (displayed in Figure) were calculated using regression analysis to display trends in pre-COVID and COVID-19 periods. All reported P values are 2-sided, and $P < 0.05$ was used to define statistical significance. Statistical analyses were analyzed using Microsoft Excel and SAS software (SAS Institute Inc., Cary NC), version 9.4. Approval for this study was obtained from the University of Wisconsin Institutional Review Board.

RESULTS

The incidence rate of T1DM increased by 69% ($P < 0.001$) overall from pre-COVID versus COVID, while T2DM increased by 225% ($P < 0.001$). The Figure further illustrates that the incidence rate of new diabetes cases increased dramatically after the pandemic measures were enforced in Wisconsin in March 2020, as indicated by the line of linear regression. The mean monthly rates of severe diabetic ketoacidosis (pH ≤ 7.1) increased from 0.85 pre-COVID to 2.14 during COVID (Table). The percent of T1DM patients with a BMI greater than the 95th percentile increased from 11.1% pre-COVID to 16.9% during COVID (OR 0.62; 95% CI, 0.29-1.29; $P = 0.19$). The majority of T2DM had an elevated BMI above the 95% percentile both pre-COVID and during the pandemic. There were no significant differences in HbA1c observed between the 2 time periods (data not displayed). Most patients were between 6 and 16 years of age at diagnosis, with no significant change in ages compared to previous years.

All patients from March 2020 onwards were tested for COVID-19 via polymerase chain reaction (PCR) at the time of hospital admission, with 9 positive results (5.6% of patients). It is unknown how many patients may have had previously contracted COVID-19, as routine screening for history of COVID-

19 was not consistently recorded at the time of admission, and COVID-19 antibody testing was performed in only a minority of patients.

DISCUSSION

While the rate of new pediatric cases of both T1DM and T2DM has been increasing slowly, we report an unexpectedly sharp rise for both conditions during the COVID-19 pandemic. In addition, a larger percent presented with severe ketoacidosis requiring intensive care. Our findings for T1DM are in line with other reports from European, Australian, and American pediatric populations during the COVID-19 pandemic.[2,4,5,10,12] Our study also reported a rise in new-onset T2DM requiring admission for insulin initiation, without a significant change in the BMI in this cohort. There were no changes in our referral patterns during this study.

The incidence of both T1DM and T2DM has risen steadily over the preceding decades. Between 2002 and 2015, the SEARCH study demonstrated an average annual increase of 1.9% in incidence of T1DM and 4.8% in T2DM in pediatric patients.[13] The increase in T2DM is attributed to the obesity epidemic and associated changes in diet, exercise, and sedentary behaviors. Reasons for the increase in T1DM are less clear, although childhood illnesses such as enterovirus and other environmental factors are often considered.[14] However, the increase we see in our study is dramatically higher compared to previous years before the pandemic.

The association of pediatric diabetes and COVID-19 is supported by a recent report by the Centers for Disease Control and Prevention, which found that following COVID-19 infection from March 1, 2020, through February 26, 2021, persons aged less than 18 years were more likely to receive a new diabetes diagnosis after 30 days since infection. Interestingly, non–SARS-CoV-2 respiratory infection was not associated with an increased risk for diabetes.[15] Our patient cohort had only 9 patients with a positive COVID-19 PCR at the time of diabetes diagnosis. Antibody testing for COVID-19 was not performed, thus we had limited ability to assess for prior infections and preexisting damage.

The mechanism of COVID-19 and increasing cases of pediatric diabetes is unknown. For T1DM and COVID-19, the hypothesis focuses on the direct effects of SARS-CoV-2 infection on pancreatic islet cells via the ACE2 receptor, thus binding and leading to cellular dysfunction and acute hyperglycemia.[16] Indirect effects of the pandemic involved in the pathophysiology of T1DM include isolation, stress, and increased BMI.[17]

For T2DM and COVID-19, the mechanism of action could include a direct impact of the virus on beta cells and other mechanisms, but also indirect effects such as sedentary lifestyle, limited medical access, and stress brought on by the pandemic. Physical education classes were altered or canceled entirely with the transition to online learning. School sports were often canceled or limited in scope. Stay-at-home ordinances may have led to decreased outdoor activities and group activities for some children.[18] In addition, dietary habits for children may have changed due to changes in schedules, increased access to snacks during the online school day at home, and psychosocial stress leading to compensatory eating behaviors.[19]

The increase in severity at presentation with ketoacidosis has been reported previously.[2,9,12,20] Reasons include delays in seeking care related to COVID-19. Several of our patient families reported delaying well-child appointments and evaluation for perceived minor concerns due to fears of exposure to infection. School closures and learning from home also limited the exposure of children to supervising adults, such as teachers and school nurses, who may notice changes in health missed by parents.[21]

Our study was limited due to its single center setting. Whether the SARS-CoV-2 virus itself increases the susceptibility to diabetes by triggering islet cell inflammation or by affecting the time of overt diabetes in patients with existing autoimmunity or the results we are seeing in our study are the downstream effects of the pandemic remain unknown. It will be imperative to carry out multicenter studies over extended time periods to explore the long-term effects of COVID-19 infection. Continued efforts such as the CoviDiab Registry (CoviDiab.e-dendrite.com) are critical in developing evidence-based guidelines and care for our vulnerable patients with comorbidities.

The major COVID variants noted during our study were alpha, beta, and delta, prior to the Omicron variant that presented near the end of 2021. Likewise, vaccinations for pediatric patients became available starting in early 2021 for those ages 16 to 18 years of age, May 2021 for those ages 12 to 15, and November for those ages 5 to 11 years of age, possibly influencing the trends seen towards the end of 2021. However, one of the limitations of our study remains that patient vaccination status and COVID variants were not recorded. It will be interesting to note how both of these factors continue to influence pediatric diabetes trends in the future. Health care systems should monitor this to adjust resources to meet the growing demands of the pediatric diabetes population.

CONCLUSIONS

We report a dramatic increase in number and severity of newly diagnosed pediatric diabetes cases seen during the COVID-19 pandemic. The increase was not explained by factors such as changes in referral patterns or insurance coverage. Further work is needed to understand the impact of societal factors and the direct diabetogenic effect of SARS-CoV-2.

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Patients' View of Their Primary Care Telemedicine During the COVID-19 Pandemic and Implications for Future Integration: A Multimethod Study

Valerie Gilchrist, MD; Kendra Nervik, PhD(c); Collin Ellenbecker, BSc; Wen-Jan Tuan, DHA, MS, MPH; Mark A. Micek, MD, MPH; Ellen Goldstein, PhD, MFT

ABSTRACT

Introduction: Telemedicine has become an integral part of primary care since the COVID-19 pandemic. This paper reports patients' assessments of their early telemedicine visits.

Methods: Adult primary care patients who had a telemedicine visit were identified from electronic medical records of a large Midwestern health system and randomly invited to participate in semi-structured interviews. Participants compared telemedicine visits (audio and video) to face-to-face visits on measures of satisfaction and answered open-ended questions about the technology, primary care relationships, and ongoing use of telemedicine. Interviews were recorded and responses transcribed for qualitative analysis.

Results: The quantitative results revealed participants valued convenience and judged telemedicine visits "about the same" as office visits on satisfaction measures. Participants were largely willing to have another telemedicine visit but were concerned with the technological challenges and lack of physical examination. The qualitative analysis found most participants reported that telemedicine care was best with a known clinician. Further, they judged telemedicine to be best for follow-ups and simple or single problems and believed it should be balanced with face-to-face visits.

Conclusions: Participants expect telemedicine will continue and have clearly articulated their telemedicine preferences. These preferences include telemedicine with a known clinician, the visits that they judged most appropriate for telemedicine, the need to balance telemedicine with face-to-face visits, and assured technologic access. The need for quality measures beyond patient satisfaction and the role of team-based telemedicine care emerged as areas for further research.

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INTRODUCTION

While improvements in technology and accessibility have increased the use of telemedicine over the last decade,[1] the COVID-19 pandemic triggered an exponential adoption of telemedicine.[2] Prepandemic studies of primary care telemedicine found that patients appreciated the convenience of telemedicine and judged the quality to be "good"[3] but expressed concerns about technology in terms of privacy and access, the lack of physical examinations, and barriers to the physician–patient relationship.[4,5] While office visits remain the reference standard,[4,5] the expanding role of telemedicine is defining a "new normal" in primary care.[6] The goals of this study are to describe patients' assessment of their beginning telemedicine experiences and highlight patients' opinions for the future use of telemedicine in primary care.

METHODS

Study Design

Semistructured telephone interviews were conducted with 52 patients who agreed to an interview after being randomly contacted from an electronic medical record database of those having had a primary care telemedicine visit early in the COVID-19 pandemic (Table 1). The consolidated criteria for reporting qualitative research (COREQ[7]) and the revised standard for quality improvement reporting excellence (SQUIRE 2.0[8]) guided this report. This study was considered quality improvement research using the University of Wisconsin Health Sciences Self-Certification Tool (https://irb.wisc.edu/is-it-research/).

Table 1. Path to Participant Engagement

	Family Medicine 4/1/2020–5/29/2020	General Internal Medicine 6/1/2020–6/12/2020
Patient population[a]	29,472	8,200
Eligible patients[b]	8,643	3,993
Total number of call attempts[c]	137	96
Patients who declined	21	12
Patients interviewed	30	22

[a] Patients were identified from the electronic health records identifying registered patients >18 years of age with no prior use of an interpreter.

[b] Eligible patients were >18 years of age with a telephone or video contact with a primary care provider during the respective study period.

[c] Unanswered calls, callbacks, and calls answered by others accounted for the difference in attempts and those patients who either declined or agreed to participate in the study.

Table 2. Demographics of the Study Population

	Total Eligible[a] Patient Population	Patients Interviewed
Patients	12,636	52
Sex		
Female	7,666	40
Male	4,970	12
Race/ethnicity[a]		
American Indian/Alaskan	40	2
Asian	244	4
Black	710	4
Hispanic/Latinx	360	2
Multiracial	72	2
Native Hawaiian/Pacific Islander	15	1
White	11,085	37
Unknown/not available	110	0
Age		
19–40 years	3,388	14
41–60 years	3,805	13
61–74 years	3,463	16
75+ years	1,980	9
Type of telemedicine visit experienced		
Audio only	9,068	24
Video only	3,035	16
Both formats	533	12
Rurality[b]		
Rural	-	17
Non-rural	-	33
Unknown/not available	-	2

[a] Eligible patients were >18 years of age, had no prior use of an interpreter, and had a telephone or video contact with a primary care provider during the study period.

[b] Population-level data on rurality were not readily available in the electronic health record; however, participants could self-identify as rural or non-rural in the study survey.

Study Sample and Setting

The study setting was a large Midwestern health care system serving both urban and rural populations from 27 primary care offices across 4 counties. Registered patients were eligible for participation if they were 18 years of age or older, did not need an interpreter, and had received at least 1 audio or video telemedicine visit in either family medicine (April 1, 2020–May 29, 2020) or general internal medicine (June 1, 2020–June 12, 2020). Primary care audio visits were introduced with pandemic lockdown in March 2020, and video visits began in April 2020.

Study Procedures

A semistructured interview guide was developed from the published literature, 2 clinician authors, and a second-year medical student who later conducted all interviews. It was reviewed and modified after other primary care clinician input (Appendix 1). The guide was then piloted by 1 author (VG) and the interview student (CE) with 5 selected primary care patients and further revised for clarity and flow. One member of the research team (VG) listened to interviews concurrently initially and then reviewed the recordings and interviewer notes within 24 to 72 hours for completeness, interviewer feedback, and emerging themes. Interviews were continued until data saturation was reached.

Eligible patients were identified from the electronic medical records and, using a random number generator, selected from within groups established by age, sex, race/ethnicity, telemedicine visit type (audio or video), and primary care offices (urban, rural, or small town and including 1 Federally Qualified Health Center). This process maximized variability based on the overall frequency of the groups in the total sample and, as a result, oversampled minority patients, patients older than 85 years, and those who had both audio and video visits. Telephoned patients verbally consented to participate and gave permission for recording of their interview. Responses were deidentified, and patients were not compensated for participation.

Semistructured Interview Guide

The interview guide consisted of both open- and closed-ended questions. Closed-ended questions for quantitative analysis included those describing the type and ease of the telemedicine visit, comparisons of telemedicine (audio or video) to face-to-face visits, comparisons of audio to video telemedicine visits, whether they would have a telemedicine visit again, and if it was important to have a visit with their primary care clinician. Comparison questions used the same 3-point Likert scale of "better," "just the same," or "worse"[3] on 9 indicators derived from the Press Ganey Outpatient Medical Practice Survey (https://www.pressganey.com/products/patient-experience). The Press Ganey Outpatient Survey is nationally the most common, validated measure of patient satisfaction and is used by the study organization. The 9 indicators were convenience, quality of care, ability to explain concerns, inclusion in decision-making, having needs met, enjoyment, overall satisfaction, overall communication, and overall comprehensiveness.

The qualitative data consisted of participants' verbalized reasons for their evaluations and their responses to additional, open-

ended questions. Participants were asked about their primary health care team, if the visit was with their known primary care clinician and if seeing a known clinician was important to them, why they made their telemedicine visit, and if their primary care visit had differed from any telemedicine visits with other professionals or specialists they may have had. Finally, participants were asked what they liked best and least about telemedicine visits and to describe what visits they deemed suitable for telemedicine.

Data Analysis

Quantitative: Frequencies and proportions were calculated to describe the sociodemographic characteristics of the sample (Table 2). Participants' comparisons (better, worse, or just the same) of any telemedicine visit to office visits (Figure 1) and a comparison of video and telephone telemedicine (Figure 2) also were reported. ***Qualitative:*** The qualitative data for analysis included patients' explanations for their evaluations and their responses to the open-ended questions. NVivo software (QSR International Pty Ltd, Version 12, 2018) was used to manage and organize the recorded transcriptions. Participant responses were initially assessed by 2 authors (VG and KN) using an inductive and iterative process. Content analysis was used to interpret and code the textual material, from which KN developed a codebook (reviewed by VG and EG), grouping codes and establishing higher order categories from which emerged themes.[9] Three qualitative researchers from different professional backgrounds, including a clinician (VG), social scientist (EG), and sociologist (KN), independently reviewed portions of the transcripts and assigned codes. All three then met weekly to refine interpretations, identify relationships within or across themes, and resolve discrepancies.

Figure 1. Patients' Self-Reported Perceptions Between Office Visits and Telemedicine Visits

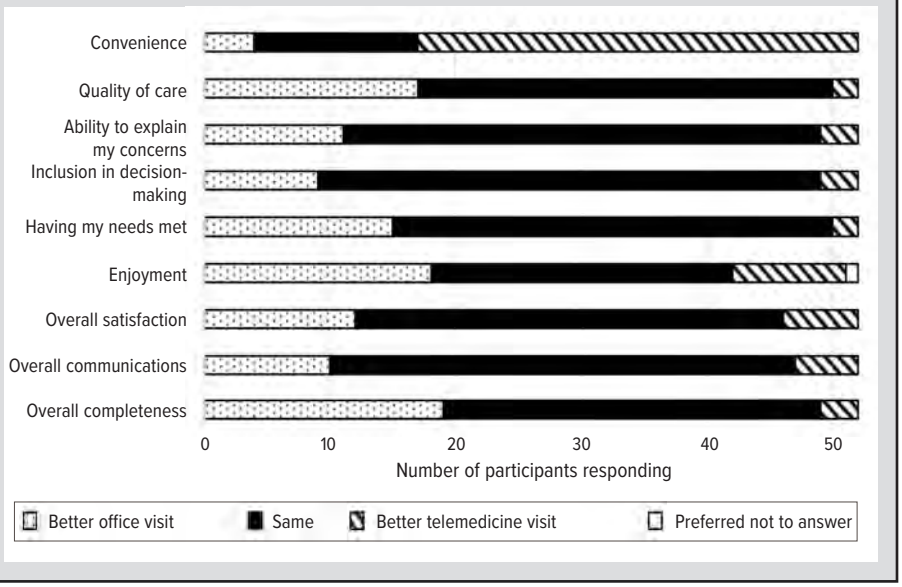
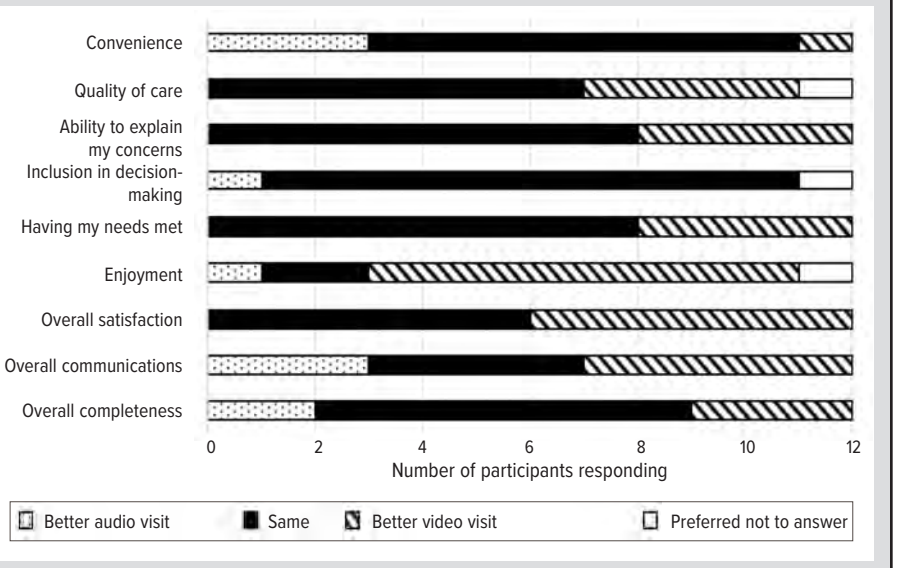


Figure 2. Patients' Self-Reported Perceptions Between Audio and Video Telemedicine Visits



RESULTS

Table 1 shows the pathway to the participant sample (N=52). Interviews lasting 10 to 43 minutes (median: 18–19 minutes) occurred in June and July 2020. Table 2 describes participant characteristics: majority female (76.9%), White (71.1%), and urban (65.3%), with a mean age of 54.3 years (range: 19–92 years). Participant views of their telemedicine experience and the emergent themes are described below, with more complete quotes in Table 3.

Technology

Most audio-visit participants (82%, n=31/38) used a cellphone, and video-visit participants used a computer (76%, n=19/25). While a majority of participants (73%, n = 38) reported the telemedicine process was "easy"—*"It was unbelievable. It was wonderful"* (Table 3.1 [49])—three experienced problems with audio visits (eg, poor connection), 4 video visits were converted to audio visits, and 7 required technical assistance from hospital support personnel or family members. When specifically asked, only 3 participants expressed privacy concerns, and none were concerned with the lack of access to laboratory or ancillary services because

Table 3. Study Participants' Self-assessment of Their Telemedicine Experience: Exemplary Quotes

3.1 TECHNOLOGY	
Easy	"It was unbelievable. It was wonderful…sitting in the kitchen, it was like the doctor was there. It was great. I could see her. She could see me." (49)
Link broken	"The one phone call was supposed to be a video chat, but I couldn't get it to work…It kept coming up that I had to have some kind of login, and they kept telling me that no login was required. And we finally just gave up and just had a phone visit, which was fine." (48)
Privacy	"Yes…if the call got dropped…if it's a major personal issue…[then you'd want that to be a very secure call]." (27)
Workflow	"Nobody told me to take my vitals before the visit." (48)
3.2 COMPARATIVE EXPERIENCES	
3.2.1 Telemedicine (Audio or Video) vs Face-to-Face Visits	
Prefers telemedicine: convenience	"I definitely like the convenience, especially since for me it was mental health services. It was really nice to just, you know, be cozy in my own bedroom and just feeling safe in that regard." (33)
Quality the same: primary care clinician efficiency	"I would say the same…the person doesn't change, and I don't either and we always have a very productive and good visit." (8)
Prefers face-to-face: examination	"I feel that my doctor gets more information from my actions, and she can look at things like…when my ankles are swollen…she can actually see [what] I might be complaining about…it's a little hard…to show my foot to her on a video call." (37)
Prefers face-to-face: relationship	"I like face-to-face…my doctor…she makes me more comfortable. She's like a friend." (31)
Prefers telemedicine: enhanced engagement	"I was so impressed with the quality of listening. In the office you're distracted…. So it was much more focused on what my concerns were and giving the information or asking me other questions. And I felt like both of those were almost falling into the phone, listening to each other, and communicating really thoroughly." (43)
3.2.2 Telemedicine Video vs Audio Visits	
Prefers video to audio	"If I am in a position that I feel the need to discuss something with my doctor it's helpful for [my doctor] to lay their eyes on me." (28)
Video: connection with clinician	"I feel probably a little better with the video, just, again, you get more of a connection with the provider that you miss, you know. You don't get…nonverbal cues [with audio]." (33)
3.3. RELATIONSHIP WITH CLINICIAN	
3.3.1 Preference for Primary Care Clinician	
Partnership	"If it's a decision, she always works with me." (8)
Efficiency	"Yes, it was faster, it was more efficient, it was because she knew the issues that I've had before." (19)
Personal relationship	"I would really lean towards my primary doctor actually because I think that they know me better. I know they can look at the charts and everything, but they do tend to know me as a person better." (10)
Affection	"She's like a family member, for God's sake. You don't get nothing by her, man. She will call it like she sees it. That's what I love about her." (14)
Trust	"And I know that my primary would not put me in bad hands." (14)
Comprehensive care	"I was dealing with alcohol abuse, and so he'd always make sure, checking in, and I went to rehab twice. He made sure I was following up." (12)
Continuity	"Well, usually, you know, because I've seen him for so many years that I think he knows more what's going on, really, on the call." (22)
3.3.2 No Preference for Primary Care	
Any clinician	"For me, it doesn't matter, just as long as I get my care." (26)
Equivalent care	"I have not noticed any difference of care because I've talked to a number of doctors through the phone, but I have not received any different quality of care from any of them." (32)
Depends upon needs	"I feel like if I had a pressing need and couldn't get in with my primary care provider, I probably wouldn't mind to be on a call with someone that I haven't met." (35)
Specialists	"Apart from the content, no. The experience was the same." (35)
3.3.3 Primary Health Care (PHC) Team	
Primary care clinician	"My primary health care team? Just my primary care provider." (35)
PHC and nurse	"I guess my doctor and then whichever nurse is working on that day." (40)
PHC and others	"I think of my primary care physician and this kind of rotating group of people around her." (19)
3.4 CONTINUED USE OF TELEMEDICINE	
Convenience	"Actually, [telemedicine is] more convenient because I don't have to wait if she runs late. If the doctor runs late, I'm affected when I'm in the office, but I'm not affected here." (8)
Access to labs, services	"Actually, I haven't had a problem with that, because they'll always get you in for bloodwork like right now. X-rays that they think you need, they always find a way. Yeah, you know, maybe not the same day, but, yeah." (12)
Safety	"I have been grateful, through having a pregnancy, that I've been able to not have to expose myself." (28)

Speaker number indicated by (#).

continued on page 185

Table 3. Study Participants' Self-assessment of Their Telemedicine Experience: Exemplary Quotes

continued from page 184

3.4.1 It Depends...	
Follow-up issues vs serious issues	"[If] it's just a follow-up, asking questions...yes or no or describe symptoms, then the phone call would be perfect...a video call...would be necessary for...more serious patients who [have]...something...[they] need to show the doctor without having to go into the hospital." (26)
New or serious complaint: face-to-face	"If I have a new complaint or something more serious, at least for the primary visit, I think it's important to be face-to-face. For follow-ups and check-ins or maybe I'm just sick...and it's...not a more complicated medical issue, I am fine with a tele-visit." (48)
3.4.2 Community Concerns	
Concern for providers	"The same day thing would be nice. I guess if it's an emergency, then...a telehealth visit...not during regular hours would be okay. But doctors have lives and need to go home." (1)
Concern for vulnerable patients	"I would preferably say for elderly, children, and women that are pregnant, they should be seen [in-person]." (25)
Accessibility	"You still have a section of people who aren't very computer savvy, and so that's a problem. Or they're sort of doing email, but they have an old system that just really has a lot of problems, and so video conferencing may not work very well." (21)
3.5 PATIENT SUMMATIVE REPORT	
3.5.1 Telemedicine Has Advantages and Limitations	
Advantage: Convenience	"Personally, I really like having the telehealth visits because...I don't have a car to get back, and it's very inconvenient to use the bus system." (44)
Limitation: lack of physical examination	"The big difference is in-person, he'll use a stethoscope...listen to his heart... take his blood pressure...check his feet, because he's diabetic, you know. Those things are missing on a teleconference." (18)
3.5.2 How will Telemedicine Fit in my Health Care Future	
Return to face-to-face	"Once there's a vaccine, and whenever that happens, I would want to return to face-to-face." (33)
Alternating assessments	"I'd be very open to video visits...but I still would like to...physically see a doctor probably once a year." (10)
Balance of in-person and telemedicine	"Well, my only comment on that, [name], is don't ever throw the baby out with the bathwater. I still feel that there is a place for the clinic visits." (29)
Need to improve monitoring technologies	"I'm of an age where...checking vital signs is something that does need to happen with some regularity.... I hope there will be some monitoring technologies that are easier to use and that they can get a constant read on a lot of things. That would be great. Until they do that, there's always going to be the need to go to the office." (19)
Future use of telemedicine	"I think there are new actions here, and...thinking as a physician as well as a patient, I think they should continue [telemedicine assessments]." (45)

Speaker number indicated by (#).

of telemedicine visits—*"they'll always get you in for bloodwork like right now.… They always find a way"* (Table 3.4 [12]).

Comparative Experiences

Comparisons of telemedicine to face-to-face visits and between audio and video telemedicine are demonstrated in Figures 1 and 2. There were no appreciable differences in the responses of family medicine and general internal medicine participants.

Participants reported that telemedicine (audio or video) and face-to-face visits were the same for all satisfaction indicators except convenience, which was characterized by a flexible location, decreased travel, and shorter wait times. The majority of participants (96%, n=50) reported that visit types were comparable because of an established relationship with their primary care clinician—*"I would say the same…the person doesn't change, and I don't either and we always have a very productive and good visit"* (Table 3.2.1 [8]). Notably, 31 participants stated that they felt safer with telemedicine during the pandemic—*"I have been grateful, through having a pregnancy, that I've been able to not have to expose myself"* (Table 3.4 [28]). They also expressed that telemedicine was better for specific concerns, *"especially since for me it was mental health services"* (Table 3.2.1 [33]). However, more participants preferred face-to-face visits because of the capacity for physical examinations and interaction with their clinician— *"she can actually see [what] I might be complaining about"* (Table 3.2.1 [37]).

Fewer participants experienced both audio and video visits (n = 12, 23%). Half of these participants (n = 6) reported that their overall experience of audio and video was the same, while the remaining 6 participants preferred video telemedicine. Participants reported that they benefited from their clinician being able to see them on video—*"you get more of a connection with the provider"* (Table 3.2.2 [33])—being able to view and discuss health information with their clinician and having others, such as family members, present.

Relationships With Clinicians

The relationship between participants and their primary care clinician was a recurrent theme throughout the interviews. The vast majority of the participants (96%) had their study visit with their regular primary care clinician, who were almost all physicians. There was a strong preference among participants for a known clinician. Participants reported that they felt comfortable, trusted their clinician, and that their shared history increased efficiency—*"it was more efficient…because she knew the issues that I've had*

before" (Table 3.3.1 [19]). Many participants spoke of their warm personal relationships with this clinician—*"She's like a family member, for God's sake"* (Table 3.3.1 [14])—and expressed concern for their clinician's schedule as telemedicine expands—*"But doctors have lives and need to go home"* (Table 3.4.2 [1]). Participants expressed features of physician–patient relationships foundational to quality primary care, such as continuity—*"because I've seen him for so many years that I think he knows more what's going on"* (Table 3.3.1 [22]); comprehensive care—*"I was dealing with alcohol abuse, and so he'd always make sure, checking in"* (Table 3.3.1 [12]); partnership—*"If it's a decision, she always works with me"* (Table 3.3.1 [8]); and trust—*"And I know that my primary would not put me in bad hands"* (Table 3.3.1 [14]). While the majority of participants expressed a preference for visits with their clinician, six reported that it was contingent upon their health care needs at the time—*"I feel like if I had a pressing need and couldn't get in with my primary care provider*" (Table 3.3.2 [35])—and three stated that it was not necessary to see a known clinician—*"For me, it doesn't matter, just as long as I get my care"* (Table 3.3.2 [26]).

When asked about their primary health care team, only their primary care clinician was identified. Nurses were acknowledged in relation to the physician—*"I guess my doctor and then whichever nurse is working on that day"* (Table 3.3.3 [40])—and other staff only after prompting, again in relation to the physician—*"I think of my primary care physician and this kind of rotating group of people around her"* (Table 3.3.3 [19]). Occasionally, family members or specialist physicians were included in the primary care team.

Several participants commented on community concerns, such as the limitation of telemedicine for some participants' access—*"You still have a section of people who aren't very computer savvy"* (Table 3.4.2 [21]), clinician workloads and, in the case of the pandemic, prioritizing resources—*"I would preferably say for elderly, children, and women that are pregnant, they should be seen"* (Table 3.4.2 [25]).

Continued Use of Telemedicine

The majority of participants (n = 41, 79%) were willing to have another telemedicine visit and expected telemedicine in the future—*"I think there are new actions here, and…thinking as a physician as well as a patient, I think they should continue"* (Table 3.5.2 [45]). Participants noted that telemedicine should be balanced with face-to-face visits—*"don't ever throw the baby out with the bathwater"* (Table 3.5.2 [29]). Participants indicated telemedicine was best for simple or singular problems, follow-up, medication changes, and chronic issues but was not suitable for serious or multiple concerns—*"If I have a new complaint or something more serious,…I think it's important to be face-to-face. For follow-ups and check-ins…I am fine with a televisit"* (Table 3.4.1 [48]). Several participants expressed concerns that the traditional office visit remain an available option—*"I'd be very open to video visits…but I still would like to…physically see a doctor, probably once a year"* (Table 3.5.2 [10]). Nine participants expressed a strong preference to return to face-to-face visits once it was possible (Table 3.5.2 [33]).

DISCUSSION

Telemedicine is estimated to provide up to 20% to 30% of primary care visits[10] in the future as one of the enabling technologies foundational for high quality primary care.[2,6,11,12] Although the COVID-19 pandemic rapidly pushed participants into telemedicine, the majority reported willingness to have another telemedicine visit. While participants' opinions were similar to prepandemic telemedicine studies of selected patients,[5] their comments provide recommendations for future telemedicine implementation and integration into ongoing primary care.

Convenient Care

Participants reported that they valued the convenience of telemedicine,[2,3,5,13] but that the lack of a physical examination posed a limitation.[3,5] For some participants, convenience overrode other features of care, suggesting that telemedicine may satisfy quality health care for some.[13] The evidence that convenience was universally appreciated by participants reinforces the need for more convenient and timely care for all primary care visits.[6]

Access to Telemedicine

Access to audio and video telemedicine requires a functioning internet connection, a smartphone or computer, and digital literacy.[14] At least 1 in 4 Americans may not have the digital literacy skills to access internet-enabled digital devices to engage in video visits,[15] and local technological infrastructure may be lacking.[12] One-quarter of participants from this study experienced some problems with technology, and most used a telephone. Telephone offers easier access and privacy, but the lack of visual interaction limits care.[12] Additionally, health insurance may either facilitate or create a barrier to telemedicine access.[16] Telemedicine brings the risk of increasing health care inequities by perpetuating the existing health care digital divide among marginalized populations who experience barriers to access, such as rural, elderly or racial minority populations and individuals with chronic conditions and/or low health and digital literacy.[2,6,12,15] There is an opportunity to mitigate barriers to telemedicine by increasing access using universal design solutions for a broad range of users, establishing robust implementation, programs of support, and evaluating outcomes across populations.[12]

Quality Telemedicine Care

Consistent with the prior literature,[3,4,13] this study's participants perceived that the quality of their telemedicine visit, based on satisfaction, was largely the same as face-to-face visits. This was likely a result of feeling taken care of by a trusted clinician.[17] Patients need to be satisfied with their care, which must be safe, effective, cost-efficient, respectful of patient preferences and values, and

accessible to reduce health care disparities.[14,16] However, the quality studies of telemedicine, including this one, are largely ones of process measures, not outcomes.

Studies of outcome measures for telemedicine are few;[16,18] however, observational studies have raised concerns about the overuse of antibiotics and diagnostic tests.[16] There are few randomized control trials, and these are largely from specialty care and are often noninferiority trials comparing telemedicine management to office management for 1 disease. Nonetheless, there are encouraging results for the geriatric population,[19] postsurgical follow-up,[20] and some mental health care.[21] Willis et al call for a telemedicine diagnostic research agenda considering the domains of the patient, physician, electronic medical record platform, clinical context, and health system.[22] Several of these domains were addressed by our participants, such as when patients discussed the challenge of telemedicine access and use, the clinician's change in workflow and team, and clinical context, meaning the prior knowledge of or relationship with a known clinician in contrast to having to establish rapport with a stranger. Consistent with prepandemic studies of primary care telemedicine, our participants described telemedicine as good for "simple problems," follow-up, basic questions, and remote treatment but considered face-to-face visits better for more serious or multiple problems.[4,5] Although outcome quality measures in primary care are often not well aligned with the goal of primary care to partner with patients to address a broad array of health care concerns,[11,18,23] matching the patient-perceived appropriate visit type and the outcomes of either telemedicine or face-to-face visits is an important future quality measure for primary care.

Relationship-Centered Telemedicine Care

Participants' positive evaluations of telemedicine were built on established relationships with their primary care clinician and, similar to prepandemic telemedicine studies, echoed participants' preference for interacting with their clinician,[13] notwithstanding the trade-off of convenience. This highlights the critical nature of the personal relationship within primary care.[4,11] Participant comments captured many of the core attributes of primary care that contribute to cost-efficiency and improved health care outcomes.[11,24,25] The strong preference expressed by participants for continuity in the patient–clinician relationship must be accommodated as telemedicine expands so that primary care relationships, built on trust, are reinforced rather than fractured.[26]

Primary Health Care Teams and Telemedicine

A core attribute of primary care is team-based care. Despite studies that have shown team-based care can improve quality, increase patient satisfaction, support primary care continuity, and lower clinician exhaustion and burnout,[11,27,28] it has proven difficult to implement due to an assortment of barriers.[28] Studies on patients' understanding of their primary care team are lacking. In our study, participants were almost universally unfamiliar with their primary care team, and their conception of continuity of care focused solely on their relationship with their clinician. When prompted, participants recognized contributing individuals beyond the clinician (eg, the nurse or medical assistant) but lacked personal relationships with these team members. A key attribute of a highly functioning team is continuity,[11] which was commonly lacking. Participants' lack of recognition of the medical team may be due to the differing roles, responsibilities, or turnover of team members.

Limitations

This study had several limitations. The interviews were conducted with a modestly sized sample from one Midwestern health care system in the first wave of the COVID-19 pandemic. Our participants were neither selected by their clinician nor preferentially self-selected for telemedicine visits; however, participants comprised a convenience sample, were English-speaking and, although roughly representative of our primary care clinic population, could not generalize to another more diverse population. We have no information from patients who avoided telemedicine visits. We did not inquire about the costs associated with telemedicine, including infrastructure, insurance coverage, and billing. Interviews were completed by 1 person (CE), who—as a White, male medical student—may have elicited different responses from some participants than another interviewer. Finally, this study reports participants' early perceptions and uses of telemedicine, within the pandemic, and almost all with their primary clinician. As telemedicine care evolves, the levels of satisfaction reported may change.

CONCLUSIONS

Findings from this study indicate participants recognized telemedicine as a technological advancement that can increase access to primary care. Participants received telemedicine positively; however, they wanted to interact with a clinician who was known to them. The situations most suitable for a telemedicine encounter were those that the participant considered to be simple problems or follow-up visits, which should be balanced with face-to-face visits. Further research is needed as telemedicine is integrated into primary health care delivery outside the COVID-19 pandemic, on the role of the primary care team in telemedicine, and on what constitutes quality care outcomes in telemedicine beyond patient satisfaction. Respecting patient preferences is a goal of person-centered care;[11,29] thus, the goal of integrating telemedicine into primary health care in the future should be to match delivery formats—face-to-face, video, or telephone visits—with individual needs and preferences and to ensure that emerging technologies can provide equitable access to quality care.

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Analysis of Emergency Department Patient-Visit Volumes in an Academic Health System During a COVID-19 Pandemic Statewide 'Safer at Home' Order

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ABSTRACT

Background: We describe patient-visit volumes, patient acuity, and demographics in our 4 academic health system emergency departments (ED) before, during, and after implementation of a COVID-19 pandemic safer-at-home order.

Methods: Data were collected from the electronic health record, including patient-visit volumes, chief complaint, Emergency Severity Index (ESI), and patient demographics. Descriptive statistics were performed.

Results: There was a 37% decrease in combined ED patient-visit volume during the safer-at-home order period (42% at the academic medical center). ED patient-visit volumes increased after the safer-at-home order concluded. During the safer-at-home order period, there was an increase in the proportion of ESI-2 visits and admission rates from EDs across the system.

Conclusions: Significant differences in ED patient-visit volumes and patient acuity were associated with a safer-at-home order in our academic health system. These differences are similar to experiences of other hospital systems across the country.

BACKGROUND

On January 30, 2020, the World Health Organization declared the novel coronavirus outbreak a global public health emergency. According to the Centers for Disease Control and Prevention (CDC), by October 10, 2021, there had been over 44.4 million cases in the United States, with 840,810 cases and 9,054 confirmed and probable deaths in Wisconsin.[1] Eighteen percent (148,023) of cases and 17% (1,584) of deaths occurred in Milwaukee County.[2] This proportion is greater than Milwaukee County's share of the Wisconsin population, which was 15.9% in 2020.[3] To combat the spread of infection early in the pandemic, a statewide "safer-at-home" (SAH) order issued by Wisconsin's governor went into effect on March 25, 2020.[4] This original order was extended through May 26, 2020, but was struck down by the Wisconsin Supreme Court on May 13, 2020.[5]

Many hospital systems reported predictable declines in emergency department (ED) patient-visits during the COVID-19 pandemic and specifically during times when "shelter-in-place" orders were in effect.[6] We sought to analyze if our local experience reflected national trends. Specifically, we evaluated ED patient-visit volumes, patient acuity, and patient demographics within our academic health system during the period of the statewide SAH order. Though the scope and enforcement of government orders meant to prevent nonessential social gatherings varied upon locality, we refer primarily to the state of Wisconsin's SAH order and use that term for similar policies in general, unless specifically stated.

There are complex explanations why the pandemic and SAH orders may affect patient acuity or types of patients presenting to the ED. For example, such orders led to cancellation of sports-related activities and possibly contributed to a decrease in sports-related injury.[7] Additionally, the rise in people working from home, going on furlough, or becoming unemployed led to decreased time spent driving and, thus, a decreased risk of motor vehicle crash-related injury.[8] While there have been observed decreases in patient presentations across all patient acuity levels and many emergent diagnoses,[9] this has not been uniform across

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Table 1. Total Emergency Department Patient-Visits Per Site During the Three Time Periods Studied

Site	2019[a] 1/1 – 3/24	3/25 – 5/13	5/14 – 12/31	1/1 – 12/31	2020[b] 1/1 – 3/24 *Pre-SAH*	3/25 – 5/13 *SAH*	5/14 – 12/31 *Post-SAH*	1/1 – 12/31
AMC	17,096 (203)	10,726 (215)	48,181 (208)	**76,003 (208)**	16,094 (192) (-5.4%)	6,204 (124) (-42.3%)	43,210 (186) (-10.6%)	**65,508 (179) (-13.9%)**
AACH #1	6,114 (74)	3,704 (74)	17,747 (77)	**27,565 (76)**	6,418 (76) (2.7%)	2,699 (54) (-27.0%)	16,432 (71) (-7.8%)	**25,549 (70) (-7.9%)**
AACH #2	4,041 (49)	2,500 (50)	11,716 (51)	**18,257 (50)**	4,022 (48) (-2.0%)	1,702 (34) (-32.0)	11,021 (48) (-5.9%)	**16,745 (46) (-8.0%)**
Freestanding ED	1,949 (24)	1,213 (24)	5,964 (26)	**9,126 (25)**	2,208 (26) (8.3 %)	882 (18) (-25.0%)	5,875 (25) (-3.8%)	**8,965 (24) (-4.0%)**
Total	29,200 (352)	18,143 (363)	83,608 (360)	**130,951 (359)**	28, 742 (342) (-2.8%)	11,487 (230) (-36.6%)	76,527 (330) (-8.3%)	**116,767 (319) (-10.8%)**

Abbreviations: SAH, safer-at-home; AMC, urban academic medical center; AACH, academic-affiliated community hospital; ED, emergency department.
[a]N (average/day).
[b]N (average/day) (% change in average/day).

all centers. Westgard et al reported no significant change in the proportion of patient acuity levels at their hospital,[10] however, national trends indicate fewer ED visits for life-threatening diagnoses, such as myocardial infarction, stroke, and hyperglycemic crisis.[11]

The goal of this study was to assess the local impact of Wisconsin's SAH order on ED patient-visit volume, patient acuity, and demographics in our academic health system EDs before, during, and after implementation of a stay-at-home order.

METHODS

This observational study examined patient encounter data from 4 EDs in our academic health system—1 urban academic medical center (which includes an adult level 1 trauma center), 2 academic-affiliated community hospitals (AACH), and 1 freestanding ED in southeast Wisconsin—during 3 time periods in 2019 and 2020. The time periods were defined by the governor's SAH order, which began March 24, 2020, and extended through May 13, 2020, when it was nullified by the Wisconsin Supreme Court. The calendar year preceding the SAH order (pre-SAH), the period of the order itself, and the remainder of the calendar year after the order was struck down (post-SAH) were used as the 3 time periods for this study. Data for 2020 and 2019 (for comparison) across all 4 sites were obtained through a systematic query of the electronic health record. This database was queried for daily patient-visit volumes, chief complaint, and Emergency Severity Index (ESI). The ESI triage system is a 5-level system that assigns a score to patients arriving in the ED based on patient condition, vital signs, and predicted resource need, with lower scores indicating higher patient acuity presentations. Proportions of ESI scores were compared across the defined time periods for 4 sites. This project was approved through our institution's Institutional Review Board. All patients presenting to the 4 EDs during the study period time intervals were included.

RESULTS

Patient Demographics

The median patient age was 49 years across all 4 EDs during the study periods. Female patients comprised 55% of all patients presenting to the study sites, and there was no significant change in this proportion during the SAH period. Similarly, there were no significant changes in the proportions of White (59%), Black (35%), Hispanic (5%), or other (6%) patients across the 3 study periods.

ED Patient-Visit Volumes

A total of 116,756 ED patient-visits in 2020 and 130,951 in 2019 were included in the study across all 4 sites (Table 1). After the SAH order was declared, the participating EDs experienced a decline from an average of 342 combined daily patient-visits prior to the SAH (January 1-March 24, 2020) to an average of 230 visits for the duration of the SAH order (March 25 – May 13, 2020). This represented a 37% decrease in combined patient-visit volume across all 4 sites during the SAH period compared to 2019. The largest proportional decrease in volume during the SAH occurred at the academic medical center (42%), with decreases at the AACHs and the freestanding ED ranging between 25% and 32%.

From the end of the SAH order (May 13, 2020) to the end of 2020, patient-visit volumes began to increase at all 4 sites but remained, on average, lower than 2019 census levels. Specifically, ED patient-visits at the academic medical center during the post-SAH period remained 11% below 2019 levels. AACH-1, AACH-2, and the freestanding ED also remained below 2019 census levels, but to a lesser extent, during the post-SAH period (8%, 6%, and 4%, respectively).

Table 2. Number of Emergency Department Patient-Visits by Emergency Severity Index (ESI) Designation at All Sites From Highest Acuity (ESI-1) to Lowest Acuity (ESI-5)

	2019				2020			
ESI	**1/1 – 3/24**	**3/25 – 5/13**	**5/14 – 12/31**	**1/1 – 12/31**	**1/1 – 3/24 Pre-SAH**	**3/25 – 5/13 SAH**	**5/14 – 12/31 Post-SAH**	**1/1 – 12/31**
ESI-1	384 (1.3%)	272 (1.5%)	1,144 (1.4%)	**1,800 (1.4%)**	423 (1.5%)	213[a] (1.9%)	1,266[b] (1.7%)	**1,902[b] (1.6%)**
ESI-2	9,665 (33.1%)	6,092 (33.6%)	28,644 (34.3%)	**44,401 (33.9%)**	10,157[b] (35.3%)	4,230[b] (37.1%)	27,324[b] (36.1%)	**41,711[b] (35.9%)**
ESI-3	14,833 (50.8%)	9,137 (50.4%)	41,002 (49.0%)	**64,972 (49.6%)**	14,017[b] (48.8%)	5,542[b] (48.5%)	36,424[b] (48.1%)	**55,983[b] (48.3%)**
ESI-4	3,855 (13.2%)	2,351 (13.0%)	11,332 (13.6%)	**17,538 (13.4%)**	3,666 (12.8%)	1,316[a] (11.5%)	9,407[b] (12.4%)	**14,389[b] (12.4%)**
ESI-5	319 (1.1%)	179 (1.0%)	910 (1.1%)	**1,408 (1.1%)**	303 (1.1%)	115 (1.0%)	776 (1.0%)	**1,067[b] (0.9%)**
Total	29,200	18,143	83,608	**130,951**	28,742	11,416	75,724	**115,882**

Abbreviation: SAH, safer-at-home.
[a]Statistically significant at $P < 0.05$.
[b]Statistically significant at $P < 0.0001$.

Table 3. Rate of Hospital Admission of All Patients Seen by Site

	2019				2020			
	1/1 – 3/24	**3/25 – 5/13**	**5/14 – 12/31**	**1/1 – 12/31**	**1/1 – 3/24 *Pre-SAH***	**3/25 – 5/13 *SAH***	**5/14 – 12/31 *Post-SAH***	**1/1 – 12/31**
Site	**N (% Total Patient-Visits)**							
AMC	5,245 (30.7%)	3,295 (30.7%)	14,725 (30.6%)	**23,265 (30.6%)**	5,201[a] (32.3%)	2,251[b] (36.3%)	15,063[b] (34.9%)	**22,515[b] (34.4%)**
AACH #1	1,761 (28.8%)	1,058 (28.6%)	4,985 (28.1%)	**7,804 (28.3%)**	1,913 (29.8%)	888[b] (32.9%)	5,022[b] (30.6%)	**7,823[b] (30.7%)**
AACH #2	895 (22.1%)	521 (20.8%)	2,632 (22.5%)	**4,048 (22.2%)**	1,003[a] (24.9%)	427[a] (25.1%)	2,703[a] (24.5%)	**4,133[b] (24.7%)**
Freestanding ED	86 (4.4%)	66 (5.4%)	323 (5.4%)	**475 (5.2%)**	91 (4.1%)	37 (4.2%)	254 (5.0%)	**382 (4.7%)**
Total	7,987 (27.4%)	4,940 (27.2%)	22,665 (27.1%)	**35,592 (27.2%)**	8,208 (28.6%)	3,603 (31.4%)	23,042 (30.4%)	**34,853[b] (30.1%)**

Abbreviations: SAH, safer-at-home; AMC, urban academic medical center; AACH, academic-affiliated community hospital; ED, emergency department.
[a]Statistically significant at $P < 0.05$.
[b]Statistically significant at $P < 0.0001$.

Patient Acuity

There was a statistically significant increase in the proportion of patient-visits with an ESI-1 and ESI-2 designation and decreases in the number of patients assigned ESI-3 and ESI-4 during the SAH order (Table 2). During the post-SAH period, there remained a statistically significant increase in the proportion of ED patient-visits with an ESI-2 designation compared to 2019 at each site, as well as a significant decrease in patient-visits with an ESI-4 designation at each site.

There were statistically significant increases in patient admission rates at the 3 largest sites during the SAH period (Table 3), with the largest increase in admission rate at the academic medical center. Admission rates generally declined after the end of the SAH order, though remained elevated compared to the 2020 pre-SAH period. There were no statistically significant changes in admission rates of patients at the freestanding ED.

DISCUSSION

ED patient-visit volumes in our academic health system decreased by just over one-third during the SAH period. This decrease was not uniform across all clinical sites, with the sharpest decline (42%) occurring at the academic medical center and the smallest decline (25%) at the freestanding ED. Of note, the freestanding ED transitioned to a microhospital model and gained limited inpatient capabilities in December 2020, towards the end of the post-SAH period, though we believe this did not have any significant effects on volume or acuity during this time. We also experienced a variation in the overall distribution of patient acuity, with a trend toward higher acuity patient presentations. This may indicate that lower-acuity patients were choosing not to seek care in an ED. The percentage of patients admitted to the hospital from the ED increased from 28.6% to 31.4% during the SAH order, further reflecting overall increase in acuity in patients presenting to the ED. Moreover, admission rates for the remainder of the calendar year remained elevated above pre-SAH order levels, which is likely the result of a variety of factors including the ongoing effects of the pandemic, as COVID-19 cases and hospitalizations increased in the region to greater levels than experienced during the SAH period. A prolonged increase in admission rates from baseline could also reflect effects from patients not able to appropriately manage chronic conditions in the outpatient setting or delaying seeking

emergent care for other acute medical complaints,[11] especially early in the pandemic.

Defining the study period and comparison periods was challenging because the pandemic does not have a well-defined start date. While we decided to use Wisconsin's "safer-at-home" order as the start date, initial examination of the overall trends of the data show that patient-visit volumes began declining prior to the SAH order. On March 13, 2020, Wisconsin Governor Tony Evers declared that public and private schools were to close March 18. When examining the week of March 18-24, prior to the SAH order, the average number of combined ED patient-visits per day decreased to 270 compared to an average of 341 visits per day during the week prior.

When the "safer-at-home" order was overturned by the Wisconsin Supreme Court on May 13, 2020, ED patient-visit volumes across the system had already begun increasing from their combined nadir of 185 patient-visits per day on April 11 and continued to trend upward after the order was lifted. While the end of the order itself may have had an impact on patient volumes, it is difficult to determine a direct relationship between volume and the termination of the order.

Based on analysis of patient-visit volumes coupled with significant fluctuations in ESI designation distribution, it is possible that reduced ED patient-visit volumes during the early part of the pandemic and SAH order reflected patient concerns about potential exposure to COVID-19 in the ED. This has been described in the literature, with fewer admissions observed for acute myocardial infarction, stroke, and other emergent conditions during the first months of the pandemic in the United States and abroad.[11] However, it is notable that as our academic health system experienced a more severe surge in COVID-19 patients in the ED later in the year, we did not see a similar change in patient volume and acuity during the post-SAH time period as we defined it. Several patient- and community-level factors likely affected patient-visit volumes during the SAH order, including (1) patient concern for contracting COVID-19 while seeking emergency care for non-pandemic-related conditions; (2) patient hesitancy caused by media portrayals of EDs overcrowded with COVID-19 patients; (3) increased, non-ED options for symptom- and non-symptom-related COVID-19 testing; (4) financial and/or logistical barriers (eg, transportation needs, employment demands, etc); (5) increased ambulatory care access through virtual visits; and (6) potential deprioritization of routine self-care during a historic pandemic. It is also possible that other communicable diseases were in decline (such as influenza) due to public health efforts to decrease the spread of COVID-19, and fewer patients were at risk of injuries due to motor vehicle crashes while working from home and not engaging in social gatherings. While many of these factors may have contributed to fluctuation in ED patient-visit volumes and acuity, it is challenging to quantify their effects specifically. Having said this, the financial impact of such sharply reduced patient-visits (to EDs and beyond) to our academic health system and parent health sciences university was clear with a resultant dramatic decrease in clinical revenue during the SAH order period.

Limitations

Our data represent ED patient-visits from 1 academic health system in primarily urban and suburban areas in southeast Wisconsin, so the findings may not be generalizable to other areas and communities. However, our findings in overall patient-visit volume and ESI designation distribution are consistent with data published previously.[6-9,11] Our use of 2019 as a comparison was based on a general trend of increasing patient-visit volumes, broader reach of new community ED locations such as the freestanding ED, and increasing capacity in the years prior to 2019 that may have distorted our findings.

The admission rate data in Table 3 show a statistically significant increase in admission rates at the academic medical center during the pre-SAH period compared to 2019. Specific reasons for this are unclear at this time with our data set. Furthermore, the persistent increase in admission rates at the academic medical center above pre-SAH levels may reflect specific effects of the significant fall increase in COVID-19 presentations and hospitalizations, in addition to other trends previously discussed. As our initial aim was to define effects on our hospital system EDs using the SAH as a reference point, further study should be done to elucidate any differences in patient-visit volumes, acuity, or other characteristics during different phases and waves of the COVID-19 pandemic.

CONCLUSIONS

Our urban, academic health system experienced decreases in ED patient-visit volumes and increases in patient acuity and admission at multiple sites during a statewide SAH order early in the spread of COVID-19 in the region. Due to the complex interactions of the pandemic with governmental policy, public perceptions, and health care systems, more study is warranted to assess direct causal relationship between SAH orders and ED utilization. However, our experiences are comparable to other studies, and our findings could prove useful in informing public health, health system, and hospital planning in future instances where "safter-at-home" or similar orders are instituted.

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Changes in Pediatric Intensive Care Admissions in Wisconsin During the 2020 COVID-19 Pandemic

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ABSTRACT

Background: We perceived changes in the frequency of and reasons for admissions to Wisconsin pediatric intensive care units (PICU) during the advent of the COVID-19 pandemic, and we hypothesized that the rates of total, scheduled, and respiratory viral admissions were lower during the first calendar year of the pandemic than would have been predicted by historical admission data. Such findings would reflect important changes in PICU utilization paradigms during the pandemic. There are no descriptions of PICU admission changes in a single American state during the pandemic.

Methods: We compared all Wisconsin PICU admissions during the COVID-19 pandemic in 2020 (the study epoch) to admissions in seasonally matched, growth-adjusted "no-COVID-19" projections generated by time series analysis of all Wisconsin PICU admissions in the previous 5 years (the control epoch).

Results: We identified 27,425 PICU admissions with 294,577 associated diagnoses in the study and control epochs. Total admissions were 60 ± 9 week^{-1} in the study epoch versus 103 ± 4 projected (RR 0.63; 95% CI, 0.59-0.68; $P < 0.001$). Scheduled admissions were 17 ± 6 week^{-1} in the study epoch versus 28 ± 3 projected (RR 0.61; 95% CI, 0.55-0.67; $P < 0.001$). Respiratory viral admissions were 8 ± 5 week^{-1} in the study epoch versus 19 ± 9 projected (RR 0.40; 95% CI, 0.33-0.48; $P < 0.001$). Some admission categories experienced dramatic declines (eg, respiratory/ear, nose, throat), while others experienced less decline (eg, injury/poisoning/adverse effects) or no significant change (eg, diabetic ketoacidosis). Except cases of COVID-19, no category had significantly increased weekly admissions. There were 104 admissions associated with COVID-19 diagnoses in 2020, 4.3% of the study epoch admissions.

Conclusions: We describe PICU admission changes in the first calendar year of COVID-19, informing health care staffing and service planning, as well as decisions regarding strategies to combat the evolving pandemic.

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BACKGROUND

The COVID-19 pandemic disrupted health care in unanticipated ways.[1] While some hospitals were tragically overwhelmed by an influx of patients outstripping resources,[2] other settings encountered reductions in health care service demands.[3-7] Pediatrics enterprises, for example, have seen reduced care demands from outpatient visits[8-11] to critical care hospitalizations.[12-16]

There are no descriptions of PICU admission changes in a single American state (with defined territory, demographics, and COVID-19 population data) during the pandemic. Wisconsin presents a unique opportunity to study the effects of the COVID-19 pandemic and response on pediatric critical care admissions. Five pediatric intensive care units (PICU) serve Wisconsin's population of approximately 5.8 million, with an under-18 population of 1.3 million.[17] All 5 PICUs participate in the Wisconsin Regional Pediatric Critical Care Consortium, formed in 2015 to foster research, quality improvement, and professional collaboration among the PICUs in the state and region. March 25, 2020, was the first day of Wisconsin's "Safer at Home" emergency executive order in response to COVID-19,[18] and our perception was that PICU admissions starkly declined thence and remained reduced throughout the calendar year.

We designed this study to determine

if the 2020 springtime decline in PICU admissions was different from the usual seasonal decline and if certain types of PICU admissions were responsible for any identified changes. We hypothesized that the total rate of PICU admissions, the rate of scheduled admissions, and the rate of respiratory viral admissions would be lower during the COVID-19 pandemic in 2020 than in seasonally matched, growth-adjusted "no-COVID-19" projections modeled from admission rates in the previous 5 years. We also hypothesized that rates of other types of PICU admissions would be higher in some categories and lower in others during the COVID-19 pandemic in 2020 compared to no-COVID-19 projections, reflecting broad changes in the reasons for admissions to Wisconsin PICUs.

METHODS

In this retrospective cohort study, all 5 Wisconsin PICUs contributed deidentified clinical data comparing admissions in the 40-week study epoch (March 25, 2020 through December 31, 2020) to those projected from the preceding 5 years' data (March 25, 2015 through March 24, 2020, the control epoch).

Each PICU obtained its data from the Virtual Pediatric Systems database (Virtual Pediatric Systems [VPS], LLC, Los Angeles, California). The VPS is a clinical database dedicated to standardized data sharing among PICUs and is used to track outcomes, measure quality, and conduct research.[19] The VPS neither endorsed nor restricted our interpretation of data. The Marshfield Clinic Institutional Review Board determined the study was exempt human-subjects research.

Our inclusion and exclusion criteria were the same as those for inclusion in VPS; briefly, we included all PICU admissions of children and adults but excluded patients who were transiently present in the PICU (eg, for procedures) without an admission order. For each PICU admission, we extracted the following data: approximate admission date (within 1 day of the actual admission date), demographics, all admission-associated diagnoses (both primary and secondary), the VPS category associated with each diagnosis, scheduled or unscheduled status, and trauma or nontrauma status.

Mean weekly admission rates with standard deviations from the study epoch were compared to those projected from the control epoch using rate ratios with 95% confidence intervals. To generate the counterfactual no-COVID-19 admission projections, we performed time series analysis with a quasi-Poisson model regressed on time, a study epoch indicator, and a first-order autoregressive lag with harmonic terms. The resultant no-COVID-19 projections may be conceived as a business-as-usual scenario (ie, an estimate of what PICU admission rates would have been if the COVID-19 pandemic had never occurred). For a more conservative comparison, we also present admission rates from record-low comparator periods, which are 40-week spans in the previous 5 years with the lowest admission rate in each category.

Table 1. Cohort Demographics

Demographic Characteristic	Control Epoch 3/25/15 – 3/24/20	Study Epoch 3/25/20 – 12/31/20
Total admissions	24,980	2,445
Total diagnoses	266,528	28,049
Median age	4.5	6.6
Sex		
Female	11,000 (44%)	1,127 (46%)
Male	13,980 (56%)	1,318 (54%)
Race/ethnicity		
White	15,276 (61%)	1,501 (61%)
Black or African American	4,416 (18%)	456 (19%)
Hispanic or Latino	1,906 (8%)	232 (9%)
Asian	503 (2%)	61 (2%)
Asian/Indian/Pacific Islander	395 (2%)	0(0%)
American Indian or Alaska Native	362 (1%)	34 (1%)
Native Hawaiian or other Pacific Islander	30 (<1%)	5 (<1%)
Other/Mixed	541 (2%)	61 (2%)
Unspecified	1551 (6%)	95 (4%)

We analyzed admissions *in total* and admissions *by category*, defining the following admission categories: scheduled (vs unscheduled), respiratory viral (vs non), trauma (vs non), primary diagnosis category (eg, respiratory/ear, nose, throat [ENT], neurological, cardiovascular), and whether admissions were associated with a diagnosis of interest, selected a priori (see Appendix: Admission Category Definitions). We chose the diagnoses of interest based on perceived changes in our PICU admission requests and in an effort to objectively evaluate reports in the lay and scientific press with implications for pediatric critical care.[8,20-24] Apart from respiratory viral infections, the diagnoses of interest were diabetic ketoacidosis (DKA), self-harm and suicide, accidental ingestions, child abuse, and asthma exacerbations. Due to the number of admission categories reviewed, we considered $P \leq 0.01$ significant for all analyses.

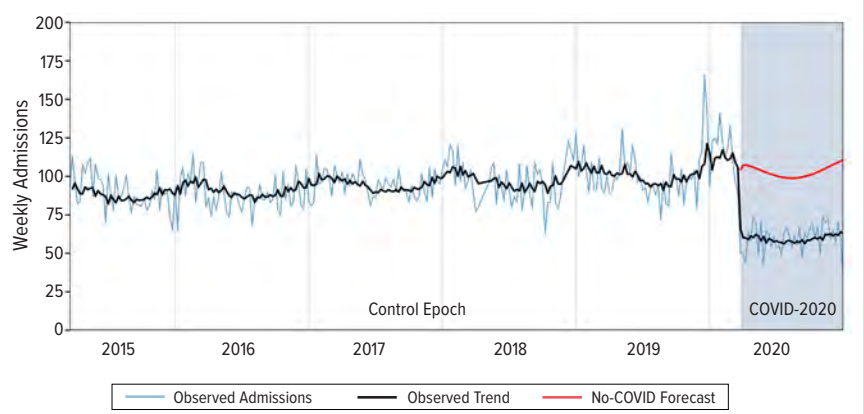
Finally, we also present the total number of Wisconsin PICU admissions with a diagnosis of COVID-19 in 2020. All analyses were completed in R version 4.0.2 using the following packages: readr, lubridate, grid, projection, tsModel, lmtest, Epi, splines, vcd, ggplot2, and RColorBrewer.[25]

RESULTS

There were 27,425 PICU admissions in Wisconsin with 294,577 associated diagnoses from March 25, 2015, through December 31, 2020 (Table 1). Despite an under-18 population decline of 0.4% annually,[26] PICU admissions increased by 2.7% annually during the 5-year control epoch.

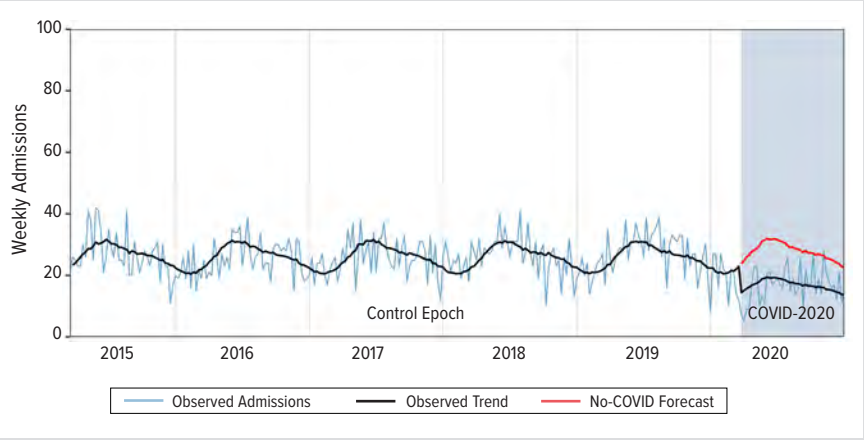
During the study epoch of COVID-19 in 2020, there were 60 ± 9 *total* admissions per week compared to 103 ± 4 projected (RR 0.63; 95% CI, 0.59-0.68; $P < 0.001$). There were 17 ± 6 *scheduled* admissions per week compared to 28 ± 3 projected (RR 0.61; 95% CI, 0.55-0.67; $P < 0.001$), and there were 8 ± 5 *respiratory viral* admissions per week compared to 19 ± 9 projected (RR 0.40;

Figure 1. Total Weekly Admissions Before and During the Pandemic With No-COVID-19 Projection Counterfactual Comparison



Total weekly admissions (blue) with trend (black) are compared to a projected no-COVID-19 admission trend from a quasi-Poisson model of weekly admissions regressed on an indicator for the COVID-19 pandemic, annual growth, a 1-week lag, and harmonic terms to account for seasonality. The estimated rate ratio for the study epoch was 0.63 (95% CI, 0.59-0.68; $P<0.001$), meaning that admissions during the study epoch were 37% lower than expected after accounting for annual growth and seasonality.

Figure 2. Weekly Scheduled Admissions Before and During the Pandemic With No-COVID-19 Projection Counterfactual Comparison



Weekly scheduled admissions (blue) with trend (black) are compared to a projected no-COVID-19 admission trend from a quasi-Poisson model of admissions regressed on an indicator for the COVID-19 pandemic, a 1-week lag, and harmonic terms to account for seasonality. The estimated rate ratio for the study epoch was 0.61 (95% CI, 0.55-0.67; $P<0.001$) meaning that scheduled admissions during the study epoch were 39% lower than expected after accounting for seasonality.

95% CI, 0.33-0.48; $P<0.001$). For each category of interest in our primary hypothesis (total admissions, scheduled admissions, and respiratory viral admissions) the model-projected trend mirrored observed admissions during the control epoch, confirming model validity, but the projected trend significantly exceeded observed admissions during the study epoch (Figures 1-3).

Among other subcategories, admission rates associated with particular respiratory viruses are presented; there were precipitous reductions in respiratory syncytial virus, adenovirus, human metapneumovirus, enterovirus, and nonpandemic coronavirus admissions. The trauma admission rate was 4 ± 2 during the study epoch—less than 6 ± 1 in the projection (RR 0.73; 95% CI, 0.63-0.86; $P<0.001$) but equal to the admission rate during the record low comparator period. With the exception of COVID-19 cases, admissions with a diagnosis of interest were also less frequent than projected. The significance threshold was met for asthma exacerbation admissions (1 ± 1 vs 5 ± 1; RR 0.28; 95% CI, 0.20-0.40; $P<0.001$) and suicide and self-harm admissions (2 ± 2 vs 4 ± 1; RR 0.59; 95% CI, 0.46-0.77; $P<0.001$) (Table 2).

When we considered admissions according to the 23 mutually exclusive VPS diagnostic categories based largely on body systems, the greatest reductions between observed and projected admissions occurred in respiratory/ENT (12 ± 3 vs 30 ± 5; RR 0.41; 95% CI, 0.35-0.47; $P<0.001$), neurologic (7 ± 3 vs 12 ± 0; RR 0.60; 95% CI, 0.51-0.70; $P<0.001$), and cardiovascular (10 ± 4 vs 15 ± 1; RR 0.67; 95% CI, 0.58-0.76; $P<0.001$) admissions (Table 2).

Finally, there were 104 PICU admissions associated with COVID-19 diagnoses in Wisconsin in 2020. The admissions were of children in 96 cases and of adults age greater than 17 years in the remaining 8 cases. All of the COVID-19 admissions occurred during the 40-week study epoch, comprising 4.3% of the PICU admissions during that time period. COVID-19 was the primary diagnosis in 36 of the 104 cases.

DISCUSSION

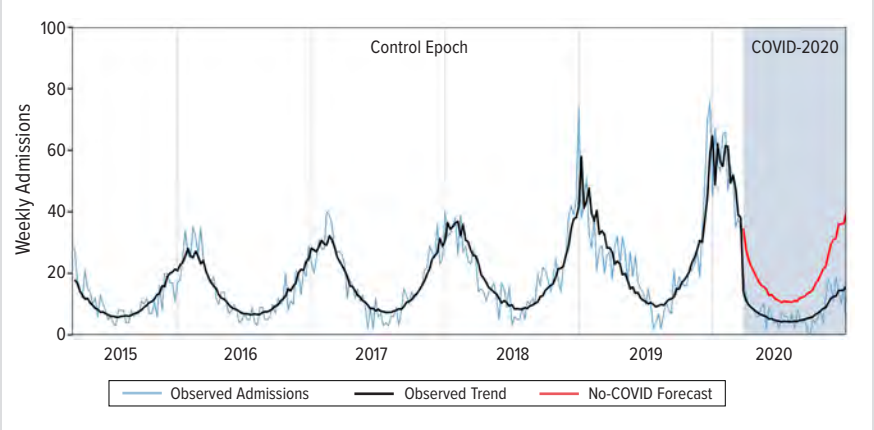
The study reveals how PICU utilization changed in Wisconsin during the COVID-19 pandemic in 2020. We identify a 37% decline overall in PICU admissions compared to the no-COVID-19 projection, consistent with our first hypothesis. The 37% reduction in total PICU admissions is greater than the 32% admission reduction reported amongst a larger group of American PICUs also contributing to VPS; however, rather than employing time series analysis, that study directly compared quarter 2 of 2020 to quarters 2 of 2017, 2018, and 2019.[12]

We aimed to identify if changes in certain categories of PICU utilization were responsible for the overall admission reduction. Scheduled admissions, respiratory viral admissions, and

trauma admissions contained nearly distinct groups of critically ill children and accounted for 56% of the total decline in admissions. If considering admissions according to VPS primary diagnosis category, the reduction in respiratory/ENT admissions alone accounted for 42% of the total admission decline. But PICU admissions were reduced almost across the board; with the exception of COVID-19 admissions, every admission category exhibited either a reduction in observed versus projected admissions or no significant admission frequency change.

Admissions of patients with COVID-19, DKA, suicide and self-harm, and asthma warrant additional discussion.

Figure 3. Weekly Respiratory Viral Admissions Before and During the Pandemic With No-COVID-19 Projection Counterfactual Comparison



Weekly respiratory viral admissions (blue) with trend (black) are compared to a projected no-COVID-19 admission trend from a quasi-Poisson model of weekly admissions regressed on an indicator for the COVID-19 pandemic, annual growth, a 1-week lag, and harmonic terms to account for seasonality. The estimated rate ratio for the study epoch was 0.40 (95% CI, 0.33-0.48, $P<0.001$) meaning that respiratory viral admissions during the study epoch were 60% lower than expected after accounting for annual growth and seasonality.

COVID-19 Admissions

We report 96 out of a population of 1.3 million children required PICU admission with a COVID-19 diagnosis in 2020. During the same time, there were 58,022 confirmed cases of COVID-19 among children in Wisconsin.[27] We do not know if the primary-secondary designation on the COVID-19 diagnoses reliably distinguishes true cases of COVID-19 disease from incidental findings of SARS-CoV-2-positive nasal swabs. Nor could we differentiate multisystem inflammatory syndrome in children (MIS-C) from non-MIS-C SARS-CoV-2-related critical illness, since the diagnostic code for MIS-C was not available until 2021. In any case, the low incidence of PICU admissions with COVID-19 diagnoses emphasizes the low burden of critical COVID-19 disease among children during the study epoch.

Diabetic Ketoacidosis Admissions

The trend toward decreased PICU admissions with DKA in Wisconsin differed from the increase reported in the other analysis of American PICU admissions,[12] but we would not have identified a reduction if we had not accounted for an 8.2% annual growth in DKA PICU admissions during the control epoch. Nonetheless, there are several reports of links between DKA and COVID-19, and an open international registry exists.[22,28-30]

Suicide and Self-Harm Admissions

Despite reports of increased positive results on adolescent suicide risk screens[31] and emergency department visits and hospitalizations for pediatric mental health concerns,[32-38] PICU admissions for suicide and self-harm in Wisconsin were approximately the same during the study epoch as during the record low comparator period and 41% less frequent than anticipated by the no-COVID-19 projection. These findings are consistent with decreased calls to poison control centers resulting in hospitalization during COVID-19.[39] The other VPS study to evaluate mental health diagnoses in PICU admissions during COVID-19 reported decreased attempted suicide but increased poisoning/ingestions.[12] Further research could identify if mental health presentations to PICUs (eg, life-threatening ingestions) increased after this study epoch ended in December 2020, when stressors associated with the COVID-19 pandemic and societal response to it were ongoing. Alternatively, increased pediatric mental health complaints associated with the pandemic may not correspond with increased PICU utilization.

Asthma Admissions

Initially, it would have been reasonable to hypothesize there would be increased PICU admissions with asthma during COVID-19;[40] however, the opposite proved true. In fact, patients with asthma and COVID-19 fared as well as those without asthma.[41] Wisconsin PICU admissions associated with asthma were significantly reduced during the study epoch, consistent with reports that pediatric asthma exacerbations requiring treatment with systemic steroids decreased.[8]

Study Strengths

A strength of this study was our ability to account for chronological growth or decay in admission frequency during the control epoch. In addition, seasonal variability in health care does not respect calendar designations, so comparing the incidence of a seasonal illness in the same week of 2 different years is often inappropriate. We accounted for both of these confounders by measuring and adjusting for growth or decay in PICU utilization over the preceding 5 years, using a relatively long—40-week—study epoch, and selecting historical control periods based on the elapsed time between the preceding admission rate nadir and day 1 of each

Table 2. Weekly Admission Rates by Category

				Comparison of Projection and Observed		
Category	**Record Low**	**No-COVID-19 Projection**	**COVID-19 Observed**	**Rate Ratio**	**% Change**	***P* value**
Total admissions	86 ± 9	103 ± 4	60 ± 9	0.63 (0.59 – 0.68)	-37%	< 0.001
Scheduled admissions	23 ± 5	28 ± 3	17 ± 6	0.61 (0.55 – 0.67)	-39%	< 0.001
Respiratory viral admissions	11 ± 5	19 ± 9	8 ± 5	0.40 (0.33 – 0.48)	-60%	< 0.001
Influenza	0.2 ± 0.5	1 ± 1	0.02 ± 0.16	0.02 (0.00-0.42)	-98%	0.012
Rhinovirus	0	0.1 ± 0.0	0	—	—	—
Nonpandemic coronavirus	0	0.5 ± 0.0	0.02 ± 0.16	0.05 (0.01 – 0.47)	-95%	0.009
Adenovirus	0.5 ± 0.7	1.0 ± 0.0	0.5 ± 0.8	0.45 (0.26 – 0.78)	-55%	0.005
Human metapneumovirus	0.0 ± 0.2	1.0 ± 1.0	0.2 ± 0.8	0.21 (0.11 – 0.42)	-79%	< 0.001
Respiratory syncytial virus	1 ± 2	3 ± 5	0.3 ± 1.1	0.08 (0.04 – 0.18)	-92%	< 0.001
Enterovirus	0.1 ± 0.3	1.6 ± 0.0	0.7 ± 0.8	0.47 (0.29 – 0.77)	-53%	0.003
Parainfluenza	0.2 ± 0.5	1.1 ± 1.0	0.0 ± 0.2	0.02 (0.00 – 0.42)	-98%	0.012
Trauma admissions	4 ± 2	6 ± 1	4 ± 2	0.73 (0.63 – 0.86)	-27%	< 0.001
Cardiovascular	13 ± 3	15 ± 1	10 ± 4	0.67 (0.58 – 0.76)	-33%	< 0.001
Dermatologic	0.1 ± 0.3	0.3 ± 0	0.0 ± 0.2	0.16 (0.04 – 0.67)	-84%	0.014
Endocrine	3 ± 2	5 ± 0	4 ± 2	0.78 (0.64 – 0.95)	-22%	0.015
Factors influencing health	0.0 ± 0.2	0.3 ± 0.0	0.3 ± 0.6	1.05 (0.61 – 1.81)	5%	0.865
Gastrointestinal	2 ± 1	2 ± 0	2 ± 1	0.96 (0.72 – 1.27)	-4%	0.766
Genetic	1 ± 1	1 ± 0	1 ± 1	0.64 (0.45 – 0.91)	-36%	0.013
Gynecologic	0	0.0 ± 0.0	0.0 ± 0.2	1.60 (0.13 – 13.95)	60%	0.671
Hematologic	0.4 ± 0.7	0.5 ± 0.0	0.6 ± 0.9	1.20 (0.79 – 1.83)	20%	0.394
Immunologic	0	0.0 ± 0.0	0.0 ± 0.2	1.06 (0.13 – 8.45)	6%	0.957
Infectious	4 ± 2	7 ± 1	5 ± 3	0.62 (0.50 – 0.78)	-38%	< 0.001
Injury/poisoning/adverse effects	11 ± 3	12 ± 1	8 ± 3	0.73 (0.65 – 0.82)	-27%	< 0.001
Metabolic	0.8 ± 0.7	1.0 ± 0.0	0.6 ± 0.8	0.66 (0.45 – 0.99)	-34%	0.045
Neurologic	9 ± 3	12 ± 0	7 ± 3	0.60 (0.51 – 0.70)	-40%	< 0.001
Newborn/perinatal	0.2 ± 0.5	0.3 ± 0.0	0.2 ± 0.5	0.86 (0.44 – 1.68)	-14%	0.654
Oncologic	2 ± 2	3 ± 0	2 ± 1	0.74 (0.60 – 0.92)	-26%	0.008
Ophthalmologic	0	0.1 ± 0.0	0	—	—	—
Orthopedic	1 ± 1	1 ± 0	0	0.68 (0.43 – 1.07)	-32%	0.094
Psychiatric	0.1 ± 0.4	0.6 ± 0.0	0.4 ± 0.7	0.61 (0.31 – 1.19)	-39%	0.151
Renal/genitourinary	0.7 ± 0.8	1.2 ± 0.0	0.9 ± 1.0	0.73 (0.50 – 1.06)	-27%	0.100
Respiratory and respiratory/ear, nose, throat	23 ± 6	30 ± 5	12 ± 3	0.41 (0.35 – 0.47)	-59%	< 0.001
Rheumatologic	0.1 ± 0.3	0.2 ± 0.0	0.4 ± 0.8	2.16 (1.12 – 4.15)	216%	0.022
Symptoms	1 ± 1	2 ± 0	2 ± 2	1.09 (0.88 – 1.36)	9%	0.443
Transplant	0.1 ± 0.3	0.3 ± 0.0	0.3 ± 0.5	0.86 (0.46 – 1.61)	-14%	0.644
Diabetic ketoacidosis	3 ± 2	6 ± 0	4 ± 2	0.78 (0.64 – 0.95)	-22%	0.014
Suicide and self-harm	2 ± 2	4 ± 1	2 ± 2	0.59 (0.46 – 0.77)	-41%	< 0.001
Accidental ingestions	1 ± 1	2 ± 0	1 ± 1	0.69 (0.48 – 1.00)	-31%	0.053
Child abuse	0.1 ± 0.3	0.3 ± 0.0	0.2 ± 0.4	0.72 (0.37 – 1.41)	-28%	0.335
Asthma exacerbation	4 ± 2	5 ± 1	1 ± 1	0.28 (0.20 – 0.40)	-72%	< 0.001

We compared admissions in the 40-week study epoch (3/25/2020 – 12/31/2020), to those projected from the preceding 5 years' data (3/25/2015 – 3/24/2020, the control epoch) using mean weekly admission rates with standard deviations and rate ratios with 95% CIs. For context, we also present admission rates in record-low comparator periods, the 40-week spans in the previous 5 years with the lowest admission rate in each category.

period rather than directly comparing admission frequencies in the same weeks of different years.

Another strength of the study is that we obtained all primary and secondary diagnoses associated with all PICU admissions, thereby gathering the most complete data regarding the reason for each admission. The analysis of secondary diagnoses corrected for any possible inconsistency in how the primary and secondary diagnoses may have been designated from site to site.

Finally, associations identified in retrospective studies do not necessarily imply causation, but despite being retrospective, our study does provide some insight into why PICU admissions declined. The reduction in admissions was not limited to categories such as respiratory admissions or scheduled admissions; in fact, these categories only account for about half of the total decline, suggesting one should reject assumptions that attribute admission reductions to only 1 component of the COVID-19 pandemic or response (eg, stay-at-home orders reducing community viral circulation or cancellation of nonurgent hospital procedures).

Limitations

Though this was a multicenter study, it reflects the experience of 1 state. More than half the admissions were in 1 PICU. Generalizability is limited to areas and populations sufficiently similar to Wisconsin. As noted previously, further research with a longer study epoch might identify important PICU admission alterations associated with the COVID-19 pandemic and response that were not evident before the end of 2020. Finally, we requested pediatric mortality data from the Wisconsin Department of Vital Statistics, but at the time of this writing such contextual data was not available.

CONCLUSIONS

At the onset of the COVID-19 pandemic, we might have predicted increased PICU admissions in 2020, but total, scheduled, and respiratory viral admissions in Wisconsin declined by 37%, 39%, and 60%, respectively. Material and human resources usually designated for pediatric intensive care were available for dismissal or deployment elsewhere.

This retrospective study of PICU admissions during the first calendar year of the COVID-19 pandemic yielded both foreseeable and unexpected results. Only half the reduction in total admissions was from predictable categories, such as scheduled and respiratory viral admissions. Unexpected findings emphasize the importance of objectively observing paradigm shifts, identifying inconsistencies between assumptions and observations, and adapting treatment and mitigation efforts to new discoveries as the COVID-19 pandemic evolves in the years to come.

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Perinatal Outcomes Associated With Institutional Changes Early in the COVID-19 Pandemic

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ABSTRACT

Objective: Many institutions implemented policy changes to protect patients and clinicians during the COVID-19 pandemic. This study examines how institutional policy changes and patient behaviors affected perinatal outcomes. We hypothesized that obstetric practice changes occurred and that these changes affected perinatal outcomes.

Methods: We conducted a retrospective cohort study of singleton pregnancies delivered at a single institution with low incidence of COVID-19. Deliveries occurring from December 15, 2019 through March 14, 2020 were designated as the pre-COVID-19 group. Those occurring from March 15, 2020, through June 15, 2020, were designated the COVID-19 group. The primary outcome is a perinatal composite defined as delivery ≥ 41 weeks, hypertensive disorder of pregnancy at term, unplanned Cesarean delivery, term neonatal intensive care unit admission, 42-day maternal readmission, and 7-day neonatal readmission. Additional maternal, neonatal, and delivery composites also were analyzed, and we evaluated all individual outcomes secondarily.

Results: Of 2,268 deliveries, 1,210 occurred during the COVID-19 period. Four of the 1,210 (0.3%) were diagnosed with COVID-19. Women during the COVID-19 period were more likely to present in spontaneous labor and less likely to undergo induction. Maternal and neonatal length of stay was also shorter. There was no difference in the perinatal composite between the 2 groups (36.3% vs 36.7% [OR 1.05; 95% CI, 0.86-1.21]). There was a significant increase in deliveries occurring at or after 41 weeks (4.7% vs 6.9% [OR 1.83; 95% CI, 1.00-3.34]). There was no difference in maternal, neonatal, and delivery composites or the outcomes assessed individually.

Conclusions: We demonstrated significant changes in clinical practice secondary to policy changes and patient behaviors during the COVID-19 pandemic. As an institution that globally adopted ARRIVE (A Randomized Trial of Induction Versus Expectant Management) practices, we noted fewer inductions, more women presenting in labor and more women delivering at or after 41 weeks. We also noted a shorter length of hospital stay for the mother-baby dyad. Overall, these changes in clinical practice did not affect perinatal outcomes.

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INTRODUCTION

In December 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified and a novel illness named coronavirus disease 2019 (COVID-19) was described.[1] In March 2020, the United States government declared COVID-19 a national emergency.[2] Health care institutions worked to establish protocols within the health care system to ensure the safety of patients and staff and prevent transmission of COVID-19. The care of pregnant patients posed its own set of challenges in regard to in-person visits, the need for antenatal testing, and visitors within the hospital.

In mid-March 2020, our institution assembled a multidisciplinary team of maternal-fetal medicine specialists, obstetricians, neonatologists, infectious disease specialists, and nursing staff to implement a series of protocols and guidelines due to the COVID-19 pandemic. These policy changes included personal protective equipment for all staff, restricting visitors within the hospital, nasopharyngeal COVID-19 testing for all pregnancy-related admissions, moving prenatal care to a telemedicine platform where appropriate, and encouraging earlier postpartum discharge.

The objective of this study was to examine how institutional policy changes implemented due to COVID-19 and associated patient behaviors affected perinatal outcomes. We hypothesized that obstetric practice changes had occurred, specifically fewer inductions of labor and delivery occurring at later gestational ages, and that these changes worsened perinatal outcomes.

Box. Institutional Changes Implemented on March 15, 2020

1. Staff were provided a mask and face shield to wear while providing patient care. Masks were required on all staff throughout the hospital at all times.
2. Social distancing restrictions were encouraged in all patient care areas, and multidisciplinary meetings were held over the phone or video to minimize gatherings.
3. Routine outpatient prenatal care (except required ultrasounds and antenatal fetal surveillance) was moved to a telemedicine format.
4. Maternal-fetal medicine consultations were performed via telemedicine.
5. Fetal echocardiograms for lower risk indications (ie, in vitro fertilization) were cancelled and the detailed cardiac screening images were reviewed by a pediatric cardiologist.
6. Antenatal testing was modified to weekly biophysical profile rather than twice weekly nonstress tests, where appropriate.
7. Patients who required in-person outpatient visits and those admitted to the antepartum unit were not allowed visitors.
8. Patients admitted for delivery were allowed 1 support person, and babies admitted to the NICU were allowed 2 visitors.
9. Universal nasopharyngeal COVID testing of all pregnant women admitted.
10. Discharge for uncomplicated postpartum patients was strongly encouraged on postpartum day 1 for vaginal deliveries and postpartum day 2 for Cesarean deliveries.
11. Resident coverage was limited to cycle residents in a 2 weeks on, 2 weeks off rotation.

METHODS

We conducted a retrospective cohort study of singleton pregnancies delivered at a single academic institution with a low incidence of COVID-19 from December 15, 2019, through June 15, 2020. Institution-wide policy changes were implemented at UnityPoint Health-Meriter, the academic home of the University of Wisconsin School of Medicine and Public Health's Department of Obstetrics and Gynecology, on March 15, 2020. Deliveries occurring from December 15, 2019 through March 14, 2020, were designated as the pre-COVID-19 group. Those occurring from March 15, 2020 through June 15, 2020, were designated as the during COVID-19 group. Exclusion criteria were multifetal gestations and those women who did not deliver at our institution. These policies included mask mandates for patients and staff, visitor restrictions, transition to telemedicine where appropriate, weekly antenatal testing with biophysical profile, mandatory nasopharyngeal COVID-19 testing for all obstetrical patients on admission, and discharge encouraged on postpartum day 1 for vaginal deliveries and postpartum day 2 for Cesarean deliveries (Box).

Maternal demographic, delivery, postpartum, and neonatal data were obtained from our institution's perinatal database, which is maintained by trained nursing staff. The database contained our specified maternal and neonatal clinical outcomes. This study was deemed exempt by the Institutional Review Board.

The primary outcome was a perinatal composite defined as delivery ≥41 weeks, hypertensive disorder of pregnancy at term, unplanned Cesarean delivery, term neonatal intensive care unit (NICU) admission, 42-day maternal readmission, and 7-day neonatal readmission. Secondary outcomes included maternal, neonatal, and delivery composite outcomes. The maternal composite comprised maternal intensive care unit admission, blood transfusion, postpartum hemorrhage, unplanned postpartum procedure, unplanned hysterectomy, 3rd or 4th degree laceration, and 42-day readmission. The neonatal composite comprised 5-minute Apgar <7, term NICU admission, 7-day neonatal readmission, meconium, and fetal or infant death. Lastly, the delivery composite comprised unplanned Cesarean delivery, delivery at or after 41 weeks, clinical intraamniotic infection, placental abruption, unsuccessful trial of labor after Cesarean, and failed vacuum or forceps delivery.

A power calculation was performed based upon our institution's baseline data. The power of this study is based on the percentage of subjects who have the primary composite event between the 2 groups. Our institution has 400 deliveries per month; therefore, we anticipated 1200 deliveries in each group. Baseline data from our institution suggest the pre-COVID

Table 1. Baseline Maternal and Pregnancy Characteristics

	Pre-COVID-19 12/15/19 – 3/14/20 (n = 1058)	During COVID-19 3/15/20 – 6/15/20 (n = 1210)	*P* value
Race			0.884
White	844 (79.8%)	961 (79.4%)	
Black	87 (8.2%)	105 (8.7%)	
Asian	82 (7.8%)	85 (7.0%)	
Native American	3 (0.3%)	3 (0.2%)	
Multiracial	42 (4.0%)	56 (4.6%)	
Hispanic ethnicity	106 (10.0%)	115 (9.5%)	0.733
Prepregnancy BMI	26.5 (6.6)	26.7 (6.8)	0.577
Previous Cesarean delivery	174 (16.4%)	188 (15.5%)	0.595
Received prenatal care	1051 (99.3%)	1208 (99.8%)	0.092
Number of prenatal visits	12.1 (3.0)	12.0 (2.3)	0.620
Gestational age at delivery (weeks)	38.8 (1.9)	38.8 (2.0)	0.574
<34 weeks	18 (1.7%)	29 (2.4%)	
34 – 36.9 weeks	67 (6.3%)	90 (7.4%)	
37 – 40.9 weeks	923 (87.2%)	1008 (83.3%)	
≥41 weeks	50 (4.7%)	83 (6.9%)	
Birth weight (g)	3321.2 (553.3)	3304 (571.7)	0.488
Labor admission	411 (39.1%)	561 (46.4%)	<0.001
Induction of labor	467 (44.2%)	477 (39.4%)	0.024
Spontaneous delivery >9 weeks	235 (22.3%)	304 (25.1%)	0.127
Maternal length of stay			<0.001
0 – 1 day	169 (16.0%)	416 (34.4%)	
>1 – 2 days	577 (54.6%)	575 (47.5%)	
>2 – 3 days	195 (18.4%)	152 (12.6%)	
>3 days	116 (11.0%)	65 (5.4%)	
Infant length of stay			<0.001
0 – 1 day	163 (15.5%)	346 (28.8%)	
>1 – 2 days	555 (52.9%)	581 (48.3%)	
>2 – 3 days	177 (16.9%)	134 (11.1%)	
>3 days	154 (14.7%)	142 (11.8%)	

Abbreviations: BMI, body mass index.
Reported as N (%), mean (SD).

group would have a 39% rate of the primary composite event. With 1200 patients in each group, we will have 99% power in a test of 2 independent proportions if the primary composite rate is 48% during COVID-19, 95% power if the rate is 46%, and 85% power if the rate is 45%.

Demographic data were compared between the 2 groups with *t* tests and chi-square tests based on the statistical distribution of the specific variable. Similarly, perinatal characteristics were compared between groups with *t* tests and chi-square tests. Composite and individual outcomes were compared between groups and summarized by logistic regression and odds ratio (OR) with a 95% confidence interval (CI). Significance level of 5% was used to determine statistical significance. The statistical software R (version 3.5) was used for all statistical analyses.

RESULTS

During the study period from December 15, 2019, through June 15, 2020, 2,366 deliveries occurred at our institution, with 2,268 deliveries (95.9%) included in the analysis. During the pre-COVID time period, 1,058 deliveries (46.6%) occurred, and 1,210 deliveries (53.4%) occurred during the COVID time period. Baseline maternal and pregnancy characteristics did not differ between groups, indicating both groups were comparable (Table 1). Our practice changes showed decreased incidence of labor induction (44.2% vs 39.4%, $P = 0.024$) and an increase in hospital admissions for labor (39.1% vs 46.4%, $P < 0.001$) during the COVID time period. Maternal and infant length of stay also were significantly lower during the COVID time period (Table 1).

The incidence of the perinatal composite did not differ between groups (36.3% vs 36.7%, OR 1.02; 95% CI, 0.86-1.21; $P = 0.844$). During COVID, deliveries were more likely to occur at or after 41 weeks (4.7% vs 6.9%, OR 1.83; 95% CI, 1.00-3.34; $P = 0.032$). There were no differences in the other individual outcomes within the primary composite (Table 2). There was no difference in the maternal composite (8.7% vs 8.8%; OR 1.02; 95% CI, 0.76-1.36; $P = 0.902$), neonatal composite (11.5% vs 13.4%; OR 1.19; 95% CI, 0.92-1.52, $P = 0.183$), or delivery composite (26.1% vs 25.4%; OR 0.96; 95% CI, 0.80-1.16, $P = 0.697$). All secondary outcomes evaluated separately were also not statistically significant (Table 2).

Table 2. Perinatal Outcomes Before and During the COVID-19 Pandemic

	Pre-COVID-19 12/15/19—3/14/20 (n = 1058)	During COVID-19 3/15/20–6/15/20 (n = 1210)	OR (95% CI)	*P* value
Perinatal composite	384 (36.3%)	444 (36.7%)	1.02 (0.86-1.21)	0.844
Hypertensive disorder of pregnancy >37 weeks	128 (12.1%)	123 (10.2%)	0.82 (0.63-1.07)	0.144
Delivery ≥41 weeks	50 (4.7%)	83 (6.9%)	1.83 (1.00-3.34)	0.032
Unplanned Cesarean delivery	214 (20.2%)	217 (17.9%)	0.86 (0.70-1.06)	0.165
Term NICU admission	57 (5.4%)	88 (7.3%)	1.38 (0.98-1.94)	0.068
42-day maternal readmission	17 (1.6%)	16 (1.3%)	0.82 (0.41-1.63)	0.573
7-day neonatal readmission	19 (1.8%)	24 (2.0%)	1.11 (0.60-2.03)	0.744
Maternal composite	92 (8.7%)	107 (8.8%)	1.02 (0.76-1.36)	0.902
Maternal ICU admission	2 (0.2%)	3 (0.2%)	1.31 (0.22-7.87)	0.766
Transfusion	8 (0.8%)	7 (0.6%)	0.76 (0.28-2.11)	0.604
Hemorrhage	32 (3.0%)	23 (1.9%)	0.62 (0.36-1.07)	0.085
Unplanned procedure	15 (1.4%)	21 (1.7%)	1.23 (0.63-2.39)	0.546
Unplanned hysterectomy	3 (0.3%)	2 (0.2%)	0.58 (0.10-3.49)	0.554
3rd or 4th degree laceration	33 (3.1%)	51 (4.2%)	1.37 (0.88-2.13)	0.17
42-day maternal readmission	17 (1.6%)	16 (1.3%)	0.82 (0.41-1.63)	0.573
Neonatal composite	122 (11.5%)	162 (13.4%)	1.19 (0.92-1.52)	0.183
5-minute Apgar <7	33 (3.1%)	27 (2.2%)	0.71 (0.42-1.19)	0.191
Term NICU admission	57 (5.4%)	88 (7.3%)	1.38 (0.98-1.94)	0.068
7-day neonatal readmission	19 (1.8%)	24 (2.0%)	1.11 (0.60-2.03)	0.744
Fetal death	7 (0.7%)	6 (0.5%)	0.75 (0.25-2.23)	0.603
Infant death	3 (0.3%)	2 (0.2%)	0.58 (0.10-3.49)	0.554
Meconium	20 (1.9%)	37 (3.1%)	1.64 (0.94-2.84)	0.079
Delivery composite	276 (26.1%)	307 (25.4%)	0.96 (0.80-1.16)	0.697
Unplanned Cesarean delivery	214 (20.2%)	217 (17.9%)	0.86 (0.70-1.06)	0.165
Delivery ≥41 weeks	50 (4.7%)	83 (6.9%)	1.83 (1.00-3.34)	0.032
Clinical intraamniotic infection	23 (2.2%)	22 (1.8%)	0.83 (0.46-1.50)	0.545
Placental abruption	14 (1.3%)	7 (0.6%)	0.43 (0.17-1.08)	0.072
Unsuccessful TOLAC	16 (1.5%)	14 (1.2%)	0.76 (0.37-1.57)	0.461
Failed vacuum delivery	6 (0.6%)	3 (0.2%)	0.44 (0.11-1.75)	0.241
Failed forceps delivery	3 (0.3%)	0 (0.0%)	NA	NA

Abbreviations: NICU, neonatal intensive care unit, TOLAC, trial of labor after Cesarean.

DISCUSSION

Our data demonstrate significant changes in clinical practice secondary to policy changes and patient behaviors early in the COVID-19 pandemic. Patients who delivered during the COVID-19 period were less likely to undergo induction of labor and were more likely to present in labor. While the overall perinatal composite did not differ between groups, we did see an increase in deliveries occurring at or after 41 weeks. We also noted a shorter length of hospital stay for the mother-baby dyad but no difference in maternal or neonatal readmission rates. Overall, these changes in clinical practice did not affect perinatal outcomes.

The primary strength of this study was our institution's high volume of deliveries and low incidence of COVID-19 during this time period. Of the 1,210 deliveries that occurred in the COVID-19 period, only 4 patients tested positive for COVID-19 (0.03%). This allows us to adequately study the institutional changes and perinatal outcomes without the bias of COVID-related adverse outcomes.

This study is limited by its single site patient population with a majority of patients of White race, thereby limiting our generalizability to other institutions with different patient populations. We are also underpowered to show a difference in more rare adverse obstetric outcomes as they relate to maternal and neonatal morbidity and mortality. It also should be noted our a priori estimate of the rate of the composite outcome in the pre-COVID-19 group was higher than our results show. However, this difference is small. Therefore, we believe the estimate of our power analysis is still accurate.

A similar study published in September 2020 showed shorter maternal and infant length of stay without an increase in adverse obstetric outcomes. This study did not show a difference in induction of labor or admission for spontaneous labor in the study population.[3] Other literature has shown a significant increase in stillbirth during the COVID-19 pandemic.[4] Our data did not show an increase in fetal or neonatal death, but we were underpowered to show this association.

Following publication of the ARRIVE trial (A Randomized Trial of Induction Versus Expectant Management), our institution globally adopted offering patients the option of an elective induction of labor at 39 weeks.[5] In this study, we saw a decrease in induction of labor and an increase in those deliveries occurring at or after 41 weeks during the COVID-19 period. While not statistically significant, there were trends toward increased term NICU admission and meconium, which would be consistent with pregnancies continuing to gestational ages in the late term period. It is possible these trends were an effect of risk perceptions and changes in patient behaviors and were not directly linked to the changes in institutional policies, which may further support our data that our institutional changes did not affect perinatal outcomes.

In mid-May 2020, there was concern for an increase in neonatal readmissions due to prompt discharge of moms and babies. Therefore, our care teams were less likely to encourage early discharge in the latter portion of our study period. Ultimately, we did not see an increase in maternal or neonatal readmissions at our institution. As the pandemic has continued, our policies have become more lenient, and more patients have returned to staying in the hospital for longer time periods. These data are reassuring it is safe to return to encouraging shorter postpartum stay, should this be necessary in the future.

In comparison to other global outbreaks, the policy changes implemented due to the COVID-19 pandemic are unprecedented. The 2009 H1N1 outbreak in the United States could be considered a comparable global health crisis witnessed in the 21st century. The Centers for Disease Control and Prevention (CDC) released a guideline during the H1N1 outbreak to specifically give guidance to clinicians in the intrapartum setting.[6] The CDC promptly recognized the needs of the pregnant population and assembled a maternal health team to help triage public health inquiries and disseminate information. This collaborative effort has served as a model for future responses, such as the response to the COVID-19 pandemic.[7]

CONCLUSIONS

The policy changes implemented at our institution during the COVID-19 pandemic and the subsequent clinical practice modifications did not affect our perinatal outcomes. Our institution's set of policy changes can be considered a model for emergency preparedness and resource allocation during the COVID-19 pandemic and possible future local or global emergencies.

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Leveraging Social Determinants of Health to Reduce Hospital Length of Stay: A Pilot QI Project for Solid Tumor Oncology Patients During the COVID-19 Pandemic

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ABSTRACT

Introduction: The impact of the social determinants of health (SDOH) on hospitalized cancer patients and hospital length of stay is unknown. At our institution, a hospital-wide SDOH survey that examined patient-specific barriers to various domains of SDOH and facilitated hospital discharge was integrated into the electronic medical record. This study reports the effect of the SDOH survey on length of stay for oncology patients and the outpatient referrals generated to facilitate the discharge.

Methods: We examined length of stay index data on inpatient oncology patients and 2 comparator services (bone marrow transplant, internal medicine). We evaluated the length of stay using a 2-sample *t* test, and the rate of referrals per discharge using a 2-sample Poisson test.

Results: Compared to the baseline length of stay, after the launch of the SDOH survey, there was a significant (8.9%) decrease in the average length of stay for oncology patients (8.14 to 7.41 days, $P = 0.004$), the LOS decrease for the bone marrow transplant was a nonsignificant trend only ($P > 0.1$). Average referrals per discharge increased from baseline 1.063 per discharge to 1.159 after implementation ($P = 0.004$), and the mean values increased by 9%.

Conclusions: The SDOH survey tool assisted in a timely examination of patient-specific barriers to discharge, leveraged care coordination, and facilitated a safe hospital discharge. Such efforts increase the efficiency of health care service delivery in response to public health threats, such as the COVID-19 pandemic.

INTRODUCTION

Cancer treatment and the disease course can be complex and, for acute illness, hospitalizations are inevitable.[1] For hospitalized cancer patients, the length of stay (LOS) is dependent on the intricacies of tumor type, treatments, and preexisting comorbidities, as well as patients' barriers associated with socioeconomic determinants.[2-12] Given the economic burden of extended hospital LOS, health systems use multiple initiatives and multidisciplinary strategies for a safe discharge process.[10,13,14] For example, barriers related to various domains of social determinants of health (SDOH), such as sociodemographic factors (transportation needs, food, and housing insecurities), behavioral factors (tobacco, alcohol use, and physical activity), and others (social connections, intimate partner violence, and mental health issues), are prevalent among socioeconomically challenged populations.[8-10,15-17] Patients with housing insecurities related to a lack of a permanent place to live or unsafe home situations and migrating populations with transient living environments lead to difficulty establishing routine health care and long-term relationships with their medical providers.[18-20] Furthermore, patients with these barriers face impediments across the health care continuum: preventive care, cancer screening, advanced disease at presentation, and treatment delays leading to emergency department visits.[21,22] Additionally, the sociodemographic barriers also lead to a lack of routine checkups for diseases such as cancer, leading to unplanned/pro-

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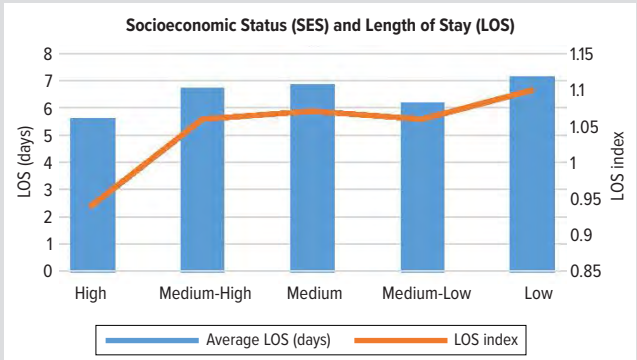
Figure 1. Baseline Needs Assessment Data of Hospital Length of Stay During the Needs Assessment: Pre-intervention Phase



longed hospitalizations and readmissions due to the complexity of the illness.[23-26]

In current practice, health systems have several strategies in place for hospitalized patients as needed, but care-delivery models integrating the SDOH evaluation into routine clinical practice are lacking. Integrating SDOH may help develop a standardized approach to care delivery for hospitalized patients and facilitate timely hospital discharge.

High rates of poverty are reported in several neighborhoods in Milwaukee, Wisconsin.[27] Beyer et al reported race-based housing discrimination, racial disparities, and inferior survival outcomes for colorectal, lung, and breast cancer patients among the underserved communities versus their White counterparts in southeastern Wisconsin.[28,29] Throughout the United States during the COVID-19 pandemic, unexpectedly higher hospitalization rates also were reported among Hispanic and Black individuals, and higher death rates were reported among American Indians.[30,31] At the same time, health systems factors, such as decreased workforce capacity, shortage of accepting facilities (eg, nursing homes), and patient-level barriers related to housing insecurities and transportation inadequacies, contributed to prolonged LOS.[32]

We conducted a quality improvement (QI) project under the auspices of the American Society of Clinical Oncology's (ASCO) Quality Training Program (QTP) to examine and address the LOS for inpatients admitted to oncology units. To help characterize the LOS and the associated socioeconomic determinants of oncology patients, we conducted a retrospective needs assessment at the Medical College of Wisconsin Cancer Center in Milwaukee, Wisconsin. First, we examined the hospital LOS for patients admitted to oncology units during the first through fourth quarters of 2018-2019. Our results demonstrated an inverse relationship between LOS and income compared to all other patient demographic factors. Based on our preliminary data, we initially planned to implement the QI initiative dedicated to cancer patients from the low socioeconomic status (SES) communities to address the LOS and the associated sociodemographic barriers during the ASCO-QTP.[33] However, during the pandemic, we observed an overwhelming volume of discharge planning required for most hospitalized patients, regardless of the presence or absence of cancer and the type of medical illness at admission. To facilitate discharge planning at our institution, a hospital-wide SDOH screen was integrated into the electronic medical record (EMR), which surveyed patients' SDOH across 11 domains within 24 hours of admission and identified the barriers that required care coordination for a timely discharge. For this project, we were interested in examining the impact of the SDOH survey among patients admitted to oncology units and the appropriate referrals generated to facilitate hospital discharge. We hypothesized that examining oncology patients' sociodemographic domain based on their SDOH survey at admission would enable the care team to address patient-specific barriers, ultimately reducing overall LOS.

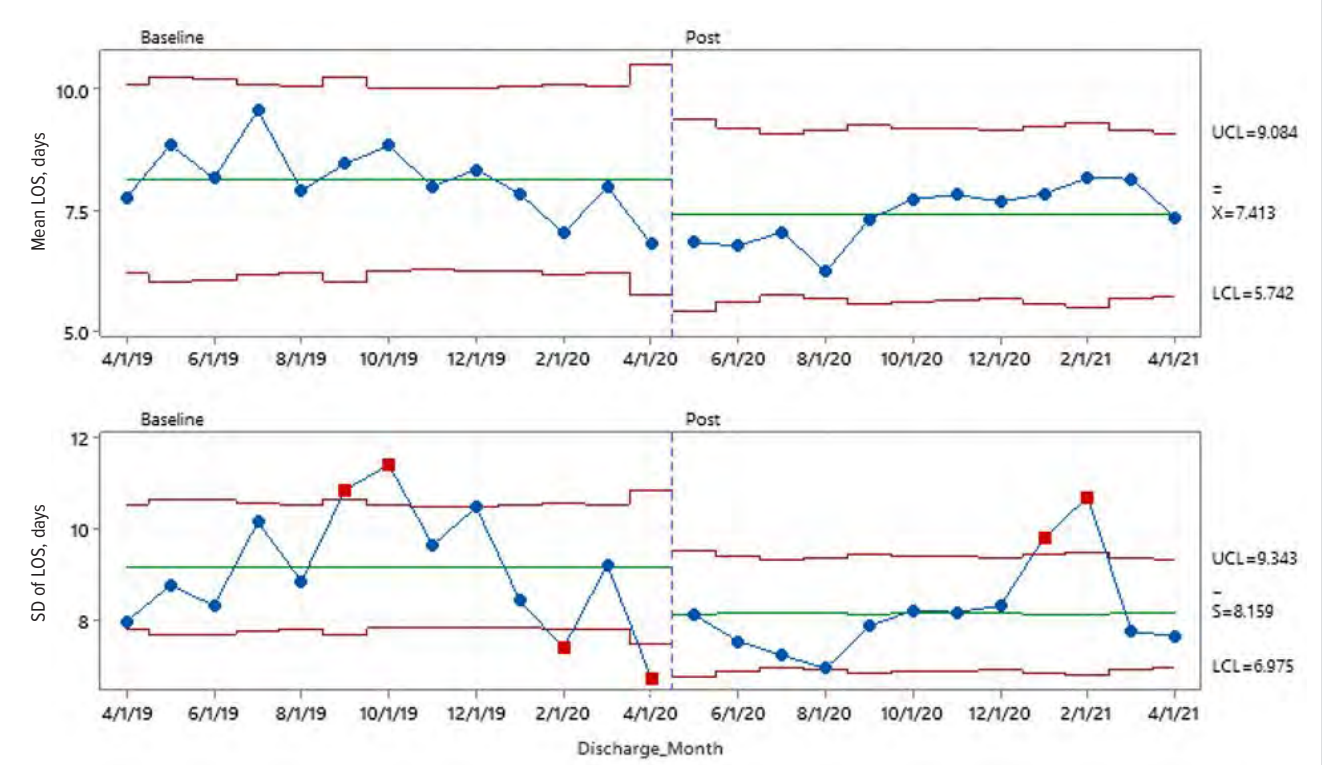
METHODS

Study Approach

In the planning phase of the QI initiative, we retrospectively analyzed the observed LOS using 1848 deidentified records of inpatient oncology patients from the first through the fourth quarters of 2018-2019. Eligibility criteria included age 18 and older and a solid tumor diagnosis at admission. Patients with a remote cancer diagnosis who were admitted to other hospital units and hospice were excluded. Our needs assessment determined SES by patient income and percent with bachelor's degrees, when available. Otherwise, SES was based on ZIP code and census tract data and categorized in groups as low, medium-low, medium, medium-high, and high income. Our patient cohort included residents of Milwaukee and outside Milwaukee County. Insurance payer types included Medicaid, Medicare, managed care, and others (self-pay/unknown). Using Vizient's 2019 academic medical centers risk model, we obtained the LOS data from the Vizient Clinical Data Base for each encounter.[34] We collaborated with inpatient and outpatient clinicians and developed a process map that examined patient flow, care plan, discharge planning, patient-specific barriers, and patient readiness for discharge. The study qualified as exempt from full institutional review board review.

During the subsequent phases of the QI initiative, we collaborated with inpatient teams during the hospital-wide implementation of a validated SDOH screening survey. The survey examined 11 specific domains of hospitalized patients, including sociodemographic factors (financial, food, housing insecurities, stress, transportation), behavioral factors (alcohol, tobacco use, physical activity), and other risks (intimate partner violence, social connections, depression)[16,17,35-38] (Appendix, Figures 1 and 2). The inpatient team's case managers provided formal training on the SDOH screening tool to hospital social workers, who then coordinated with patients to complete a 1-time SDOH survey within 24 hours of hospitalization and repeated once every 6 months (Appendix, Figures 1 and 2). Based on the survey results,

Figure 2. Flow Chart for Inpatient Hospital Length of Stay (LOS) for Oncology Demonstrating an Improvement After the Launch of Social Determinants of Health Screen (Plan-Do-Study-Act Do and Study Phase)



Results include rows where Service = "Oncology."
Project Kamaraju_SHD_LOS_2021-05-26.mpx; Worksheet original data: 7/19/2021 11:36:05 AM; D. Atkinson, FH Dept of Process Improvement

Abbreviations: UCL, upper confidence limit; LCL, lower confidence limit.
Significance level of 0.05.

the inpatient case manager team identified patient-specific social risks and barriers across all the SDOH domains and generated appropriate outpatient referrals in collaboration with the inpatient clinicians.

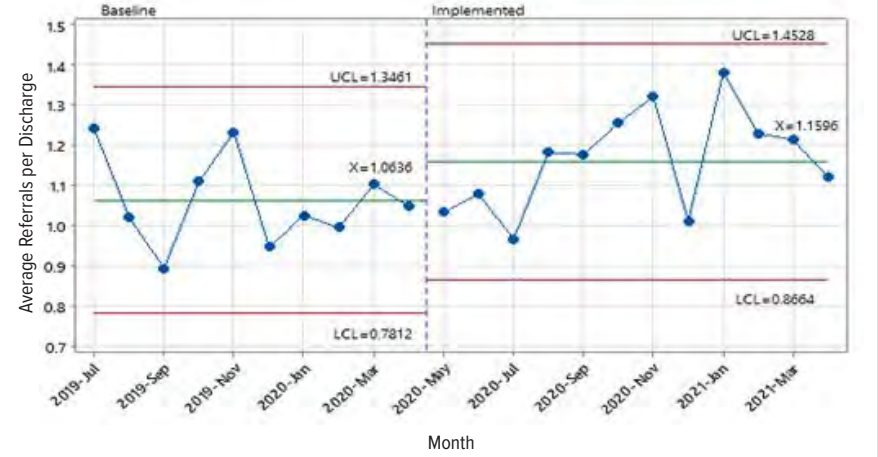
Patients who reported intimate partner violence were given informal and formal debriefing sessions with case managers/social workers and referred to counselors and behavioral health experts when appropriate.[39] For patients with food insecurities, referrals to the local shared food programs (IMPACT 211) were provided.[40] The IMPACT 211 program offers central access for people who need assistance during a crisis, community disaster, or for those regaining stability.[40] We partnered with the Milwaukee Health Care Partnership (MHCP) program for patients needing housing assistance. Established in 2007, this program is a public consortium dedicated to improving health care for low-income and underserved populations in Milwaukee County.[41] MHCP's initiatives serve clients with housing insecurities—either as fee for service or overnight shelter accommodations—and collaborate with Milwaukee Rescue Mission and Repairs of the Breach, a nonprofit organization that provides daytime refuge and resources for homeless adults.[41,42] Other partnerships with community advocates were used for rental assistance.[43] Additional referrals that facilitated a safe discharge included a home health nurse, home physical therapy, dietician, and medication management. Social workers and case managers who assisted during this project were employed and salaried by Froedtert Hospital, and no additional payments were made. Our prospective study cohort included patients 18 years and older with a solid tumor diagnosis hospitalized in oncology wards from May 1, 2020, through April 30, 2021.

We then compared the LOS and referrals data before the implementation of the SDOH survey (October 1, 2019 – April 29, 2020) to the period following implementation (May 1, 2020 – April 30, 2021). Finally, to further evaluate the differences in LOS across non-solid tumor comparators, we examined the LOS separately for bone marrow transplant and general internal medicine wards.

Study Outcomes

The primary and secondary outcomes included the difference in the mean observed hospital LOS and the number of referrals generated, respectively. Mean observed LOS was defined by subtract-

Figure 3. Average Number of Referrals for Inpatient Oncology Patients



Abbreviations: UCL, upper confidence limit; LCL, lower confidence limit.
The number of referrals per oncology discharge—baseline and postlaunch—was evaluated using a 2-sample Poisson test. Referrals increased from baseline by 0.0959977 (9.03%) with a 95% CI (0.0307458–0.161250) and *P* value = 0.004.

ing the date of admission from the date of discharge. The length of stay index (LOSi) is calculated by dividing the observed LOS by the expected LOS values obtained from the Vizient Clinical Data Base.[34]

Statistical Analysis

A monthly Xbar-S Statistical Process Control Chart was used to visualize the LOS for the oncology service during the baseline period and after launching the SDOH tool.

Hypothesis testing using a 2-sample *t* test was performed to compare the mean LOS baseline and post-launch for each comparator service (bone marrow transplant and internal medicine) to identify statistically significant differences. Average referrals per discharge were plotted on a monthly run chart; a 2-sample Poisson test was then used to compare the baseline and post-launch rates. All statistical analysis was performed using Minitab 19.2020 software (Minitab, LLC).

RESULTS

We retrospectively examined 1848 oncology patient records as a needs assessment (Figure 1). The cohort was reflective of a tertiary academic center serving southeastern Wisconsin. The study sample was predominantly White (81.7%), with Black (13.1%), Hispanic (2.3%), and other races (2.8%) comprising the remainder of the sample. Twenty-three percent lived in rural areas. Health insurance types included Medicare (49.2%), Medicaid (6.9%), and commercial insurance (41%). Additionally, 2.9% were uninsured. Oncology patients from the low SES groups had an average LOS of 7.2 days compared to 5.6 days for the high SES group (Figure 1).

We then prospectively examined the effect of the SDOH survey launch on patients' LOS. Figure 2 describes the differences in the LOS before versus after the survey integration. Compared to the baseline LOS, after the launch of the SDOH survey, there was an 8.9% decrease in the inpatient average LOS for oncology patients (8.14 to 7.41 days, $P = 0.004$), with a nonsignificant trend for the comparator groups (6.6% for bone marrow transplant [15.27 days to 14.26, $P = 0.166$] and 7.5% for internal medicine [4.87 to 4.50 to days, $P = 0.131$]) (Figure 2).

After implementation of the SDOH initiative, the average number of referrals per discharge increased from a baseline of 1.063 to 1.159. The mean values increased by 9.0% ($P = 0.004$) (Figure 3). Appropriate discharge referrals included radiation, psychiatry, pharmacy for medication management, wound care, nutrition, physical therapy, and palliative care. Other referrals included home health nurse (19.6%) and durable medical equipment referrals for canes/walkers and other supplies (11%). Health insurance coverage of postdischarge billable referrals depended upon their insurance payer type, and patients were notified of this information in advance; additional resources were provided for those who were denied reimbursements. For patients with transportation barriers, cab vouchers and bus tickets were provided. Social workers provided specific transportation resources and pertinent information for Medicaid participants. Behavioral health concerns related to social networks or depression, smoking, alcohol use, and physical activity were addressed mostly by physicians caring for the patients. Patients who reported intimate partner violence on the SDOH survey and agreed to share their personal stories received a social/safety assessment and a confidential interview by our social workers/case managers. The assessment included safety at home and dependents' welfare. If appropriate and a patient expressed interest, the social workers provided additional resources to file a case with local law enforcement officials.

DISCUSSION

This prospective study shows a small but significant improvement in the LOS for oncology patients after integrating the SDOH survey at hospital admission. To our knowledge, this is the first study that prospectively evaluated the impact of the SDOH on routine inpatient care. At this time, the SDOH screening is integrated and documented permanently on inpatients' EMR, and we plan to expand this tool from hospital-wide to system-wide. The SDOH screen has been an essential first step for our case managers and social workers, enabling them to recognize patient-specific needs and subsequently coordinate local resources.

Although most health care systems collaborate with local community organizations to assist patients with high-risk sociodemographic challenges, referrals are only generated as needed before hospital discharge. However, during this project, the integration of the SDOH survey into the EMR at the time of admission streamlined the approach, assisting some of the most vulnerable patients who otherwise may have had additional delays in addressing barriers to discharge. For example, in Wisconsin, the number of domestic violence cases rose during the pandemic in 2020; based on the SDOH tool results, our social workers promptly generated interventions with appropriate referrals to local violence prevention programs.[37,39,44] Additional resources included collaboration with Sojourner, the largest provider of domestic violence prevention and intervention services in Wisconsin.[44] For patients with housing and food insecurities, partnerships with local organizations in Milwaukee County (MHCP, Community Advocates, Milwaukee Rescue Mission, and IMPACT 211) offered food vouchers, food pantry lists, and food share programs for mothers of young children through the Women, Infants, and Children (WIC) program.[40-43,45] Through state funding mechanisms, MHCP and the Community Advocates programs assisted with rental payments, which was highly helpful in preventing eviction. Even for patients without specific transportation or food/housing barriers, the SDOH survey triggered automated alerts on the EMR for other needs, such as family counseling while adjusting to the new cancer diagnosis and caregiver counseling.

In Wisconsin during the pandemic, widened disparities became more evident and created financial strain on health systems, highlighting the need for multidisciplinary interventions and care-delivery models that address patient-specific needs and barriers based on their SDOH.[34-36] Several health care systems encountered discharge delays due to a limited number of accepting facilities, such as nursing homes and rehabilitation facilities, and workforce shortages in outpatient settings (ie, home health services); at our institution, we also encountered other barriers related to high-risk sociodemographic factors.[20,37-39] And although our study planning started prior to the pandemic, we believe that capturing some of the SDOH needs is becoming even more relevant throughout the pandemic to provide patient-specific care delivery in a multidimensional approach.

While it is well known that LOS is complex and heavily dependent on acute illness and multilevel factors, leading to varied outcomes across different health systems and geographic locations,[12,30,31] a few studies explored SDOH on LOS and readmission rates. In a retrospective analysis of hospital LOS after trauma injury, Brasel et al found that prolonged LOS was associated with multiple factors: Medicaid use, discharge to nursing homes, rehabilitation facilities, and patients' sociodemographic factors.[46] A few investigators explored specific SDOH-related factors, such as SES and neighborhood household income in low-resource settings, and the impact on hospital readmission rates.[31,32] Zhang et al evaluated hospital 30-day readmission rates by incorporating SDOH information. Although the addition of the SDOH score failed to improve the readmission rates among all patients, Medicaid beneficiaries, patients 65 and older, and obese patients saw improvements in hospital readmission rates.[47] Investigators acknowledged that readmission rates depended on socioeconomic determinants in their retrospective studies, but these are not specific to oncology units or based on all the domains of an individual's SDOH.[12,31] Although readmission rates are not reported in this manuscript, based on our ongoing work, we conclude that SDOH-guided coordination also has potential implications for LOS, readmission, and optimal transition plans to outpatient medical follow-up appointments for cancer patients.[33-35]

Our study results are unique. Prospective evaluation of SDOH screening at the time of inpatient admission for oncology patients at a regional medical center in southeastern Wisconsin will lay a strong foundation for personalized and patient-specific care-delivery studies in the near future. While the SDOH survey may not be a tool to address all hospital outcomes, it is beneficial for accomplishing long-term, cost-effective strategies, such as transitioning to the outpatient setting. Additionally, as part of this QI initiative, our inpatient clinicians and case managers have been able to set up a protocol for home health and other skilled services in the outpatient setting during the pandemic, in keeping with COVID-19 guidelines and the facilities' policies. Finally, our social workers collaborated with multiple local organizations based on patients' sociodemographic needs as reported on the SDOH survey.

Most of our inpatient social workers and case managers received training to implement the SDOH tool, which is time-consuming (approximately 30 minutes per patient), suggesting the need for additional resources, including staffing and novel health care technologies. While we acknowledge the limitations of this being a single-institution study with a 1-year follow-up, the integration of the SDOH survey was timely in addressing health inequities during the pandemic. Further, a 1-time evaluation of the SDOH survey may have its limitations among populations with transient living situations, such as migrant workers or those with relocations due to changes in employment and or health care insurance coverage. The reasons for the overall increase in the outpatient referral patterns, including routine referrals (ie, radiation, medical, psychiatry), are unclear; however, we believe they are intended to encourage outpatient care during the pandemic and avoid extended LOS for patients ready for discharge and willing to follow up on an outpatient basis. Although beyond the scope of this study, we plan to evaluate the hospital readmission rates, emergency department use, health-related quality of life surveys, changes in the outpatient referral

patterns after the intervention, and feedback from patients and our case manager team. Ultimately, if successful in saving clinicians' time and cost-effectiveness, we anticipate the sustainability of the SDOH survey.

CONCLUSIONS

This study explored hospital LOS for oncology patients and the effect of integrating a SDOH survey on hospital discharge. Implementation of the SDOH survey at hospital admission demonstrated a small but significant improvement in LOS and generated appropriate referrals. Health care systems may benefit from developing SDOH-guided care-delivery models and, ultimately, improve patient care. Such efforts increase the efficiency of health care service delivery in response to public health threats, such as the COVID-19 pandemic.

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Appendix: Available at wmjonline.org.

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Difficult Questions With Many Gray Areas: Nuanced Abortion Attitudes Among Physicians

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ABSTRACT

Introduction: Abortion is a polarizing social and medical issue, even among physicians. Though the public may expect physicians to hold purely scientific attitudes about abortion, their attitudes and behaviors are just as strongly informed by social and political factors as the public's. In a recent survey study of physicians at an academic medical center about their abortion attitudes, most reported strong support for abortion access. However, more were unwilling to consult in abortion-related cases, and many perceived little or no professional connection to abortion and were reticent to publicly advocate for their position.

Methods: In order to investigate the nuances in physicians' abortion attitudes, we analyzed the open-ended, qualitative responses provided by physicians at the end of a quantitative survey using modified concept mapping procedures and theme generation.

Results: Two hundred twenty-two open-ended responses resulted in 487 data units. We categorized respondents' comments into 2 main groups: attempts to depersonalize or distance oneself from abortion and expressions of nuance or ambivalence about abortion. Ambivalence and nuance in abortion attitudes centered around multiple factors that varied from individual to structural.

Conclusions: Our findings support previous literature suggesting that physicians' abortion attitudes are not binary and add that nuanced attitudes may be perceived as unwelcome. Acknowledging ambivalence and addressing physicians' tendency to depersonalize abortion could result in more honest, open, and nuanced discourse and contribute to addressing structural issues that result in poor health outcomes, achieving broader reproductive justice goals and greater access to abortion services.

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INTRODUCTION

Abortion is a polarizing social and political issue; thus, individual attitudes about abortion are often perceived to be binary (ie, pro-choice or pro-life).[1–3] Although some survey research has captured only the "central tendency" of individuals' abortion attitudes,[4] other studies have observed significant ambivalence about abortion.[5] Those who identify as pro-life tend to experience ambivalence in contexts of "traumatic abortion" (ie, abortions sought due to rape, fetal anomalies, or threats to maternal health), and pro-choice individuals experience more ambivalence in contexts of "elective abortion" (ie, abortions stemming from unintended pregnancies).[6]

Due to their medical training, physicians might be expected to hold more unambiguous, "scientific" abortion attitudes compared to the public. However, physicians and other health care providers have nuanced or inconsistent attitudes about abortion.[1] While some physicians may experience true ambivalence, or the simultaneous "presence of opposing considerations,"[7] other "respondents who are well-educated and well-informed about policy questions might be able to provide the arguments of both partisans, while adhering more strongly to one, or to neither."[6] False dichotomies between pro- and anti-abortion attitudes ignore clinicians with complex abortion attitudes, including those who generally oppose abortion but find it acceptable in specific cases, those who generally support abortion but find it unacceptable in certain contexts, and those who are willing to help patients access

abortion care even in contexts that they personally find morally objectionable.[1,8,9]

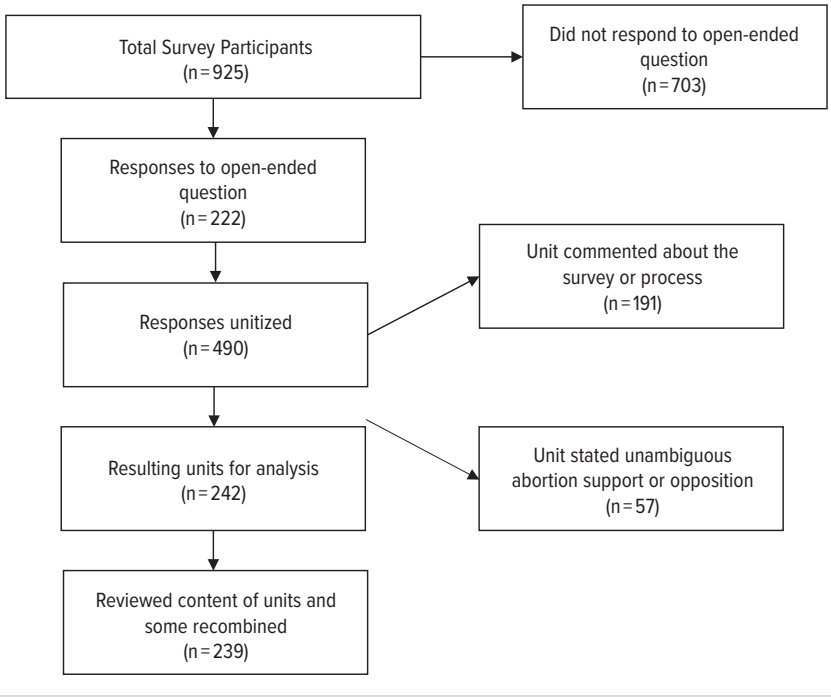
Physicians' attitudes have consequences for abortion access, especially when they translate to willingness to participate in abortion-related care. Clinicians must balance their (potentially conflicting) personal and professional attitudes[10] against empathy for patients, patient safety and autonomy, fiduciary or professional responsibilities, religious or moral orientation, and desire to respect the beliefs of colleagues.[8,11]

Medical specialty may be related to abortion attitudes, though the relationship is likely a two-way street. In one study, pediatric and obstetric specialists asserted that their primary responsibilities were to fetuses and to pregnant patients, respectively—a relationship that might be explained by a priori alignment of their values and professional pursuits.[12] Many abortion providers describe their work as politically and socially important.[13] They also have described both general and contextual ambivalence about abortion, including about when life begins,[14] when a fetus is "viable,"[14] the balance between professional responsibility and conscientious objection,[2] and funding for abortion services.[15,16] For some physicians, attitudes about abortion or willingness to participate in abortion-related care fluctuates with their own life circumstances (eg, if they are currently pregnant or have recently had a miscarriage or stillbirth).[11]

Many physicians still experience shame and stigma about abortion work due to restrictive laws, policies, and workplace cultures.[13,17] Stigma and restrictions place limits on physicians who might otherwise be willing and able to provide abortions[13,18,19] and prevent abortion from being integrated into full-spectrum obstetrics and gynecology and primary care settings.[20]

Not all physicians have the skills and expertise to directly participate in abortion care. However, many have opportunities to provide abortion-related counseling, referrals, or consultations, and their abortion attitudes can, therefore, affect access to abortion services.[21] In a recent survey regarding physicians' abortion attitudes, strong majorities supported abortion access and their colleagues who provide abortion services. However, relatively fewer physicians reported participation (or willingness to participate) in any aspect of abortion-related care or consultation.[22] To further investigate nuances in physician abortion attitudes that are often obscured in survey research, we analyzed open-ended responses provided by physicians at the end of a primarily quantitative survey.

Figure 1. Flowchart of Data Collection and Unitizing Processes



METHODS

The parent study consisted of a 45-item survey gauging physicians' knowledge, attitudes, and practices regarding abortion. Investigators recruited all currently practicing physician faculty members at a large academic medical center in Wisconsin. Quantitative findings were reported previously.[22]

The institution's survey research center disseminated the survey via web and mail.[23] All 1357 practicing physician faculty members received individualized introductory letters containing $5 cash incentives and unique study URL/passcode combinations. Nonresponders received a series of email reminders. A paper questionnaire was mailed to nonresponders after 6 weeks. We fielded the survey from January to April 2019. The Institutional Review Board deemed this study exempt from full review.

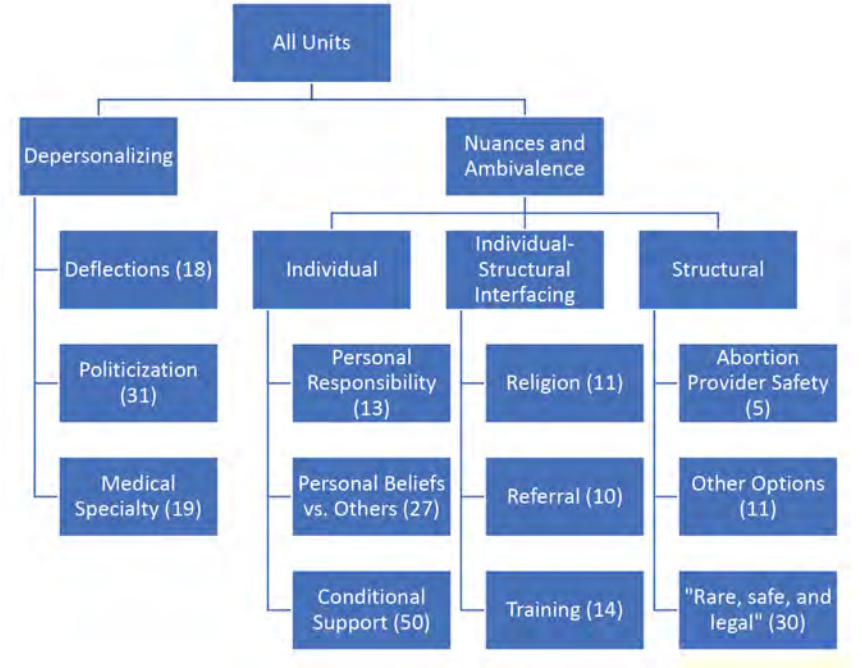
Of note, these data were collected significantly before the US Supreme Court decision to overturn *Roe vs Wade*,[24] which had upheld a constitutional right to abortion for several decades. Most survey questions were closed-ended.

The final survey item was an open-ended text entry box preceded by the prompt, "If you have any other comments or feedback about this survey, please share it below." Qualitative responses, which ranged in length from a few words to several sentences, are described in this report.

Data Analysis

Three researchers conducted thematic content analyses of the open-ended responses inspired by Jackson and Trochim's approach to quasi-qualitative data.[25] First, they independently

Figure 2. The 12 Resulting Unit Groups (and the Number of Units in Each Group), Reflecting 2 Major Themes: Depersonalizing the Issue of Abortion and Expressing Nuances or Ambivalence



divided qualitative responses into conceptual units (single-concept phrases). Next, they worked together to separate units into 2 umbrella categories: (1) comments about the survey itself (eg, technical issues or methodological suggestions); and (2) substantive comments about abortion and related topics. Only units in the second umbrella category were analyzed. All 3 analysts independently sorted units into conceptually consistent groups, without overlap. Through an iterative process, the researchers discussed re-sorted units until they reached 100% agreement about groupings. The team then discussed the relationships between unit groups and noted emergent themes across unit groups.

RESULTS

We sent the survey to 1357 physicians and 913 (67%) responded. Of those, 222 entered an open-ended response (24%), resulting in a total of 487 data units. Open-ended responses that related directly to the survey or process (191 units), such as "thank you for doing this survey" or "I detected bias in this survey," or stated unambiguous support or opposition to abortion (57 units), such as "please don't allow abortion" and "I do support abortion and abortion care," were excluded from further analysis. The remaining 239 units were sorted (Figure 1).

Twelve unit groups emerged from the qualitative analysis, reflecting 2 major themes: (1) depersonalization of or distancing oneself from abortion and (2) expressions of nuance and/or ambivalence. Expressions of nuance or ambivalence were further grouped into 3 levels: individual, structural, and individual-structural interfacing. Figure 2 displays unit group categories, and the Table summarizes each group and provides examples of units within each.

Depersonalizing Abortion

Three unit groups comprised the theme of depersonalizing abortion. The units in these groups reflect some respondents' indifference toward the abortion debate or resistance to stating a clear-cut opinion. In the "deflections" group, some asserted that abortion was not relevant or of interest to them (eg, "I personally do not have an interest in the area of abortion."). Relatedly, units in the "medical specialty" group conveyed the idea that certain specialists are exempt from abortion-related care and, therefore, abortion-related opinions.

A third group, "abortion is political," functioned to depersonalize abortion by designating it as a political topic separate from medicine and science. These units commented on the politicization of abortion without expressing the participants' own views (eg, "the polarization around abortion makes it nearly impossible to discuss."). One respondent wrote, "I trust this is medical and not political research," implying that any abortion research is politically motivated.

Nuance and Ambivalence in Abortion Attitudes

In the 9 remaining unit groups, respondents expressed ambivalence about abortion, expressing that they could see "both sides" of a particular debate, or shared specific nuances and complexity in their opinions. These nuances spanned from very individual to very structural in scope.

Individual

Three unit groups represented ambivalence or nuances that were characterized in individualistic or personal terms. The "personal responsibility" group included units that expressed 2 divergent views on the concept of personal responsibility as it relates to abortion. Some asserted that people seeking abortions are taking personal responsibility for their lives (eg, "Most patients I have interacted with consider having an abortion very carefully."). Contrarily, other units implied that abortion results from a lack of personal responsibility (eg, "This is a problem that is much greater than abortion in America, which is TAKING RESPONSIBILITY [sic] for your own actions.").

A group of units labeled "personal beliefs versus the needs of others" conveyed how respondents managed gaps between personal beliefs and professional behavior. These units reflected an awareness that respondents' own beliefs or moral codes were not necessarily shared by others and a desire to avoid imposing them

Table. Each of the 12 Unit Groups, Themes Within Each Group, and Exemplars of Units in Each Group

Unit Group	Themes	Exemplars
DEPERSONALIZING		
Deflections/lack of interest/relevance	Abortion is not relevant to the participant's life or interests.	"I haven't stopped to think about [abortion] in so long." "I personally do not have an interest in the area of abortion."
	Most people don't want to think or talk about abortion.	"This kind of work is treated as a black box in medicine and society."
Medical specialty	Abortion is not relevant to the participant's specialty or expertise.	"I do not engage in such care in my role as a behavioral health provider." "I could not answer many questions because a pathologist does not deal with the issue."
	Abortion is particularly relevant to primary care specialties.	"The issue of abortion and pregnancy outcomes is a constant presence in primary care practices."
	Abortion should be isolated from other health care.	"I propose that an abortionist be restricted in practice merely to provide abortion care."
Abortion is political	Pessimism about the potential to discuss abortion productively because it has been so politicized.	"The polarization around abortion makes it nearly impossible to discuss." "This is such a polarizing issue I do not think a consensus can be built." "I trust this is medical and not political research."
	Abortion politics have undermined physicians' medical expertise.	"I think that the intrusion of legislators into health care decisions is a travesty. It is that mindset that does not make me like being a physician in this state, and I have on occasion considered leaving, though not just on this issue." "I am more worried about the political thinking of physicians interfering with appropriate care than politicians." "I am shocked that this has become such a political problem and has not remained a physician-patient problem."
	Participants question whether a publicly funded health care system should engage in abortion care.	"Offering abortion services in a public university supported by taxpayers is too controversial and violates the conscience of many taxpayers." "While many people [in urban areas] probably support your efforts, we have to remember that a large and vocal majority of conservative people also live throughout the state, are taxpayers, and use [health care] services."
	Participants mention concerns about specific policies.	"I think overturning Roe vs Wade would overstep the boundaries of government and remove free will from the patient." "I think that health care for women has suffered and I fear that it will continue to get worse if there continues to be restrictive changes to the laws."
NUANCES AND AMBIVALENCE		
Personal responsibility	People seeking abortions typically have carefully considered their options and are taking responsibility for their lives.	"Most patients I have interacted with consider having an abortion very carefully." "No woman I have ever provided anesthesia for who received an abortion ever made this choice frivolously."
	People who are against abortion assume that patients have failed to take personal responsibility.	"It is apparent that the 'right to life' anti-abortion forces have a very distorted view of why women have abortions… No one in the 'pro-abortion' camp thinks abortion is a good form of birth control."
	Needing or having an abortion represents a lack of personal responsibility.	"This is a problem that is much greater than abortion in America, which is TAKING RESPONSIBILITY [sic] for your own actions." "A woman should absolutely have control and say over her body… This does include who and what precautions she takes or has the male partner take to prevent pregnancy."
Personal beliefs vs needs of others	A provider's religious or political beliefs should not dictate whether a patient has access to abortion care.	"I personally have strong beliefs against abortion but also feel that it is my job as a physician to provide patients medical facts and options and not impose my personal views on them and their decisions. So I hope the survey reflects this dichotomy in my personal beliefs and how I would act towards patients." "Though I might pray that individuals choose against abortion except in the most medically serious circumstances, I know this is a decision I should not make for the patient. It is a decision she must make for herself. And shame on me if I were ever to judge someone for such a choice."
	Participants were against abortion for themselves but would not restrict options for others.	"I would personally struggle if I had to undergo an abortion, but also do not feel that any woman should be forced to proceed with a pregnancy against her wishes." "I am pro-life, I have been offered an abortion and declined… but politically + professionally I am pro-choice. A woman should be informed and allowed to choose."
	There may be professional consequences for particular personal beliefs.	"It is very difficult to be a faculty member in this department with any degree of opposition toward termination, and those individuals are silenced and devalued by the leadership."
Conditional support	Abortion is only a morally acceptable choice in cases of threat to maternal life, fetal anomalies incompatible with life, or when the pregnancy is the result of rape or incest.	"I acknowledge that abortion is unequivocally necessary and morally justifiable in cases of rape." "In the tragic cases of rape and incest and for the question of saving the life of the mother, my degree of moral objection is much less than in other cases, and the particular instances would require the utmost of care and sensitivity for the people suffering in this abominable way, and, based on particulars of the case, may even be 'morally ambiguous'." "The questions that lumped together 'rape, incest, and life-threatening conditions' were difficult to answer as I personally believe that conditions that threaten the life of the mother should be its only category based on the ethical beliefs around beneficence."

continued on page 216

Table. Each of the 12 Unit Groups, Themes Within Each Group, and Exemplars of Units in Each Group *(continued from page 215)*

Unit Group	Themes	Exemplars
Conditional support *continued*	"Late-term" or third trimester abortions are less or not at all morally acceptable.	"The only restriction I would support is eliminating late abortions." "My only headscratcher is what to think about third trimester abortions or, more specifically, when the fetus can almost certainly survive outside the womb. For example, is 1 day before the due date OK? 4 weeks before? Should this change with technological advances in preemie care?... I also have no answer to it if the scientific line between fetus and infant is legitimately difficult to define." "It would have been nice to comment how late-term abortions can be classified as morally repugnant." "If she has become pregnant and decides very late in the pregnancy, at the point of fetal viability, that she does not want the child, it is not morally acceptable for her to arbitrarily choose to have the pregnancy aborted, which is taking a life."
INDIVIDUAL-STRUCTURAL INTERFACING		
Religion	A provider's religious beliefs should not dictate whether a patient has access to abortion care.	"I tried to differentiate between my moral views on abortion vs. my professional duties. As a Catholic I'm strongly opposed to abortion. As a medical provider, I feel that the patient should be aware of all options available to her, including abortion, and the provider should not seek to sway the patient based on the provider's moral stance." "Religion should not be allowed to dictate the care of someone who does not participate in that religion; this is a form of religious persecution."
Medical referrals	Providers who do not do abortion-related work would help a patient find an abortion provider.	"If I had a patient who asked me for help finding her a resource to get [an abortion], I would ask no other questions and I would find one for her." "I would not provide a formal referral for abortion but would inform a patient that abortion is an option they could consider if it is permissible within their moral framework and would suggest other options for obtaining a referral to discuss abortive options."
	Participants do not know where to refer patients who might need abortion services.	"I wouldn't even know where to refer a patient besides sending to Planned Parenthood." "It would be very helpful to get resources to primary care providers about who to call to refer for an abortion; I used to know the number during residency but not now, 20 years later."
Medical training	Participants had concerns about the inadequacy of abortion-related training and the resulting impact on provider competency, patient access, and abortion safety.	"My medical school and residency program were not allowed to provide formal training of any kind." "I think it is difficult for residents to get enough training in this procedure, which is the only reason I would doubt a physician's skills in performing it."
	Participants were interested in pursuing and/or supporting abortion-related training.	"[I] would like to know how I can better support the training of abortion providers and the provision of safe, appropriate abortion services in the [health system] and [local] community."
STRUCTURAL		
Other options counseling	Patients should receive counseling for options other than abortion.	"The resources available to a pregnant patient through external organizations or the option for adoption even with serious abnormalities were never presented to patients struggling with difficult decisions." "I would support all other reproductive services, social supports, and good adoption service referrals if she chose not to parent the child." "I struggle to find the right thing to do to help women who seek abortion, for whatever reason they state, and I wish abortion was not needed in this world. But, I do understand the circumstances in which women do seek abortion, and I wish we had other alternatives so that abortion was not needed and women's needs were met, all at the same time."
Concerns about abortion provider safety	Abortion providers are subject to harassment and violence, which presents a major problem for the workforce.	"I would say that one of the major reasons more medical professionals do not participate in abortion services is the fear of harassment or violence against them and their family." "For me, the biggest problem with abortion care is the question of personal safety... There are a lot of extreme anti-abortion groups in [our state], and safety is a huge issue for anyone working in the field." "Support of safe practice/safety for practitioners and patients is one of the top legislative issues."
Rare, safe, and legal	Abortion is not desirable but should remain available when absolutely necessary.	"I think we should do everything we can to make abortion less necessary... An abortion can be seen, to some extent, as some failure in our system to provide choice and care. Despite these misgivings, if a woman becomes pregnant with a child she does not want for any reason, she should have full choice about her options." "I am pro-choice which does not mean I am pro-abortion (who really ever wants that) but my pro-choice trumps all." "I support safe and legal ACCESS [sic] to abortion much more than I support or like the procedure itself."
	Comprehensive pregnancy prevention programs and services should be offered to limit the need for abortions.	"A principle that would work... would explicitly focus on reducing the number of abortions by policy (eg, prevention of teenage pregnancy) while preserving the right to have an abortion." "The anti-abortion lobby contributes to the number of abortions by opposing sex education, which includes birth control and access [to] contraceptives."
	Making abortion illegal would place patients in danger.	"Politicians who dare to think about overturning Roe & Wade [sic] should think first about the consequences of their decision, because abortions will still happen illegally in that case and have much more devastating consequences. They should learn from the experiences of other countries around the world, which have been forced into such ban!" "Women should have the right... to not be subjected to more likely medical complications and death by restricting a procedure that is not without risks but far safer than if it were done illicitly."

on patients (eg, "I personally have strong beliefs against abortion but also feel that it is my job as a physician to provide patients medical facts and options and not impose my personal views on them and their decisions."). This tension sometimes extended to physicians' feelings about coworkers, as described by one respondent:

> I wanted to provide additional explanation regarding how I answered one of the earlier questions concerning abortion providers' 'conscience.' I answered that abortion providers are attentive to their conscience 'less' than other providers. This response was based on a perspective that I hold—namely one that believes that universal abortion care is in conflict with good conscience. However, I also recognize that many health care professionals that provide or participate in the provision of abortion care believe (deep within their conscience) that this form of health care provision is morally right and, as such, their provision of abortion is consistent with THEIR worldview, and, as such, they are attentive to their conscience as much, if not more, than other physicians.

Many participants articulated circumstances in which they found abortion to be morally acceptable or unacceptable. The "conditional support" group encompassed ideas about abortion being acceptable only early in pregnancy or in cases of threat to maternal life, fetal anomalies incompatible with life, or rape. One respondent admitted that they "have no answer" to the complicated question of gestational limits.

Individual-Structural Interfacing

Three unit groups reflected nuances related to individuals' interactions with a larger social system. The "religion" group largely consisted of units expressing the idea that one's religious beliefs should not dictate whether abortion is offered or available to patients. Some units in this group specifically rejected the abortion-related teachings of respondents' religious institutions.

Two other unit groups reflected clinicians' interactions with health care systems. A group called "medical referrals" contained units that expressed clinicians' willingness to help patients access abortion through referral, ranging from proactively connecting patients with abortion providers to simply acknowledging that abortion is a legal option. This group also included units expressing that respondents did not know where to refer patients for abortion services. Finally, the "medical training" group reflected participant concerns about inadequate abortion training and resulting effects on clinician competency, and participants' interest in or support for abortion-related training.

Structural

Finally, 3 unit groups reflected ambivalence or nuanced views about structural issues related to abortion. The "other options counseling" group contained opinions that patients should receive high-quality or thorough counseling about alternatives to abortion if they do not want to parent a child. Some of these units implied that alternative options should be offered in place of abortion access, while others suggested that a range of options be discussed alongside abortion counseling.

The "concerns about abortion provider safety" group addressed how abortion providers can be subject to harassment and violence from anti-abortion activists. These units characterized the fear (or reality) of this violence as a structural reason why health care providers may choose not to participate in abortion care.

Finally, a large group of units expressed the point of view that abortion should be "safe, legal, and rare," implying that abortion is undesirable but the public health consequences of restrictive policies are worse. Units in this group mentioned respondents' specific ideas about how to make abortion rare (eg, comprehensive sex education and contraceptive access) and expressed how illegally obtained abortions would be both inevitable and dangerous.

DISCUSSION

Our findings support previous literature suggesting that physicians have nuanced abortion attitudes and extend those observations to specialties outside of reproductive health care. Nearly a quarter of our sample responded to an optional free-response question at the end of a lengthy survey, expressing ideas that may have been missed or misrepresented by closed-ended survey questions. Many stated that their nuanced, specific, and contextual abortion attitudes had been silenced in their professional lives.

Some physicians also expressed detachment or indifference regarding abortion. This often took the form of deflection, with participants characterizing themselves as removed from the abortion debate either by personal lack of interest or because they practice a specialty not routinely involved in abortion care. Detachment also emerged in the form of vague comments that abortion is a "complicated," "difficult," or "political" subject.

A common type of ambivalence was reflected in the framing that abortion should be "rare, safe, and legal." This sentiment conveys that clinicians may value certain abortion outcomes (eg, bodily autonomy, saving maternal lives, or preventing inevitable infant suffering and death), but disdain other aspects of abortion (eg, ending what the respondent defines as a human life or introducing significant risk). Seeing abortion as a "necessary evil"—harm that is justified in the pursuit of a broader social good—is antithetical to the "pro-choice" versus "pro-life" dichotomy and may be morally distressing to some physicians.[26]

Our findings also suggest that influences on physicians' abortion attitudes are similar to those affecting the general public, including political affiliations, religious beliefs, and personal experiences with pregnancy, childbearing, and infertility. The idea that physicians' abortion attitudes may stem from factors outside of medical and scientific data may be of concern; however, our findings suggest that many physicians aim to separate their personal attitudes from their medical practices.

Notably, some physicians in our sample reported hesitance to provide abortions due to threats to their own safety, rather than moral ambiguity. While physician voices of support could be instrumental in increasing abortion access at multiple levels,[18] it may be unreasonable to expect all abortion providers—regardless of their enthusiasm—to speak openly about their work, given the safety issues involved in doing so.[17] Our study further indicates that fears about safety among abortion providers and advocates meaningfully impact the medical discourse around it.

Limitations

Several limitations of this study should be considered. First, free-response opportunities allow survey participants to elaborate upon quantitative responses or provide context beyond the questionnaire, but they do not allow researchers to follow up. Thus, the data analyzed here lack some of the detail that traditional qualitative methods generate. Nonetheless, in many cases, these data describe not only what physicians think about abortion but how they think about it. Alongside the quantitative results,[18,22] these findings can help future researchers examine the attitudes of the substantial proportion of physicians who do not place themselves on the extreme ends of the "pro-life" versus "pro-choice" spectrum.

We also cannot determine the extent to which the 67% of physicians who responded to the larger survey represent the entire population. If response bias occurred, we cannot know whether responders tended to be those with special interest in the topic, enthusiastic supporters, or vehement opposers. Regardless, we did not aim to develop a generalizable measure of physician attitudes, but rather to understand the nuances in abortion attitudes expressed by a group of people empowered to facilitate or deny access to abortion.

Implications

New approaches to abortion discourse with physicians may contribute to broader efforts to work towards reproductive justice. Reproductive justice is a set of principles that affirm "the human right to maintain personal bodily autonomy, have children, not have children, and parent the children we have in safe and sustainable communities."[27,28] Reproductive justice takes a broader view than the reproductive rights framing, incorporating access to abortion as one—but not the only—critical issue. Resisting the pervasive "for or against" framing, we may generate broader consensus around the shared values of autonomy over reproduction and healthy family-making. Encouraging or allowing more nuanced conversations about abortion within and outside of public health spheres might feasibly result in greater access to abortion by inviting physicians to enact the nuances of their consciences. For some people, this might mean declining to participate in a few abortion cases or actively referring those cases to physicians who do not have the same moral objections they do. For others, it might mean that, occasionally, they will feel that abortion is justifiable and help facilitate it.

Unfettering the conversation in this way could engage a broader spectrum of reproductive justice allies and address structural issues that result in what are perceived as only bad options. For example, this framing might invite physicians who think about abortion as a "necessary evil" to contribute to the reproductive justice-oriented goals of effective sex education, universally accessible contraception, policy supports for parents and families, and expanded health coverage. This shift could also reframe the concept of "conscientious objection" as the only option for managing gaps between clinicians' personal moral frameworks and patients' needs for abortions. "Conscientious provision" posits abortion provision (and not just objection) as an act of conscience and centers clinicians' obligations to meet patients' needs and offer all available medical options.[2,29]

This shift in messaging about abortion also may combat the assertion that many of our respondents made: that certain medical specialties have "nothing to do" with abortion. This is especially significant for specialists in fields like psychiatry, pathology, pediatrics, and anesthesiology, who are likely to encounter a patient or clinical situation involving abortion. Some specialty providers may represent some patients' main access point to health care.

Implications for Practice

Our study highlights the need for intervention to destigmatize abortion, particularly among those who feel ambivalent or exempt from an opinion, because these attitudes ultimately may lead to decreased or delayed access and quality of care. Given that risk of abortion-related morbidity and mortality increases with gestational age,[30] reducing delays in abortion access protects the health of pregnant people.

"Values clarification" exercises have been shown to decrease abortion stigma among health care providers.[31] Participants reflect on their abortion attitudes, how those attitudes align or conflict with their values, and how they might be influenced by broader sociocultural forces. Through this process, participants arrive at more nuanced opinions about abortion care and intentions to support abortion care increase, especially among those with the most negative baseline attitudes.[32] Fostering communication about abortion among clinicians, administrators, and key stakeholders may lead to improved access to care, clinical outcomes, and patient satisfaction.

Future Research

Our data suggest that dichotomous abortion discourse is dissatisfying to physicians. Future research might test messaging or communication strategies to create a more justice-oriented climate around abortion in health care settings and to reduce hostility and mistrust between clinicians who have different views.

Finally, it remains unclear how much clinicians' attitudes and opinions about abortion (among both general supporters and general opposers of abortion) results in abortion-related stigma felt by patients. Studies that focus on patient experiences with clinicians who hold various attitudes toward abortion would help identify priority areas for intervention to reduce stigma experienced by patients seeking abortion or with a history of abortion.

ENDNOTE

The data and analysis reported here were completed before the 2022 *Dobbs v Jackson Women's Health Organization* Supreme Court decision,[33] which overturned the court's previous ruling in *Roe v Wade*.[24] This decision has created a new legal and political context surrounding abortion in Wisconsin and beyond. Thus, more research should be conducted regarding physicians' attitudes and behaviors related to abortion in this new context.

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Interdisciplinary Deprescribing of Aspirin Through Prescriber Education and Provision of Patient-Specific Recommendations

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ABSTRACT

Background: Inappropriate aspirin use can lead to increased frequency of bleeding events and poor patient outcomes.

Objectives: Compare current aspirin prescribing to guideline recommendations and analyze the impact of pharmacist education for clinicians with provision of patient-specific recommendations.

Methods: Internal medicine residents received 1 educational session on appropriate aspirin use. Over a 5-month period post-education, 100 patients on aspirin with a clinic appointment were screened and their charts reviewed. Aspirin use was classified based on guideline recommendations as follows: (1) recommended, (2) weigh the risk and benefits, (3) not recommended, (4) dose change recommended, or (5) outside of guideline recommendation. A recommendation for aspirin deprescribing was then communicated to the clinician prior to the patient's appointment. Prescriber practice following the appointment was collected and analyzed.

Results: Inappropriate aspirin use occurred in 29% (n = 29) of patients prior to their appointment. Of these, aspirin was not recommended in 65.5% (n = 19), and a dose reduction from 325 mg to 81 mg was recommended in 34.5% (n = 10). Of the 81 patients who kept their appointment, pharmacist recommendations to deprescribe aspirin were communicated to the clincian for 20 patients (24.7%) and resulted in a 55% aspirin deprescription.

Conclusions: The majority of patients identified as using aspirin inappropriately fell into 3 groups: (1) patients taking 325 mg aspirin, (2) patients taking aspirin for primary prevention, and (3) patients taking aspirin concomitantly with an anticoagulant. Strategies that may lead to optimization of aspirin use include lectures and patient-specific chart reviews with pharmacist recommendation.

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BACKGROUND

Aspirin is used chronically for numerous indications, including primary prevention of atherosclerotic cardiovascular disease (ASCVD), secondary prevention of ASCVD, and prevention of stent thrombosis after percutaneous coronary intervention (PCI), among many others.[1,2] However, there are a significant number of patients taking aspirin when it is not appropriate or at a dose higher than recommended.[2,3] This can increase the risk of serious adverse events.[4] A meta-analysis by Zheng and Roddick found the number needed to harm in primary prevention was 210 for major bleed, 927 for intracranial hemorrhage, and 334 for major gastrointestinal (GI) bleed when compared to no aspirin.[1] In an evaluation of aspirin prescribing trends, Hira and colleagues reported an 11.6% rate of inappropriate aspirin prescribing in primary prevention.[3] Similarly, analysis of aspirin use in patients on a warfarin regimen revealed inappropriate aspirin use rates ranging from 20% to 37.5%.[2,5]

Inappropriate aspirin dosage is also of concern. The most common dose of aspirin is 81 mg daily and the second most common is 325 mg.[6] However, aspirin at a 325 mg daily dose is associated with an increased risk for GI bleeding when compared to a daily dose of 81mg.[6] For many indications, 81 mg of aspirin daily has been found to be as effective as 325 mg daily and is the recommended dose when compared to 325 mg daily.[6-20] The majority of guideline recommendations pertaining to aspirin use recommend a dose range that includes 81 mg daily and excludes 325 mg daily.[7,12-17]

In 2019, the American College of Cardiology (ACC)/American Heart Association (AHA) updated their guideline on aspirin use in primary prevention. The guideline does not recommend aspirin for patients with high risk for bleeding or for patients age 70 and older.[7] This change in recommendations has created an opportunity to improve aspirin use and enhance patient outcomes.

Preliminary efforts to optimize aspirin use have produced promising results. Deprescribing was found to improve patient mortality in a large meta-analysis of randomized studies.[8] However, mortality was reduced only when the interventions were patient-specific, highlighting the need for patient-specific recommendations when deprescribing. To enhance patient care and reduce inappropriate aspirin prescribing, we developed and implemented a targeted educational program and provided patient-specific recommendations for aspirin use to clinicians in a rural health care system.

METHODS

This interdisciplinary quality improvement program was designed to reduce the rate of inappropriate aspirin use among patients. Our primary objectives were to compare clinicians' current aspirin prescribing practices to guideline recommendations and evaluate the impact of a pharmacist-led intervention on inappropriate aspirin prescribing by clinicians. The Marshfield Clinic Health System Institutional Review Board (IRB) deemed this project exempt from IRB review.

Prescriber Education

An educational program consisting of a lecture, dissemination of educational materials, and pharmacist-provided, patient-specific recommendations for appropriate aspirin use was developed for clinicians based on the most recent guidelines for each aspirin indication (Box). The lecture provided a summary of aspirin prescribing recommendations based on current guidelines and was presented to all available internal medicine residents (clinicians). Corresponding educational materials were disseminated prior to provision of patient-specific aspirin prescribing recommendations. A summary of the method and timing of communications clinicians would receive from pharmacists also was included with the educational materials. During the program, clinicians were asked to give feedback via email, verbally, and through anonymously answered questions.

Implementation of Patient-Specific Recommendations for Aspirin Use

Patients were included for program evaluation purposes if they were taking aspirin and had an appointment in the internal medicine resident clinic during the project implementation period from February 2020 through June 2020. The appointment had to be scheduled at least 3 days in advance to provide time for pharmacists to conduct a chart review and communicate their recommendations to the clinician.

Box. Guidelines Used to Determine Appropriateness of Aspirin

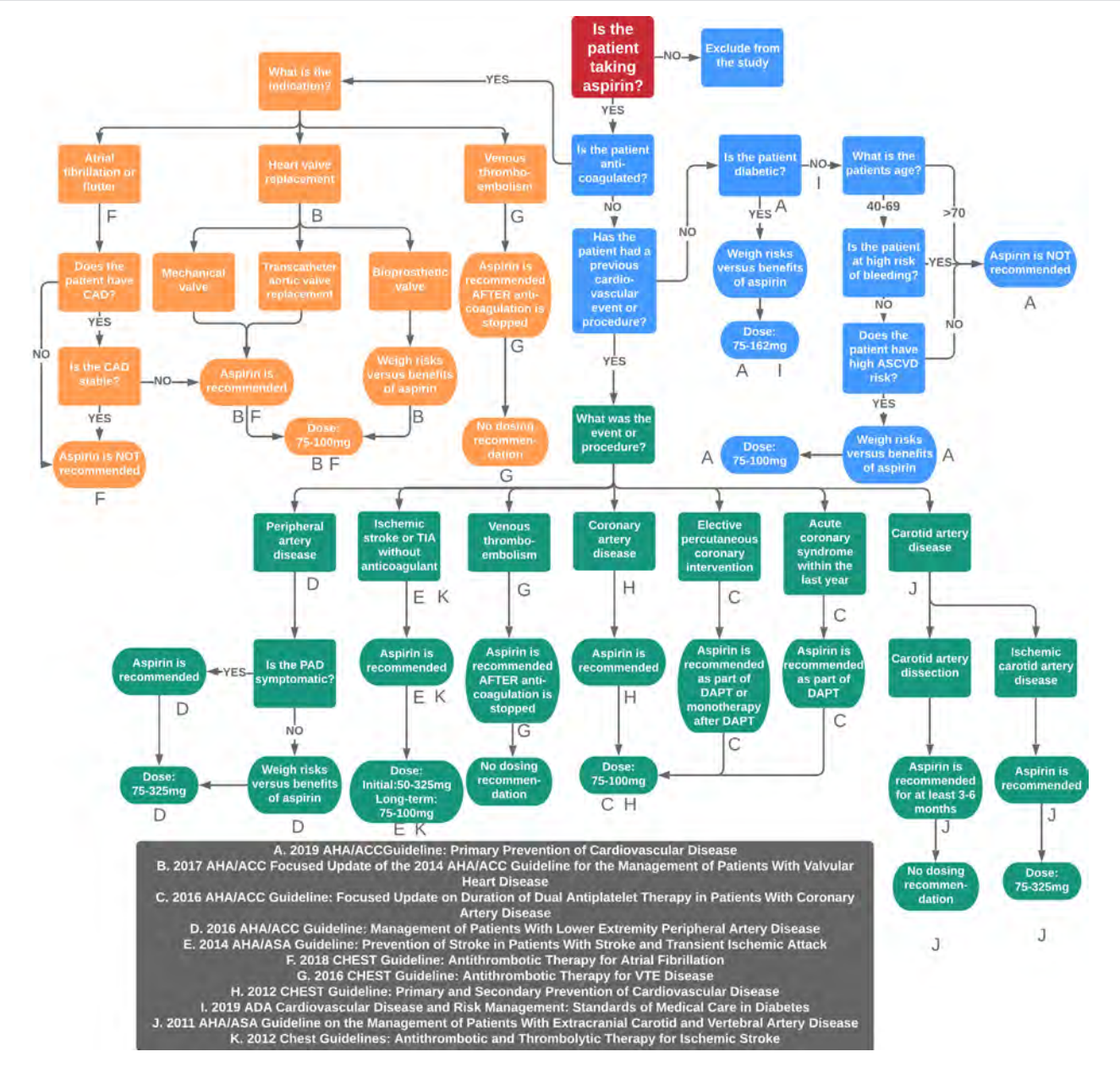
- 2019 AHA/ACC Guideline on the Primary Prevention of Cardiovascular Disease[7]
- 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease[12]
- 2016 AHA/ACC Guideline: Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease[13]
- 2016 AHA/ACC Guideline on the Management of Patients with Lower Extremity Peripheral Artery Disease[18]
- 2014 AHA/ASA Guidelines for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack[19]
- 2011 AHA/ASA Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease[20]
- 2018 CHEST Guidelines: Antithrombotic Therapy for Atrial Fibrillation[14]
- 2016 CHEST Guidelines: Antithrombotic Therapy for Venous Thromboembolism (VTE) Disease[21]
- 2012 CHEST Guidelines: Primary and Secondary Prevention of Cardiovascular Disease: Antithrombotic Therapy and Prevention of Thrombosis[15]
- 2012 CHEST Guidelines: Antithrombotic and Thrombolytic Therapy for Ischemic Stroke[17]
- 2019 ADA: Chapter 10 Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes[16]

Once a patient on an aspirin regimen was identified, a chart review of the electronic medical record (EMR) was conducted to determine the indication(s) for aspirin and the appropriate guidelines to consult. One pharmacist performed the chart review. Aspirin use was then categorized as (1) recommended, (2) weigh the risk and benefits of aspirin use, (3) not recommended, (4) dose change recommended, and (5) outside of guideline recommendations based on the ACC/AHA, American College of Chest Physicians, and American Diabetes Association guidelines. To assist in determining the aspirin category, a summary flowchart was developed and used to decrease intra-rater variability in scoring (Figure 1). Once the aspirin regimen was categorized, an email was drafted and sent to the clinician for review 1 to 7 days prior to the patient's appointment. This email notified the clinician of the aspirin recommendation made based on the chart review and included relevant sections of guidelines reviewed for that patient. After the visit, a second review of the EMR was conducted to determine if the patient attended the visit and whether aspirin dosing was continued, changed, or stopped.

Statistical Analysis

Data tracked throughout program implementation included patient age and sex, reason for visit, aspirin dose and frequency, other antiplatelet agent use, anticoagulant use, aspirin category as determined by chart review, and appointment result. Informal clinician feedback was reviewed but not analyzed formally. Data were analyzed using descriptive statistics with continuous variables presented as means ± standard deviation and discrete variables presented as value (percent). Data were gathered and analyzed using Microsoft Excel.

Figure 1. Guideline Summary Flowchart



Abbreviations: ACC, American College of Cardiologists; ADA, American Diabetes Association; AHA, American Heart Association; ASA, American Stroke Association; ASCVD, atherosclerotic cardiovascular disease; CAD, coronary artery disease; CHEST, American College of Chest Physicians; DAPT, dual antiplatelet therapy; PAD, peripheral artery disease; TIA, transient ischemic attack; VTE, venous thromboembolism.

RESULTS

Clinician Receipt of Pharmacist-Led Educational Program

The pharmacist-led educational program for aspirin deprescribing was provided 1 month prior to the start of the study period to internal medicine residents in the early phase (years 1 and 2) of their residency. Thirty of the 37 residents, plus 2 attending physicians interested in learning more about the new aspirin recommendations, attended the lecture and received educational materials.

Aspirin Use Review

A total of 100 patients on aspirin were seen in the clinic between February 3, 2020, and June 19, 2020 (Table). Sixty-two patients (62.0%) were men with an average age of 67.3 ± 9.8 years, and 38 (38.0%) were women with an average age of 72.2 ± 10.4 years. All patients on aspirin were on 81 mg or 325 mg. The majority of patients (81.0%) had only 1 indication for aspirin use. Primary prevention for future adverse cardiovascular events was the most common indication (37.0%), with coronary artery disease (30.0%) as the most common type of secondary preven-

tion, followed by peripheral artery disease (14.0%). Clopidogrel was the only P2Y12 inhibitor taken by patients included in the analysis (12.0%). Warfarin was the most common oral anticoagulant (8.0%), but apixaban (2.0%) and rivaroxaban (1.0%) also were used by patients.

Of the various categories, aspirin use was "recommended" for 41 patients (41.0%), "weigh the risks and benefits" for 27 (27.0%), "not recommended" for 19 (19.0%), "change in dose recommended" for 10 (10.0%), and "outside guideline recommendations" for 3 patients (3.0%) (Figure 2). The 68 patients (68.0%) on aspirin categorized as "recommended" or "weigh the risks and benefits" were included in the "appropriate" group, while the 29 patients (29.0%) on aspirin categorized as "not recommended" or "change in dose recommended" were included in the "inappropriate" group. Three patients (3.0%) were on aspirin that was considered outside of guideline recommendations and were not included in either group. Of the patients in the "inappropriate" group, 51.7% were on aspirin for primary prevention, 17.2% for atrial fibrillation, 31.0% for coronary artery disease, and 6.9% for venous thromboembolism, with 6.8% on aspirin for multiple indications. In the primary prevention group, patients without diabetes (48.0%) tended to be in the "inappropriate" group versus those with diabetes (25.0%).

Table. Baseline Characteristics of the Patient Population

	Total n (%)	Appropriate[a] n (%)	Inappropriate[b] n (%)
Number of patients	100	68 (68)	29 (29)
Age (years)	69.2 ± 10.3	68.1 ± 10	71.8 ± 10.5
Men	62 (62)	46 (67.6)	13 (44.8)
Aspirin dose			
81 mg	84 (84)	65 (95.6)	16 (55.2)
325 mg	16 (16)	3 (4.4)	13 (44.8)
Indication[c]			
Primary prevention without diabetes	25 (25)	13 (19.1)	12 (41.4)
Primary prevention with diabetes	12 (12)	9 (13.2)	3 (10.3)
Coronary artery disease	30 (30)	21 (30.9)	9 (31.0)
Peripheral artery disease	14 (14)	14 (20.6)	0 (0)
Dual antiplatelet therapy	4 (4)	4 (5.9)	0 (0)
Valvular heart disease	4 (4)	4 (5.9)	0 (0)
Atrial fibrillation	13 (13)	8 (11.8)	5 (17.2)
History of venous thromboembolism	8 (8)	6 (8.8)	2 (6.9)
History of stroke or transient ischemic attack	6 (6)	6 (8.8)	0 (0)
Extracranial carotid and vertebral artery disease	3 (3)	3 (4.4)	0 (0)
Other	3 (3)	0 (0)	0 (0)
Number of indications for aspirin use	1.2. ± 0.5	1.3. ± 0.6	1.1. ± 0.3
1	81 (81)	51 (75)	27 (93.1)
2	14 (14)	12 (17.6)	2 (6.9)
3	5 (5)	5 (7.4)	0 (0)
P2Y12 inhibitors			
Clopidogrel	12 (12)	12 (17.6)	0 (0)
Anticoagulated	11 (11)	5 (7.4)	5 (7.4)
Warfarin	8 (8)	4 (5.9)	3 (10.3)
Apixaban	2 (2)	1 (1.5)	1 (3.4)
Rivaroxaban	1 (1)	0 (0)	1 (3.4)

[a]Patients on aspirin categorized as "recommended" or "weigh the risks and benefits" were included in the "appropriate" group.
[b]Patients on aspirin categorized as "not recommended" or "change in dose recommended" were included in the "inappropriate" group.
[c]Percentages will not sum to 100, as some patients had multiple indications for aspirin.

Of patients taking 81 mg of aspirin, the largest category was "recommended," with 38 patients (45.2%). Overall, 65 patients (77.4%) taking 81 mg were in the "appropriate" group, and 16 (19.0%) were in the "inappropriate" group. All 10 patients in the "change in dose" category were taking 325 mg of aspirin, composing 62.5% of patients in the overall sample. All patients taking clopidogrel fell into the "appropriate" group, with 11 (91.2%) in the "recommended" category. On the other hand, 5 patients (45.5%) on anticoagulants were in the "not recommended" aspirin category, and only 1 (9.1%) was in the "recommended" aspirin category.

Evaluation of Aspirin Prescribing Practices Post-Clinician Education and Provision of Patient-Specific Recommendations by Pharmacists

Of the 100 patients included in the program evaluation, 81 (81.0%) attended the scheduled clinician visit and had follow-up data collected. Of the patients who attended their visit, 39 (48.1%) were in the "recommended" category, 20 (24.7%) in "weigh the risks and benefits," 13 (16.0%) in "not recommended," 7 (8.6%) in "change in dose recommended," and 2 (2.5%) in "outside guideline recommendations" categories. No aspirin was discontinued in the "recommended category," and aspirin was discontinued in 4 (20.0%) patients in the "weigh the risks and benefits category." Of the patients who attended the visit, 20 (24.7%) had a change recommended in their aspirin use (Figure 3). Changes were accepted for 11 of the 20 patients (55.0%). Aspirin was stopped for 8 of 13 (61.5%) in the "not recommended" category, and the dose was changed for 3 of 7 (42.9%) in the "dose change recommended category."

The acceptance rate of recommended change was highest for preventive visits and follow-up visits for specific problems (75.0%), then initial visit for a specific problem (28.6%) and, lastly, hospital discharge follow-up (0.0%). From the informal feedback gathered from clinicians, the most commonly mentioned barriers to implementing the recommended changes were

Figure 2. Aspirin Dose vs Aspirin Category

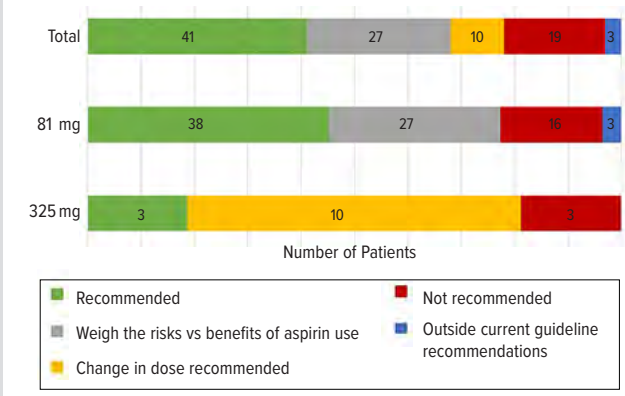
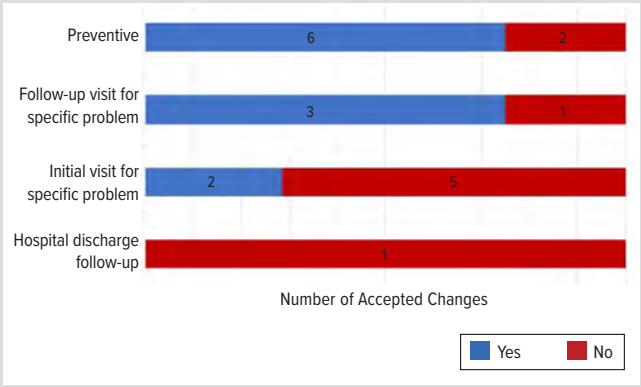


Figure 3. Reason for Visit vs Number of Accepted Changes



lack of time to address the change and the reason for the visit was not appropriate for addressing change. Other barriers included patient reluctance and aspirin use being monitored by another physician or specialist. The average number of recommendations made by the pharmacist to clinicians was 2.8 ± 1.2 per day.

DISCUSSION

Aspirin Use Review

Aspirin is a medication that presents an area of opportunity for deprescribing. In a 2016 meta-analysis of aspirin use for primary prevention of cardiovascular disease by Whitlock et al, the odds of a serious GI bleeding event occurring were greater in patients on a very low-dose aspirin regimen versus no treatment.[22] Our analysis of aspirin use in 100 patients indicated an appreciable rate of inappropriate aspirin use (29.0%). For 19 patients (19.0%), aspirin was not recommended at all, as bleeding risk outweighed the potential benefits. For 10 patients (10.0%), a reduction in aspirin dose from 325 mg to 81 mg was recommended. Of the patients taking aspirin 325 mg daily, 81.3% were in the inappropriate group compared to only 19.0% of patients taking 81 mg daily. Patients taking aspirin 325 mg are a high-yield area of opportunity and, unless specifically indicated, low-dose aspirin (75–100 mg) is generally a preferred choice for patients using aspirin for primary or secondary prevention, based on our analysis and the recommended dose ranges given by the guidelines used in this program.[7,12-20]

In addition to patients on an aspirin regimen of 325 mg, patients using aspirin for primary prevention could be targeted for reassessment of aspirin use. Almost 41% of the 37 patients on aspirin for primary prevention were categorized in the "inappropriate" category—the highest rate of any indication. The most common reason aspirin was not recommended for primary prevention in the cohort was patients age 70 or greater, but other reasons, including increased risk of bleeding for patients under the age of 70, also contributed to this decision. A higher frequency of patients with a single indication for aspirin use were noted in the inappropriate group (33.3%) than patients with multiple indications (10.5%). Patients taking aspirin for primary prevention represent another high-yield area of opportunity to deprescribe aspirin.

Prescriber Education and Uptake of Patient-Specific Recommendations

Overall, the combination of prescriber education and patient-specific recommendations changed clinician prescribing of aspirin in the patients included in this initial program evaluation. Nearly a quarter (24.7%) of patients seen at a visit had aspirin use that was considered inappropriate, and more than half of those patients (55.0%) had a change in aspirin use. Additionally, the 19.0% of patients in the "weigh the risks and benefits" category who had aspirin stopped implies that clinicians were willing to take the time to reassess aspirin use in situations without a straightforward recommendation.

Previous studies have demonstrated that inappropriate aspirin use is a common problem, but with a large number of indications and guidelines pertaining to the use of aspirin, improving aspirin prescribing can be difficult.[2,3] Results from this study indicate that areas of high yield include patients taking aspirin 325 mg and those taking aspirin for primary prevention. Additionally, the clinician acceptance rate may be increased by focusing on the most appropriate type of visit. Clinicians seeing patients for preventive and specific problem follow-up visits showed a higher acceptance rate of change in aspirin use or dose than those seeing patients at their initial visit for specific problems or hospital discharge follow-ups. Clinician feedback suggests that time and appropriateness were the largest barriers to implementing recommended changes to aspirin prescribing and dose. Furthermore, sending clinicians patient-specific information closer to the visit date also may increase the acceptance rate of aspirin deprescribing recommendations.

Limitations

Our program evaluation has several limitations. The first is a small sample size, which prevents us from drawing strong conclusions

and performing statistically powered analysis of subgroups. Sample size was further diminished by rate of patient attrition, as nearly a fifth of patients included in the initial analysis did not attend their follow-up visit. Lack of a comparator arm, in addition to the single point in time analysis, also limited our ability to evaluate program effectiveness. Since this pilot program was implemented in a rural health care system, our results may not be generalizable to more diverse urban populations. Finally, the program was conducted in an internal medicine resident clinic only; program implementation outside of the resident program may result in different clinician prescribing practices and response to pharmacist education and patient-specific recommendations.

CONCLUSIONS

Inappropriate aspirin use and dosage occurs with appreciable frequency. Pharmacist provision of clinician education and patient-specific recommendations for changes or discontinuation of aspirin may lead to improved prescribing practices.

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The Use of Health Care and Community-Based Services by People Living With Dementia and Their Caregivers During the COVID-19 Pandemic

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ABSTRACT

Introduction: People living with dementia have been particularly affected by the COVID-19 pandemic.

Methods: A survey of dementia care professionals was conducted to assess the use of health care and community-based services by people living with dementia and their caregivers during the first year of the pandemic.

Results: The survey indicated that most services were no longer being used or were being used less during the pandemic, with a few key exceptions.

Discussion: Many barriers and few facilitators were identified to service use for people living with dementia and their caregivers. The results identify potential gaps in the dementia care service network and may inform efforts to improve dementia care during future large-scale public health emergencies in the state of Wisconsin and beyond.

INTRODUCTION

The COVID-19 pandemic has had an outsized effect on people living with dementia and their caregivers. In terms of direct impact, people living with dementia have a greater risk of diagnosis and death from COVID-19 after controlling for age, living arrangements, chronic conditions, and other characteristics.[1] At the same time, dementia care and health care delivery systems have changed substantially as a result of the pandemic,[2] and people living with dementia and their caregivers have been disproportionately vulnerable to the negative impact of the pandemic on diagnosis and management of mental and physical health conditions and use of community-based services.[3,4]

Dementia care professionals, including county dementia care specialists, care managers, and social workers, have a unique vantage point on health care and community-based service use by people living with dementia and may be able to identify needs and opportunities for this population during the COVID-19 pandemic. Wisconsin Department of Health Services contracts with counties to run Aging and Disability Resource Centers (ADRC), which provide older adults with resources and information about programs and services. ADRCs employ dementia care specialists to conduct memory screening, to provide information and assistance to adults with cognitive concerns, and to help develop dementia-friendly communities (https://www.dhs.wisconsin.gov/adrc/dementia-care-specialist-program.htm).

Early studies during the pandemic based on physician and clinical psychologist expert opinion identified a number of barriers to health care access for people with dementia during COVID-19, including discontinuation of home care services, increased caregiver burden, suspension of nonurgent care in many areas, financial hardship, and disrupted medication supply systems.[3,4] Studies based on administrative database review have assessed the impact of the COVID-19 pandemic on specific service areas, such as home care[5] and mental and community physical health services.[6] However, to our knowledge, an assessment of a broad range of dementia care services during the pandemic—including related barriers and facilitators—from the perspective of dementia care professionals has not been undertaken. Dementia care professionals work directly with people with dementia and families to

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facilitate service utilization and, thus, have a unique and valuable perspective that has not been adequately represented in previous literature. This project seeks to address this gap in the literature, with a particular focus on the state of Wisconsin.

METHODS

A survey was created to assess the impact of the COVID-19 pandemic on 2 related areas: (1) changes in use of health care and community-based services by people living with dementia and their caregivers and (2) factors affecting use of these services—from the perspective of dementia care professionals—to inform on quality improvement opportunities across the state. Changes in the use of 14 services were assessed using the response stem: "Please indicate how the use of the following health care or community-based services has changed for your clients with dementia and their caregiver(s) during the COVID-19 pandemic." Respondents chose from an ordinal scale with the following response options: (1) "Clients with dementia and caregiver(s) are no longer using this service;" (2) "Clients with dementia and caregiver(s) are using this service less than usual;" (3) "Clients with dementia and caregiver(s) are using this service the same as usual;" and (4) "Clients with dementia and caregiver(s) are using this service more than usual." Fifteen factors affecting service use were assessed using the response stem: "How have the following factors changed the use of dementia care professional services, health care, and community-based supportive services for clients with dementia or their caregivers during the COVID-19 pandemic?" Respondents chose from an ordinal scale with the following response options: (1) "This has been a barrier to service use;" (2) "This has not affected service use;" and (3) "This has facilitated service use." "I don't know" was included as a response option for both survey topics to encourage respondents to provide information only about items for which they had professional or personal knowledge.

Survey questions were developed based on input from an interdisciplinary team with direct experience working with people living with dementia, including dementia care professionals, clinical social workers, physicians, and mental health providers. The survey was piloted with a small group of dementia care professionals working within the Wisconsin Department of Health Services and was edited for relevancy of content and question clarity before being administered on a larger scale.

The survey was administered online via 2 networks of dementia care stakeholders: the Wisconsin Dementia Resource Network (WDRN) and a dementia care network supported by the Wisconsin Department of Health Services (DHS) comprising county dementia care specialists, tribal dementia care specialists, and dementia care leads throughout the state. These networks are made up of clinical and community-based service providers, as well as caregivers for people living with dementia. The survey was administered between August 28, 2020, and October 9, 2020. The project was conducted for quality improvement and therefore did not require Institutional Review Board (IRB) review, according to the University of Wisconsin Health Sciences IRB and federal regulations. Data were collected and managed using REDCap electronic data capture tools hosted by the University of Wisconsin–Madison[7,8] and analyzed using the R language and environment for statistical computing,[9] Version 4.1.0. All reported frequencies for survey items were calculated based on the number of respondents for that survey item, not including those reporting "I don't know."

Table 1. Demographic Characteristics of Survey Respondents

Characteristic	N (%)
Sex	
Female	94 (92.2)
Male	5 (4.9)
Prefer not to answer	3 (2.9)
Race	
White	88 (88.0)
American Indian or Alaska	2 (2.0)
Asian American	1 (1.0)
Black or African American	2 (2.0)
Hispanic or Latino	2 (2.0)
Prefer not to answer	5 (5.0)
Profession	
Dementia care specialist	34 (34.0)
Dementia lead	13 (13.0)
Dementia lead supervisor	12 (12.0)
Social worker	6 (6.0)
Administrator	5 (5.0)
Manager	5 (5.0)
Outreach specialist	5 (5.0)
Service specialist	5 (5.0)
Care coordinator	4 (4.0)
Other	11 (11.0)
Work Setting	
Aging and Disability Resource Center	54 (53.5)
Nonprofit community organization	20 (19.8)
Managed care organization	4 (4.0)
State or County Health Department	4 (4.0)
Long-term care	3 (3.0)
Memory clinic	3 (3.0)
Health and Human Services	2 (2.0)
Health care organization	2 (2.0)
Tribal Health Services	2 (2.0)
Other	7 (7.0)
Work location	
Rural	61 (60.4)
Rural and suburban	2 (2.0)
Rural, suburban, and urban	4 (4.0)
Suburban	12 (11.9)
Suburban and urban	2 (2.0)
Urban	20 (19.8)

RESULTS

The survey was sent to 331 dementia care professionals from the

Table 2. Changes in Health Care and Community-Based Service Use by People Living With Dementia and Caregivers During the COVID-19 Pandemic

	No Longer Using This service				Using This Service Less Than Usual				Using This Service the Same as Usual				Using This Service More			
Program	**N (%)**				**N (%)**				**N (%)**				**N (%)**			
	Total	**Rural**	**Sub**	**Urban**	**Total**	**Rural**	**Sub**	**Urban**	**Total**	**Rural**	**Sub**	**Urban**	**Total**	**Rural**	**Sub**	**Urban**
Senior center programs	**52 (60.5)**	29 (59.2)	8 (72.7)	10 (55.6)	**32 (37.2)**	18 (36.7)	3 (27.3)	8 (44.4)	**2 (2.3)**	2 (4.1)	0 (0)	0 (0)	**0 (0)**	0 (0)	0 (0)	0 (0)
Adult day programs	**34 (40.5)**	17 (37.0)	6 (54.5)	8 (42.1)	**41 (48.8)**	22 (47.8)	4 (36.4)	11 (57.9)	**8 (9.5)**	7 (15.2)	1 (9.1)	0 (0)	**1 (1.2)**	0 (0)	0 (0)	0 (0)
Companion/friendly visitor services	**31 (38.8)**	14 (29.8)	6 (66.7)	9 (52.9)	**40 (50.0)**	28 (59.6)	2 (22.2)	7 (41.2)	**7 (8.8)**	4 (8.5)	1 (11.1)	1 (5.9)	**2 (2.5)**	1 (2.1)	0 (0)	0 (0)
Caregiver education classes	**11 (14.3)**	7 (14.6)	1 (14.3)	2 (12.5)	**51 (66.2)**	32 (66.7)	5 (71.4)	11 (68.8)	**9 (11.7)**	5 (10.4)	1 (14.3)	2 (12.5)	**6 (7.8)**	4 (8.3)	0 (0)	1 (6.3)
Caregiver support/respite services	**8 (10.1)**	5 (10.4)	0 (0)	2 (12.5)	**59 (74.7)**	34 (70.8)	6 (75.0)	13 (81.3)	**6 (7.6)**	5 (10.4)	0 (0)	1 (6.3)	**6 (7.6)**	4 (8.3)	2 (25.0)	0 (0)
Caregiver counseling services	**6 (8.8)**	2 (4.7)	1 (16.7)	2 (14.3)	**54 (79.4)**	34 (79.1)	5 (83.3)	11 (78.6)	**5 (7.4)**	4 (9.3)	0 (0)	1 (7.1)	**3 (4.4)**	3 (7.0)	0 (0)	0 (0)
Transportation services	**6 (7.6)**	2 (4.2)	1 (11.1)	3 (17.6)	**52 (65.8)**	32 (66.7)	7 (77.8)	9 (52.9)	**18 (22.8)**	12 (25.0)	1 (11.1)	4 (23.5)	**3 (3.8)**	2 (4.2)	0 (0)	1 (5.9)
Homecare services	**4 (4.9)**	1 (2.0)	1 (12.5)	2 (11.1)	**58 (70.7)**	35 (70.0)	4 (50.0)	14 (77.8)	***15* (18.3)**	11 (22.0)	1 (12.5)	2 (11.1)	**5 (6.1)**	3 (6.0)	2 (25.0)	0 (0)
Physical therapy visits	**4 (5.9)**	2 (4.9)	0 (0)	1 (6.7)	**53 (77.9)**	30 (73.2)	8 (100)	12 (80.0)	**11 (16.2)**	9 (22.0)	0 (0)	2 (13.3)	**0 (0)**	0 (0)	0 (0)	0 (0)
Assistance with medication	**2 (3.1)**	0 (0)	0 (0)	1 (9.1)	**28 (43.8)**	20 (47.6)	1 (16.7)	6 (54.5)	**29 (45.3)**	20 (47.6)	4 (66.7)	4 (36.4)	**5 (7.8)**	2 (4.8)	1 (16.7)	0 (0)
Counseling/behavioral health visits	1 (1.4)	0 (0)	0 (0)	0 (0)	**61 (87.1)**	35 (83.3)	8 (88.9)	14 (100)	**5 (7.1)**	4 (9.5)	1 (11.1)	0 (0)	**3 (4.3)**	3 (7.1)	0 (0)	0 (0)
Primary care visits	**1 (1.3)**	0 (0)	0 (0)	0 (0)	**71 (88.8)**	40 (87.0)	9 (100)	16 (88.9)	**7 (8.8)**	5 (10.9)	0 (0)	2 (11.1)	**1 (1.3)**	1 (2.2)	0 (0)	0 (0)
Medical specialist visits	**0 (0)**	0 (0)	0 (0)	0 (0)	**66 (88.0)**	38 (84.4)	8 (88.9)	15 (93.8)	**8 (10.7)**	6 (13.3)	1 (11.1)	1 (6.3)	**1 (1.3)**	1 (2.2)	0 (0)	0 (0)
Meal delivery services	**0 (0)**	0 (0)	0 (0)	0 (0)	**15 (18.3)**	12 (23.5)	1 (12.5)	2 (12.5)	**30 (36.6)**	13 (25.5)	4 (50.0)	11 (68.8)	**37 (45.1)**	26 (51.0)	3 (37.5)	3 (18.8)

Abbreviation: Sub, suburban.

Total (%) are row percents. Work setting percents are row percents for all with data in that setting. Respondents working in more than one setting were excluded from the setting counts; therefore, totals may not equal the sum of rural, suburban, and urban counts.

WDRN and DHS networks and was completed by 102 individuals (response rate 31%). The respondents predominantly identified as female (92.2%), White (88.0%), served rural settings (66%), half worked at ADRCs (53.5%); and 34.0% were employed as dementia care specialists, reflecting all or nearly all dementia care specialists in Wisconsin. See Table 1 for the full demographic characteristics of the survey sample.

Nearly all services queried, with a few notable exceptions, were reported by a majority of respondents as not being used or being used less than usual during the COVID-19 pandemic. Senior center programs were reported as the most negatively affected, with a majority of respondents reporting people living with dementia and caregivers were no longer using these services (60.5%). A large proportion of respondents also reported that people living with dementia and caregivers were no longer using adult day programs (40.5%) and companion/friendly visitor services (38.8%). A majority of respondents reported only 2 services—medication assistance (53.1%) and meal delivery (81.7%)—as being used the same or more than usual by most respondents. Response data for the changes in health care and community-based service use during the pandemic are summarized in Table 2 in aggregate and stratified by area of service provision.

Several factors were identified by a majority of respondents as barriers to health care and community-based services for people living with dementia and caregivers during the pandemic. Some of the most frequently reported barriers included changes in access to other natural supports in their network (eg, friends, other family members, neighbors, religious organization members) (80.7%), changes in caregiver support/respite services (78.0%), knowledge of technology/virtual tools (72.9%), compassion fatigue/caregiver burnout (71.8%), and access to technology/virtual tools (67.8%). Factors that most respondents reported had not affected service use included changes to language services (91.2%), changes to insurance status (84.5%), changes to employment status (63.2%),

Table 3. Factors Affecting Health Care and Community-Based Service Use by People Living With Dementia and Their Caregivers During the COVID-19 Pandemic

	This Has Been a Barrier to Service Use				This Has Not Affected Service Use				This Has Facilitated Service Use			
Factors	**N (%)**				**N (%)**				**N (%)**			
	Total	**Rural**	**Suburban**	**Urban**	**Total**	**Rural**	**Suburban**	**Urban**	**Total**	**Rural**	**Suburban**	**Urban**
Changes in access to other natural supports	**67 (80.7)**	38 (80.9)	10 (90.9)	14 (77.8)	**10 (12.0)**	6 (12.8)	1 (9.1)	2) (11.1)	**6 (7.2)**	3 (6.4)	0 (0)	2 (11.1)
Changes in caregiver support/respite services	**64 (78.0)**	38 (79.2)	8 (88.9)	13 (72.2)	**13 (15.9)**	7 (14.6)	1 (11.1)	3 (16.7)	**5 (6.1)**	3 (6.3)	0 (0)	2 (11.1)
Knowledge of technology/virtual tools	**62 (72.9)**	37 (75.5)	10 (83.3)	11 (61.1)	**11 (12.9)**	6 (12.2)	1 (8.3)	3 (16.7)	**12 (14.1)**	6 (12.2)	1 (8.3)	4 (22.2)
Access to technology/virtual tools	**59 (67.8)**	33 (67.3)	10 (83.3)	12 (63.2)	**12 (13.8)**	7 (14.3)	1 (8.3)	3 (15.8)	**16 (18.4)**	9 (18.4)	1 (8.3)	4 (21.1)
Compassion fatigue/caregiver burnout	**56 (71.8)**	31 (70.5)	6 (66.7)	14) (77.8)	**11 (14.1)**	7 (15.9)	2 (22.2)	1 (5.6)	**11 (14.1)**	6 (13.6)	1 (11.1)	3 (16.7)
Changes in familial obligations	**51 (66.2)**	32 (69.6)	6 (66.7)	8) (53.3)	**18 (23.4)**	10 (21.7)	2 (22.2)	4 (26.7)	**8 (10.4)**	4 (8.7)	1 (11.1)	3 (20.0)
Changes in appointment availability	**49 (65.3)**	32 (72.7)	5 (55.6)	9 (60.0)	**20 (26.7)**	11 (25.0)	3 (33.3)	3 (20.0)	**6 (8.0)**	1 (2.3)	1 (11.1)	3 (20.0)
Changes in access to primary caregiver	**44 (57.1)**	28 (62.2)	6 (60.0)	5 (31.3)	**27 (35.1)**	15 (33.3)	3 (30.0)	8 (50.0)	**6 (7.8)**	2 (4.4)	1 (10.0)	3) (18.8)
Changes to mental health	**44 (58.7)**	25 (58.1)	5 (55.6)	9 (56.3)	**22 (29.3)**	13 (30.2)	3 (33.3)	4 (25.0)	**9 (12.0)**	5 (11.6)	1 (11.1)	3 (18.8)
Changes in transportation	**39 (51.3)**	24 ((52.2)	7 (77.8)	7 (43.8)	**36 (47.4)**	21 (45.7)	2 (22.2)	9 (56.3)	**1 (1.3)**	1 (2.2)	0 (0)	0 (0)
Changes to physical health	**36 (48.6)**	19 (44.2)	5 (62.5)	8 (50.0)	**34 (45.9)**	22 (51.2)	3 (37.5)	6 (37.5)	**4 (5.4)**	2 (4.7)	0 (0)	2 (12.5)
Changes to financial resources	**29 (40.8)**	16 (31.4)	6 (50.0)	6 (31.6)	**40 (56.3)**	25 (49.0)	4 (33.3)	7 (36.8)	**2 (2.8)**	1 (2.0)	0 (0)	1 (5.3)
Changes to employment status	**23 (33.8)**	11 (26.8)	3 (50.0)	7 (43.8)	**43 (63.2)**	29 (70.7)	3 (50.0)	8 (50.0)	**2 (2.9)**	1 (2.4)	0 (0)	1 (6.3)
Changes to insurance status	**9 (15.5)**	4 (11.1)	1 (14.3)	3 (30.0)	**49 (84.5)**	32 (88.9)	6 (85.7)	7 (70.0)	**0 (0)**	0 (0)	0 (0)	0 (0)
Changes to language services	**5 (8.8)**	3 (9.1)	0 (0)	2 (15.4)	**52 (91.2)**	30 (90.9)	6 (100)	11 (84.6)	**0 (0)**	0 (0)	0 (0)	0 (0)

Total (%) are row percents. Work setting percents are row percents for all with data in that setting. Respondents working in more than one setting were excluded from the setting counts; therefore, totals may not equal the sum of rural, suburban, and urban counts.

and changes to financial resources (56.3%). Interestingly, although they were reported as barriers by a majority of respondents, the most commonly reported facilitators to service use were access to technology/virtual tools (18.4%) and knowledge of technology/virtual tools (14.1%). Response data for perceived barriers and facilitators to services are summarized in Table 3 in aggregate and stratified by area of service provision.

DISCUSSION

In this quality improvement project, dementia care stakeholders were surveyed to gain insight into how the COVID-19 pandemic affected service use for people living with dementia and their caregivers. The findings suggest that almost all health care and community-based dementia services have seen a decrease in use during the pandemic. One possible explanation of this finding is that the dementia care infrastructure in Wisconsin initially was not equipped to meet the new challenges presented by the COVID-19 pandemic, resulting in a decrease in availability of desired services. Supporting this point, the 2 services that were reported by a majority of respondents as being used the same or more during the pandemic were medication assistance and meal delivery, which already had existing infrastructure in place for at-home and contact-free access. Another explanation for the decrease in service use may have been concerns about exposure to COVID-19 in public or health care settings and subsequent self-imposed limitations on treatment utilization. Changes to social support networks and the more prominent role of technology during the pandemic were the most commonly identified barriers to service use. Although telemedicine has been proposed as a solution to dementia care delivery during the pandemic,[10] our results suggest that it can also be a barrier to service use.

There are several considerations in interpreting the findings

of this project. The survey was administered prior to approval by the US Food and Drug Administration of any of the COVID-19 vaccines. Since then, access to vaccination and adaptation of service providers has likely improved access to health care and community-based service. Furthermore, two-thirds of respondents worked in rural areas, while according to the 2010 US Census, only approximately one-third of Wisconsin's population live in rural areas.[11] Although we present stratified survey results for the reader's interest in Tables 2 and 3, the sample did not contain enough respondents working in suburban or urban settings to make rigorous comparisons between the groups. Based on the rough differences in survey responses, our preliminary results raise the possibility that rurality/urbanicity may have had a differential impact on availability of services and types of barriers/facilitators during the early pandemic. This topic would be worth exploring further in order to more specifically address the needs of unique geographic populations. The geographic scope of the study within the state of Wisconsin and rural-predominant survey respondents warrant caution when generalizing the study findings to other geographic settings. Findings in other geographic regions or in more urban settings may demonstrate a distinct pattern of changes to dementia care services than observed in this project. Finally, a number of sources of potential response bias exist in this study, including missing responses from dementia care professionals working outside of the survey distribution networks, the length of the survey and/or lack of incentive reducing the likelihood of survey completion by certain individuals, and respondents skewing towards extreme responses. This evaluation provides insight into dementia-related service areas in Wisconsin that are particularly vulnerable to large-scale public health calamities. The results will hopefully inform public health efforts to improve dementia care provision during future pandemics.

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Wisconsin's COVID-19 Safer-at-Home Order: Perspectives on Pain, Stress, and Functioning From Pediatric Patients With Chronic Pain

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ABSTRACT

Background: Given that enforced quarantine is associated with psychological distress, our objective was to understand factors that either helped or harmed pediatric chronic pain patients during Wisconsin's 2020 safer-at-home quarantine.

Methods: We reviewed the electronic medical records of 145 pediatric chronic pain patients seen at the Jane B. Pettit Pain and Headache Center, Children's Wisconsin, between April 1 and July 30, 2020.

Results: Stress and poor/disturbed lifestyle factors were primary contributors to increased pain. Over half of the sample (58.7%) reported COVID-related stressors as contributing to increased stress levels. Coping, engagement, and socialization were primary contributors to patient functioning.

Conclusions: Continued access to clinicians who can help with coping and stress management techniques is necessary for the well-being of pediatric chronic pain patients during a quarantine.

BACKGROUND

Chronic pain is typically defined as pain lasting 3 or more months and can be either recurrent or persistent.[1] Pediatric chronic pain affects approximately 1 in 4 children[1] and is associated with anxiety, depression, fatigue, and impaired physical and academic functioning.[2] Known deficits in academic functioning, including school attendance, were of particular importance when COVID-19 disrupted in-person schooling.[3] While the negative psychological effects of quarantine are well established, factors that affect mental health during quarantine are not well understood.[4] Identification of such factors may mitigate the negative effects of a quarantine, especially for vulnerable populations, such as youth with chronic pain.

To slow the spread of COVID-19, governments around the world issued safer-at-home (SAH) orders, with the state of Wisconsin issuing an order on March 25, 2020. Historically, forced quarantine has been associated with a number of problems.[5] For example, during lockdowns for Severe Acute Respiratory Syndrome (SARS), 28.9% of people had symptoms of posttraumatic stress disorder (PTSD), and 31.2% exhibited signs of depression.[6] During COVID-19 quarantines, a study found a 42.5% increase in anxiety, 74.3% increase in depression, and 63.3% increase in suicidal thoughts.[7] While the majority of such studies have been conducted on adults, children are similarly affected. Our objective was to understand factors that positively or negatively affected pediatric chronic pain patients' pain, stress, and functioning during the COVID-19 quarantine period in Wisconsin.

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METHODS

Study Design and Setting

This retrospective chart review included patients seen at the Jane B. Pettit Pain and Headache Center, a multidisciplinary pediatric chronic pain and headache clinic located at Children's Wisconsin. Data from patients with follow-up or therapy appointments from April 1, 2020, through July 30, 2020, were included in the study. The hospital Institutional Review Board approved the study.

Table 1. Patient Demographics and Pain Characteristics, N = 145

Age, years; mean (SD)	13.8 (3.1)
Age group, n (%)	
Children (≤12 years)	46 (31.7)
Adolescents (≥13 years)	99 (68.3)
Sex, n (%)	
Female	107 (73.8)
Male	38 (26.2)
Race, n (%)	
White	121 (83.4)
Black	17 (11.7)
Asian	1 (0.7)
Unknown	4 (2.8)
Mixed	2 (1.4)
Ethnicity, n (%)	
Hispanic	18 (12.4)
Not Hispanic	124 (85.5)
Unknown	3 (2.1)
Primary pain location, n (%)	
Head	106 (73.1)
Limbs (arms/legs)	7 (4.8)
Abdomen	17 (11.7)
Back	4 (2.8)
Other	11 (7.6)
Number of appointments, N	310
Mean	2.6
SD	2.7
Appointment type, n (%)	
Follow-up	260 (83.9)
Therapy	50 (16.1)
Appointment format, n (%)	
Virtual	252 (81.3)
In-person	45 (14.5)
Phone	13 (4.2)

Measures

All data were extracted from each patient's electronic medical record (EMR). Demographic data included patient age, sex, race, and ethnicity. Other data included pain intensity and pain location, appointment date, appointment type (follow-up or therapy), and appointment format (virtual, in-person, or phone).

The primary outcomes included patient responses to questions that were designed specifically to capture factors that were helping or hurting patients' pain, stress, and functioning during the quarantine. Immediately after the SAH order was issued, a panel of experts in pediatric chronic pain at Children's Wisconsin developed a set of questions to capture these factors. Clinicians then posed the questions to patients at follow-up or therapy appointments and recorded patient responses in the EMR. These "COVID-19 questions" included the following:

1. "What are you doing now that is helping your pain?"
2. "What are you doing now that is not helping your pain?"
3. "What are you doing now that is helping your stress?"
4. "What are you doing now that is not helping your stress?"
5. "What are you doing now to help your functioning?"
6. "On a scale of 0 to 10, how stressed are you, with 0 being no stress and 10 being the worst stress possible?"[8]

Data Analysis

Descriptive statistics were used to characterize the sample (including COVID-19 question 6). Patient responses to COVID-19 questions 1 through 5 were analyzed with interpretive phenomenological analysis (IPA).[9] IPA utilizes inductive analytic techniques, which emphasize data interpretation at multiple levels. Three study team members (a medical student, clinical psychologist, and research psychologist) contributed to the thematic analysis. The first step required coders to read and reread patient responses to gain familiarity with responses and response types. Second, coders generated initial codes intended to be short, exploratory comments that were descriptive, linguistic, or conceptual in nature.[9] Next, coders collaboratively identified themes based on initial codes, moving toward the development of broader, emergent themes. In a collaborative group process, coders discussed the emergent themes to ensure that they accurately reflected participant data. Emergent themes were grouped to create superordinate themes through abstraction and subsumption.

RESULTS

A total of 145 patients gave responses to the COVID-19 questions at a minimum of 1 appointment (range 1–17 appointments). The most common pain location was the head (73.1%) followed by abdominal pain (11.7%), and pain onset ranged from 4 months to 7 years. For a subset of patients (n = 54; 37.2% of sample), data were available on current pain intensity. Mean rating was 1.94 (SD 2.5), with responses ranging from 0 to 8. For a subset of patients (n = 100; 69.0% of sample), data were available on stress ratings at the time of the appointment. Mean rating was 3.3 (SD 2.8), with responses ranging from 0 to 10. Data are shown in Table 1.

Qualitative Results

Superordinate and emergent themes based on patient responses to each COVID-19 question are shown in Table 2. Each superordinate theme (in bold below, for each question) characterized the majority of the sample.

What are you doing now that is helping your pain?

Superordinate themes: **(1) lifestyle factors, (2) medical interventions, (3) psychosocial/stress management, and (4) other.** Lifestyle factors was the most common response (52.3%). Common emergent themes were drinking water and increasing physical activity. About half the sample (50.5%) reported medical interventions, and almost a third (27.1%) reported psychosocial/stress management factors, including practicing stress management skills and engaging in pleasurable activities. Approximately 23.4% reported other factors (eg, using a heat pack).

What are you doing now that is not helping your pain?

Superordinate themes: **(1) stress, (2) poor/disturbed lifestyle factors, (3) other, and (4) treatment plan not working.** Stress, including school stress, emotional factors, and pain triggers, was reported by 50.8% of patients, and 46.3% reported poor/disturbed lifestyle factors, such as disturbed sleep patterns. Other factors (eg, environmental triggers such as sounds and odors) were reported by 15.9%. Some patients (13.0%) reported that an aspect of their treatment plan was not working (primarily medications).

What are you doing now that is helping your stress?

Superordinate themes: **(1) pleasurable activities, (2) stress management/coping skills, (3) school, (4) pets, and (5) other.** Most patients (56.7%) reported that pleasurable activity helped their stress, including music, electronics, and time with friends/family. Almost half (48.9%) reported a specific coping skill as beneficial (eg, working with their pain psychologist), 13.3% reported school-related factors (eg, keeping a structured school schedule), 11.1% reported pets, and 7.8% reported some other factor (eg, taking prescribed medication).

What are you doing now that is not helping your stress?

Superordinate themes: **(1) COVID-19-related stressors, (2) anxiety/general and family stressors, and (3) other.** Over half of patients (58.7%) reported COVID-19-related stressors, including stress stemming from quarantine, worry about the safety of family and friends, and stress from adjusting to virtual school. Anxiety/general and family stressors were reported by 39.7%, and 28.6% reported other reasons for worsening stress (too much screen time or increased pain).

Table 2. Superordinate and Emergent Themes for Key COVID-19 Questions

Superordinate Theme	Emergent Themes
What are you doing now that is helping your pain?	
Lifestyle factors (52.3%)	Drinking water, being more physically active, getting more sleep or rest, eating healthier and having regular meals
Medical interventions (50.5%)	Engaging in physical or occupational therapy, taking prescribed medications
Psychosocial/stress management (27.1%)	Practicing stress management skills, engaging in pleasurable activities, structuring activities throughout the day
Other (23.4%)	Getting new eye glasses, other
What are you doing now that is not helping your pain?	
Stress (50.8%)	Increased school stressors, increased family or social stressors
Poor/disturbed lifestyle factors (46.3%)	Disturbed sleep patterns, eating unhealthy food or skipping meals, not drinking enough water, not getting enough physical activity, increased screen time
Other (15.9%)	Environmental triggers such as light, sound, or odors; other
Treatment plan not working (13.0%)	Prescription medications not helping or increasing pain, not taking prescription medications
What are you doing now that is helping your stress?	
Pleasurable activities (56.7%)	Pleasurable activities (eg, music, self-care, social media, relaxation), socializing with friends and family, getting physical activity
Stress management/ coping skills (48.9%)	Practicing stress management and coping skills
School (13.3%)	Prioritizing and taking charge of school work
Pets (11.1%)	Spending time with pets
Other (7.8%)	Taking prescribed medications, pain is improving, better sleep hygiene, other
What are you doing now that is not helping your stress?	
COVID-related stressors (58.7%)	School stress induced by online adjustment, social isolation and missing friends, worries about getting COVID or quarantining
Anxiety/general and family stress (39.7%)	Worrying about family conflict
Other (28.6%)	Too much screen time, pain or illness, poor sleep hygiene, eating unhealthy or infrequently
What are you doing now to help your functioning?	
Coping, engagement, socializing (57.0%)	Engaging in pleasurable activities, socializing with friends and family, keeping up with school work
Lifestyle Factors (42.0%)	Getting physical activity, drinking more water, better sleep hygiene, eating healthier and more frequent meals
Pets (6.9%)	Taking care of and playing with pets
Other (5.8%)	Taking prescribed medication, complementary medicine (eg, yoga), other

For each question, patients' responses could be categorized multiple times across the superordinate themes but only once within a superordinate theme.

What are you doing now to help your functioning?

Superordinate themes: **(1) coping, engagement, and socialization; (2) lifestyle factors; (3) pets; and (4) other.** Most (57.0%) reported some type of coping, engagement, or socialization factor as helping them function. Examples included engaging in pleasurable activities and socializing with friends/family. One patient reported engaging in socially distanced gatherings that included friends meeting but staying in their own cars. Adjusting lifestyle factors also was reported (42.0%). Examples included better sleep hygiene and eating healthier foods. Time with pets was reported as helping patients' function (6.9%). Finally, 5.8% reported other factors, such as taking prescribed medications.

DISCUSSION

This study evaluated factors that affected pain, stress, and functioning for pediatric chronic pain patients during the COVID-19

SAH order period. Contrary to expectations, patients reported relatively low pain and stress levels during this timeframe. Key findings included the following: (1) lifestyle factors were as important as medical management to pain reduction; (2) stress and poor/disturbed lifestyle factors were the most common reasons for increased pain; (3) stress was increased by worries about COVID-19 and other general stressors but was deceased by engaging in pleasurable activities and stress management/coping skills; and (4) coping and lifestyle factors were the most frequently reported as helpful to patients' functioning.

This study also highlighted the ups and downs that are common in chronic pain. For example, flexibility with online schooling helped patients adapt to quarantine, but the increased screen time exacerbated pain for some. Those who used the increased leisure time afforded by remote schooling to get/play outside reported lower pain and stress, while others found themselves more sedentary. Spending more time than usual with friends/family also had either positive or negative effects.

Strengths and Limitations

Almost nothing is known about the impact of quarantine on pediatric chronic pain patients. This study highlights factors that both helped and hurt patients' pain, stress, and functioning during the Wisconsin SAH order period in 2020. The subjective nature of qualitative data and lack of standardized questionnaires limit the study's replicability. Data were missing, in part, due to staff shortages during the quarantine and, in part, due to the retrospective design. Nonetheless, the data shed light on important facets of patient well-being during the pandemic.

CONCLUSIONS

Continued access to clinicians who can help with coping and stress management techniques is necessary for the well-being of pediatric chronic pain patients during a quarantine.

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Implementation of an Active Screening Program for SARS-CoV2 – Experience at an Academic Medical Center

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ABSTRACT

Background: This study documents the experience of an academic medical center implementing SARS-CoV2 screening of asymptomatic research personnel to support the "return-to-work" initiative and donor cadavers to support in-person student education.

Methods: Testing was performed on samples received June 1, 2020 (for the cadaver program) and July 20, 2020 (for the personnel screening program) through September 30, 2021. Data were evaluated to document the number of cases and the positivity rate.

Results: Approximately 3000 specimens were tested across both programs, with an overall positivity rate of 2.5% and 3.6% in the personnel and cadaver screening programs, respectively.

Discussion: This screening program serves as an example of institutional investment in the safety of its faculty, staff, and students alike to address specific needs of a global pandemic.

BACKGROUND

The Coronavirus disease 2019 (COVID-19) is an ongoing global pandemic caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV2).[1] In a model proposed by the Centers for Disease Control and Prevention (CDC) in early 2021, it was predicted that 59% of coronavirus transmission would come from people without symptoms, including 35% from people who were presymptomatic and 24% from those who never showed symptoms at all.[2] Data now suggest that about 1 in 5 infected people (~17%) are asymptomatic[3] and can transmit the disease.

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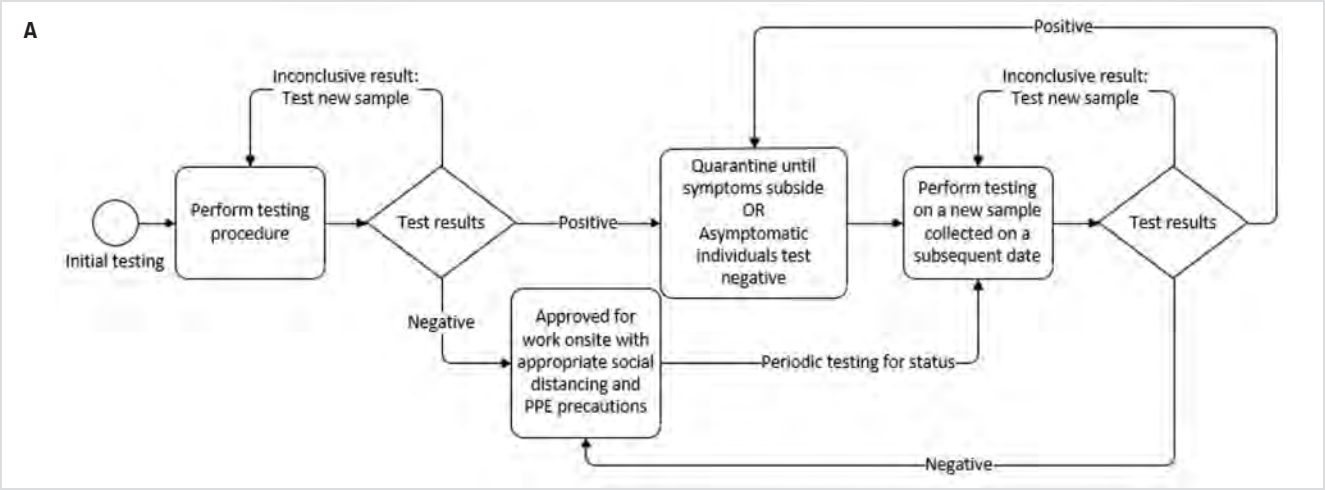
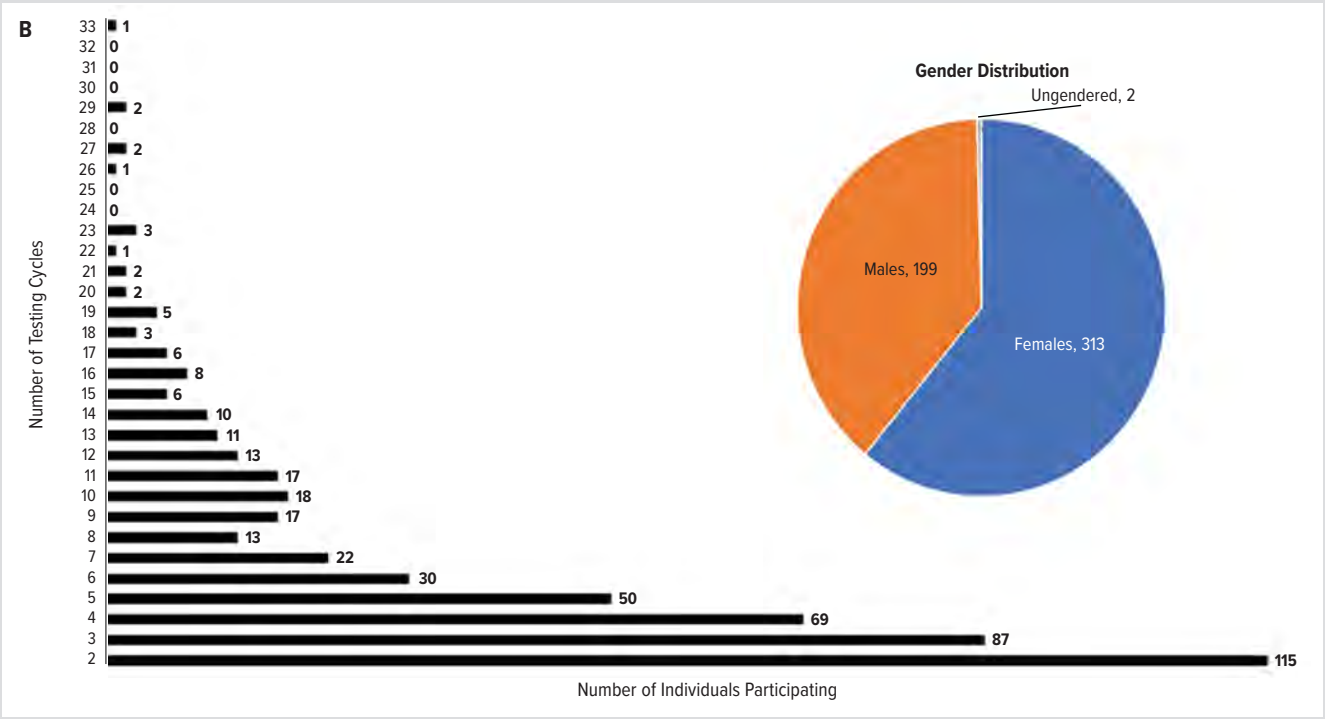
The Medical College of Wisconsin (MCW) is a major national research center and the second-largest research institution in Wisconsin, employing researchers in basic science, clinical, and translational fields. With the onset of the pandemic, the biomedical research workforce was at risk for several reasons. First, most researchers cannot work remotely and need to be onsite to conduct most of their work. Second, biomedical researchers perform experiments in close proximity with others, making physical distancing a challenge. Third, clinical grade personal protective equipment (PPE) was not consistently available to researchers, especially early in the pandemic. With the start of mandated lockdown, enterprise-wide efforts focused on the implementation of processes that would support the "return-to-work" initiative for faculty, staff, and students. MCW is also a private medical education institution that supports the education and training of medical students, graduate students, residents, postgraduate physicians, and other health care professionals. These health care students take anatomy classes utilizing cadaveric material.

Given the statistics for asymptomatic transmission of SARS-CoV2[2,3] and for enhanced researcher safety, MCW offered testing of asymptomatic individuals to allow for early detection of infection in asymptomatic carriers (reducing risk to others in the workplace and serving as a potential early warning system should a surge of infection affect the researcher workforce). Additionally, as the relative risks of transmission from cadavers were not yet understood,[4] SARS-CoV2 testing of donor cadavers received through the Anatomical Gift Registry (Registry) was also implemented, to ensure student, staff, and faculty safety. The institution's Precision Medicine Laboratory (PML) developed and validated the SARS-CoV2 nucleic acid amplification test (NAAT), a quantitative reverse transcription polymerase chain reaction (qRT-PCR) assay

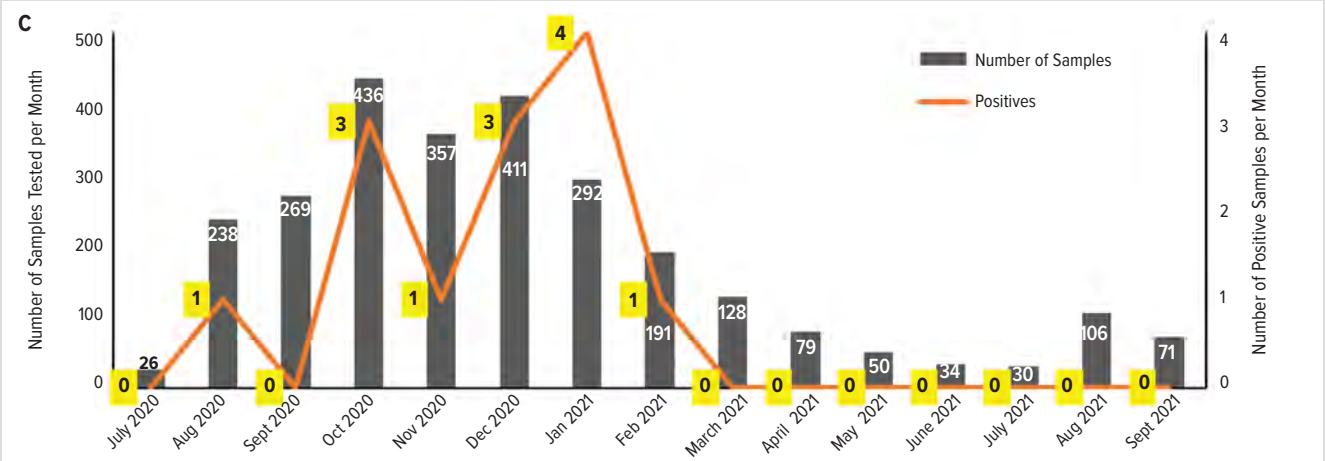
Figure 1. SARS-CoV-2 Testing of Asymptomatic Research Personnel



A. Outline of protocol followed based on positive or negative test results.



B. Testing asymptomatic individuals for COVID-19 occurred from July 2020 through September 2021. Those who participated the longest had at least 33 testing cycles.



C. In the 15 months of implementation, a total of 2718 tests were performed across 514 individuals, with 13 individuals testing positive for SARS-CoV2.

with increased specificity and sensitivity for viral detection[5] in both nasopharyngeal and anterior nasal swabs, for screening of personnel and donor cadavers. This study documents the implementation of both screening programs.

METHODS

Screening of Asymptomatic Laboratory Research Personnel Returning On-site for Work

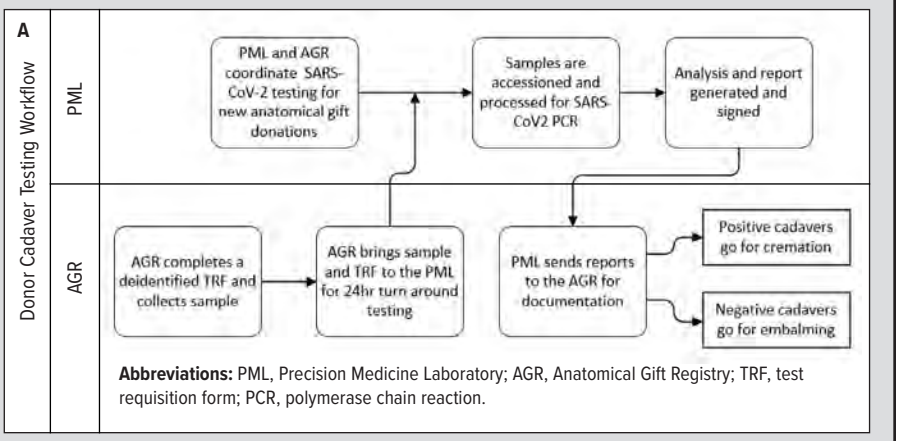
The Office of Research launched the SARS-CoV2 testing program for asymptomatic laboratory research personnel, including faculty, staff, graduate students, and post-doctoral fellows, returning to work on-site on July 20, 2020, as an employee benefit. Participation was voluntary. Specimens were collected at the Adult Translational Research Unit (ATRU) and tested in the PML. Human Resources provided a list of 1128 personnel eligible to participate in the program. An online appointment system informed the ATRU email system. Asymptomatic employees who volunteered for testing were provided with an employee test requisition form, a wellness screening form that included consent for testing, and were directed to report to the ATRU for specimen collection at the appointment time.

Specimens were collected by trained nurses wearing appropriate PPE using collection kits provided by the PML. Nasopharyngeal or anterior nasal swabs were placed in sample collection tubes containing universal transport medium and stored at 4°C until picked up by PML staff the same day for testing, with a turnaround time of 24 hours from specimen collection to result report. Based on CDC recommendations,[6] individuals with negative results were scheduled for repeat testing on a 2-week cycle, with an option to cancel if they preferred not to get tested. Individuals who tested positive for SARS-CoV2 were reported to Human Resources to ensure appropriate follow-up, including mandatory self-isolation, contact tracing, and repeat testing postisolation[7] (Figure 1A).

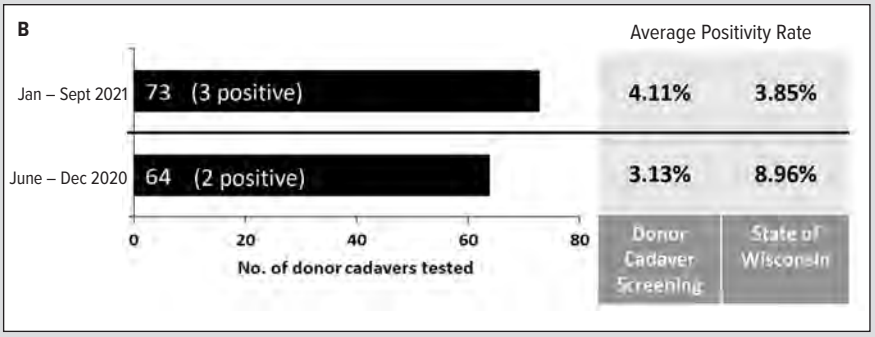
Screening of Donor Cadavers

To ensure the safety of individuals interacting with body donors, all donor cadavers were screened for SARS-CoV2 prior to embalming (Figure 2A). PML-provided collection kits were used to collect specimens from donor bodies temporarily stored in isolation. Nasopharyngeal swabs were collected by the Registry team donning proper PPE prior to approaching quarantined body donors. Collected samples were submitted to the PML for testing. Postprocessing, reports were sent to the Registry director. Donor cadavers with negative SARS-CoV2 test results were removed from isolation and embalmed, and those with positive results were sent for cremation.

Figure 2. SARS-CoV-2 Testing of Nasopharyngeal Swab Samples Obtained From Anatomical Gift Registry Body Donors



A. Prior to collecting nasopharyngeal (NP) swab samples from body donors, the PML and AGR collaborated to create a protocol for obtaining and testing donor samples. NP sample swabs were collected through each nostril by the AGR, and samples were submitted to the PML for SARS-CoV2 PCR analysis.



B. Testing body donors for SARS-CoV2 began in June 2020. From June through December, 2020, 64 body donors were evaluated with 2 testing positive, an average positivity rate of 3.13% vs 8.96%, the average positivity rate in Wisconsin during the same period. Between January and September 2021, 73 body donors were evaluated with 3 testing positive, an average positivity rate of 4.11% vs 3.85%, the average positivity rate in Wisconsin during the same period.

Evaluation of Data From Both Cohorts

Data from testing across both programs – the personnel screening (July 27, 2020 – September 30, 2021) and donor cadaver screening program (June 1, 2020 – September 30, 2021)–were evaluated to document case numbers and positivity rates. For the personnel screening program, we also reviewed sex of individuals in the cohort as well as the number of continuous testing cycles various individuals participated in during the evaluation period. This study was reviewed and approved by the MCW Institutional Review Board.

RESULTS

Laboratory Research Personnel Screening Program

At the end of 14 months of implementation (September 30, 2021), the program had screened 514 individuals for a total of 2718 tests;

spanning an age range of 22 to 81 years; with 313 females, 199 males, and 2 ungendered individuals (Figure 1B inset). One individual with the longest participation record completed 33 testing cycles (Figure 1B), with 472 individuals participating in 2 to 10 testing cycles. Thirteen individuals in the cohort tested positive, resulting in a positivity rate of 2.5% (13 of 514) or 0.5% (13 of 2718) if calculated across the number of specimens evaluated (Figure 1C). Vaccines were made available to research personnel in early March 2021, at which time the screening program participation numbers started to decrease (Figure 1C). It is expected that the program will continue to be offered to personnel until the institution is able to introduce a phased relaxation of COVID-19 protective measures that remain in place, in line with CDC recommendations.

Anatomical Gift Registry Donor Screening Program

Sixteen months after implementation (September 30, 2021), the Registry had received 137 body donations for which a total of 174 specimens were evaluated, with 2 or more samples being evaluated in some cases. Of all incoming donors, 5 tested positive for SARS-CoV2, a 3.6% (5 of 137) positivity rate (Figure 2B). Interestingly none of the positive cases in this cohort were documented as COVID-related deaths on donor death certificates, which would have precluded acceptance into the program.

DISCUSSION

Our study describes the successful implementation of a screening program for SARS-CoV2 in asymptomatic personnel and donor cadavers by our institution. Approximately 3000 specimens were tested across both programs, with an overall positivity rate of 2.5% in asymptomatic personnel and 3.6% in donor cadavers. This is in contrast to the high positivity rate observed in the state of Wisconsin during the study period (average 6.07%; minimum 0.72%, maximum 17.53%).[8]

The low positivity rate in the personnel screening program reflects the excellent overall adherence of research personnel to safety measures instituted, including the use of PPE and physical distancing. One might presume that removal of individuals with asymptomatic disease from MCW assisted in maintaining an environment free of workplace-associated infections. It is important to note that in the research personnel screening program, of the 1128 individuals who were eligible to participate, 514 availed this benefit—a 45% participation rate. While we have not directly investigated the reasons behind the lack of participation by certain individuals, we speculate that it may be due to the nature of their job, such as a limited need for them to be on-site for work or their confidence in the protective measures mandated by the organization to be on-site (including wellness screening prior to arrival, CDC recommended-distancing, and mandated face masks as PPE). A review of the demographics of those who did not participate in the program did not reveal any differences across gender, age, or position in the organization.

Early implementation of the donor cadaver screening program allowed for resumed acceptance of body donations within 3 months of disruption of research and educational operations on campus. Given that the donor certificates did not document death as being COVID related, the observed positives in this cohort could be due to asymptomatic, early stages of infection or likely because infection was undiagnosed, validating the need for the program to ensure safety for students and faculty. The latter is plausible given the advanced age and comorbidities in our donors. Cadaver donations are paramount to educational programs,[9] and proactive testing supported anatomy education, ensuring safe interactions with donated cadavers. Additionally, the subsequent follow-up measures with positive cases lowered risk of exposure for students.

CONCLUSIONS

This screening program serves as an example of institutional investment in the safety of its faculty, staff, and students alike. It also highlights the swift action and collaborative efforts taken to address specific needs brought on by a global pandemic, including restrictions on in-person interactions that disrupted research and educational operations.

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Safe Opioid Prescribing for Pediatric Patients: An Interprofessional Learning Activity

Kenneth Fiala, BS; Marianna Shershneva, MD, PhD; Barbara Anderson, MS

ABSTRACT

Introduction: An innovative online course on safe opioid prescribing for pediatric patients was designed by an interprofessional team of experts for an interprofessional target audience of clinicians in Wisconsin.

Methods: The 2-hour accredited course included recorded TED Talks-style presentations and interactive patient cases. A total of 227 course completers responded to pre- and posttests and a 20-item Interprofessional Collaborative Competency Attainment Scale (ICCAS). A Fisher exact test was used to compare pre/post first-attempt test responses and a 2-tailed *t* test compared the before/after ratings of ICCAS statements.

Results: Improvement on pre/posttest assessment was not significant. ICCAS showed a significant increase in interprofessional competence for each statement.

Discussion: Interprofessional learning can be effectively incorporated in opioid-related continuing education.

INTRODUCTION

The opioid epidemic is well documented in Wisconsin and the greater United States. In Wisconsin between 2010 and 2019, opioid overdose deaths more than doubled.[1] While the opioid epidemic is continuously researched, its impact on the pediatric population is less investigated compared to the adult population. Multiple studies show that there is a significant variation in the mean days supplied of postoperative opioids in pediatric patients.[2] Approximately 1 in 20 adolescents who filled an opioid prescription after a surgery developed a new and persistent use,[3] and approximately 5% of past-year opioid naïve pediatric patients filled an opioid prescription greater than 90 days after their surgery.[4] Due to the large negative effects of this epidemic and the persistent duration, creative interventions are needed to eliminate the ongoing threat to individuals and communities.

Education is an important route in which the opioid epidemic can be addressed. Opioid-related education for health care providers is shown to improve knowledge and trigger changes in practice;[5] for example, such positive impact resulted from a 1-hour training for emergency medicine providers and other clinicians in Wisconsin.[6] The medical community in Wisconsin recognizes the need for and the value of continuing education to aid in alleviating the current crisis.[7] This article reports on an innovative, highly interactive, online educational intervention for health care providers in Wisconsin that was designed by an interprofessional team of experts for an interprofessional target audience of clinicians that addresses safe opioid prescribing for pediatric patients.

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METHODS

Course Description

The "Safe Opioid Prescribing for Pediatric Patients" course was provided by the University of Wisconsin-Madison Interprofessional Continuing Education Partnership (ICEP). Content experts, including physicians, pharmacists, and nurses, collaborated with an instructional designer and accreditation specialists to develop

Figure. Enrolled Participants and Course Noncompleters by Profession

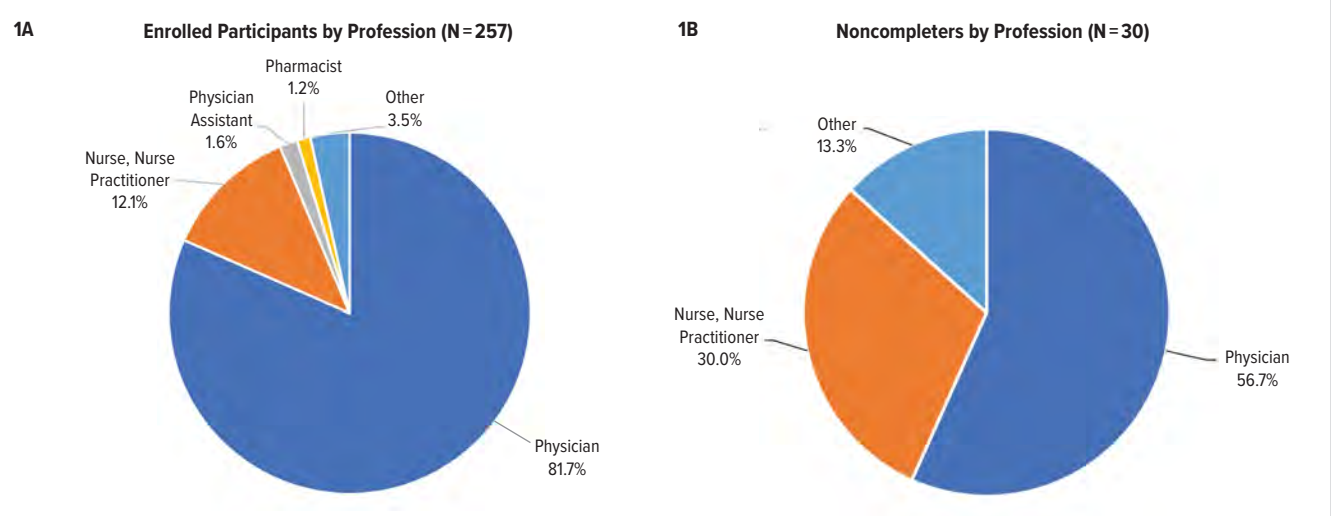

Table 1. Comparison of Pre- to Posttest Responses to Six Assessment Questions

	No. of Correct Responses	No. of Incorrect Responses	Total No. of Responses
Pretest (245 respondents)	1039	431	1470
Posttest (229 respondents)	1010	363	1373

The Fisher exact test statistic value is 0.0943. The result is not significant at $P \leq 0.05$.

this 2-hour on-demand course. The content addressed best practices for safe opioid selection, dosing, duration, and discontinuation in pediatric patients; techniques to minimize opioid use; safe use, storage, and disposal of prescribed opioids; and collaborative pain management in pediatric care. The course offered multiple opportunities to engage in active learning. These educational strategies included 5 TED-style presentations—delivered by a physician, a pharmacist, or a nurse; 6 unique patient cases designed to test clinical decision-making skills while supporting learning through immediate feedback; discussion questions; and embedded educational resources. Several types of continuing education credit were awarded with this course, including *AMA PRA Category 1 Credit*, American Nurses Credentialing Center (ANCC) Contact Hours and ANCC Pharmacotherapy Contact Hours, Accreditation Council for Pharmacy Education (ACPE) Contact Hours, American Psychological Association (APA) Credits, and American Board of Pediatrics (ABP) Maintenance of Certification (MOC) Part 2 Points. The course was also approved by the Wisconsin Medical Examining Board and met the state of Wisconsin continuing medical education (CME) requirement for education on responsible opioid prescribing.

Evaluation Methods

The course evaluation included pre- and posttest assessments; a post-activity evaluation survey to measure the quality of education and solicit learner commitment to practice change; a post-activity Interprofessional Collaborative Competency Attainment Scale (ICCAS), and a 3-month post-activity follow-up survey. For the purpose of this article, we highlighted test results, ICCAS data, and planned changes in practice.

The pretest consisted of 6 clinical vignette questions; the same questions were included in the larger posttest. Pre-responses versus post-responses to these 6 questions were compared using a Fisher exact test with a significance level of $P \leq 0.05$. Participants were allowed to take both the pre- and posttest multiple times; however, only their first attempt on each occasion was used in the data analysis.

The ICCAS is a validated, 20-item self-reporting tool to assess behaviors associated with patient-centered, team-based, collaborative care.[8] Participants were asked to rate their ability perform each descriptive statement for "before" and "after" participation in the course on a 5-point scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent. The course evaluation, including the ICCAS tool, was not required to earn continuing education credit, so each evaluation question/statement rating had a variable number of responses. A 2-tailed *t* test was used to compare the "before" and "after" ratings of ICCAS statements, with a significance level of $P \leq 0.05$.

The evaluation also included open-ended questions asking learners to state specific changes they planned to make in practice as a result of course participation and explain how their interprofessional team would utilize the information provided during the course. The responses were reviewed to identify themes.

RESULTS

A total of 257 health care professionals enrolled in the course; 227 completed all required educational components. The majority of completers (n = 193, 81.7%) were physicians. More than half of noncompleters were physicians, and the rest were in nursing or other professions (Figure).

First-attempt responses to the pretest were compared against the first-attempt posttest responses. The results indicated improvement, although not statistically significant, with a *P* value of 0.0943 (Table 1).

For the ICCAS tool, there was a range of 203 to 215 responses to each of 20 statements. Each statement was found to have a significant difference between "before" and "after" the course, with a *P* value of ≤ 0.05 (Table 2).

The 21st and final statement in the ICCAS tool refers to the overall ability to collaborate interprofessionally. The respondents were asked, "Compared to the time before the course, would you say your ability to collaborate interprofessionally is: (5 options from "much worse now" to "much better now" were listed). A total of 214 participants answered this question, reporting "much worse now" (1.0%), "somewhat worse now" (0.5%), "about the same" (57.0%), "somewhat better now" (30.0%), and "much better now" (11.0%).

Participants' statements about planned changes in practice included collaborative language, such as:

- "We will talk with each other regarding difficulty, options, and consultation for effective pain management."
- "Utilize pain management team when appropriate."
- Ask for health psychology to be part of our clinic practice."
- "Collaboration with subspecialists on pain management."

Other themes included appropriate use of opioids, nonopioid analgesics, and nonpharmacological therapies; use of distraction techniques with procedures; better conversations with parents; and encouraging families to get a locked box for opioids and safely disposing of leftover medication.

Table 2. Rating Averages for Interprofessional Statements Before and After Course Participation (ICCAS Tool)

Statement	Before Course Participation, Mean (no. of responses)	After Course Participation, Mean (no. of responses)	*P* value
Promote effective communication among members of an interprofessional (IP) team.	3.803 (213)	3.986 (213)	$1.75 \cdot 10^{-7}$
Actively listen to IP members' ideas and concerns.	3.898 (215)	4.079 (215)	$5.89 \cdot 10^{-8}$
Express my ideas and concerns without being judgmental.	3.822 (214)	3.972 (214)	$2.31 \cdot 10^{-6}$
Provide constructive feedback to IP team members.	3.738 (214)	3.883 (214)	$1.29 \cdot 10^{-6}$
Express my ideas and concerns in a clear, concise manner.	3.775 (209)	3.919 (209)	$2.16 \cdot 10^{-6}$
Seek out IP team members to address issues.	3.823 (209)	4.014 (209)	$1.03 \cdot 10^{-7}$
Work effectively with IP team members to enhance care.	3.865 (208)	4.072 (208)	$1.18 \cdot 10^{-9}$
Learn with, from, and about IP team members to enhance care.	3.846 (208)	4.029 (208)	$9.78 \cdot 10^{-8}$
Identify and describe my abilities and contributions to the IP team.	3.776 (210)	3.919 (210)	$6.31 \cdot 10^{-6}$
Be accountable for my contributions to the IP team.	3.840 (206)	3.978 (206)	$1.05 \cdot 10^{-5}$
Understand the abilities and contributions to the IP team.	3.825 (211)	4.000 (211)	$4.86 \cdot 10^{-7}$
Recognize how others' skills and knowledge complement and overlap with my own.	3.817 (208)	4.020 (208)	$3.56 \cdot 10^{-8}$
Use an IP team approach with the patient to assess the health situation.	3.819 (210)	3.986 (210)	$2.09 \cdot 10^{-6}$
Use an IP team approach with the patient to provide whole person care.	3.861 (209)	4.024 (209)	$4.65 \cdot 10^{-7}$
Include the patient/family in decision-making.	3.976 (208)	4.111 (208)	$1.05 \cdot 10^{-5}$
Actively listen to the perspectives of IP team members.	3.933 (208)	4.067 (208)	$1.70 \cdot 10^{-5}$
Take into account the ideas of IP team members.	3.928 (209)	4.048 (209)	$7.36 \cdot 10^{-5}$
Address team conflict in a respectful manner.	3.854 (205)	3.937 (205)	0.002
Develop an effective care plan with IP team members.	3.828 (203)	4.000 (203)	$1.30 \cdot 10^{-6}$
Negotiate responsibilities within overlapping scopes of practice.	3.818 (203)	3.975 (203)	$1.31 \cdot 10^{-6}$

Scale: 1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent.

Abbreviation: ICCAS, Interprofessional Collaborative Competency Attainment Scale.

DISCUSSION

The Midwest Interprofessional Practice, Education, and Research Center advocates for integration of interprofessional learning throughout the curricula.[9] This was one of the goals underlying the development of the described course, and it was accomplished by the interprofessional team of experts and planners who considered practice gaps and challenges experienced by health care teams who prescribe and administer opioids for pediatric patients. Significant

improvement in the learners' interprofessional competence, measured by the ICCAS tool, may be explained by a deliberate effort of the course developers to (a) emphasize how this topic relates to different members of the health care team and requires collaborative practice, (b) involve faculty representing different members of the health care team typically caring for these patients, and (c) embed strategies for active learning in the course.

Participants' responses to the first-attempt posttest compared to the pretest showed a trend toward improved understanding of the material and its application to solve clinical cases, although this improvement was not statistically significant. Explanations of correct answers were provided to test-takers to reinforce knowledge and skills emphasized in the course. When incorrect responses were given, these explanations may have helped participants learn the skill or strategy they missed due to rushed participation or because the content was insufficiently covered in the course. Thus, the course facilitated clinician learning. It also met the State of Wisconsin requirement that physicians complete 2 CME credits on responsible opioid prescribing each biennium. Good participation and high course completion rate by physicians aligned with this requirement.

In the next iteration of this course, the planners intend to explore ways to better reach a more interprofessional group of health care professionals while striving for a higher percentage of completion by nonphysician learners. In addition to reviewing the current standards of practice, updating analysis of educational needs, and working with an interprofessional team of planners and presenters, the following strategies are being considered: inviting patients/caregivers to contribute to case development, adding an interprofessional panel discussion to the course, and tailoring the audience generation messages to the needs of all members of the health care team.

Evaluations of opioid-related continuing education programs have been criticized for lack of measuring patient- or population-level outcomes,[10] and we acknowledge this limitation in our evaluation. Another limitation is that the data were mostly self-reported, with the exception of the pre- and posttest results. At the same time, use of the validated ICCAS tool was the strength of this evaluation. Finally, outcomes of this interprofessional course were not compared with a similar non-interprofessional course. Future evaluation or research studies could assess this comparison.

CONCLUSION

This brief report provides an example of how interprofessional learning can be effectively incorporated in on-demand, opioid-related continuing education for health care professionals. An interprofessional content-development effort, use of faculty whose professions reflect the target audience of learners, and employing engaging and interactive educational strategies that reflect team-based care can result in an increase in the participants' collective ability to collaborate interprofessionally.

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Same-Day Discharge After Robotic Hysterectomy: A Resource Utilization and Quality Improvement Project

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ABSTRACT

Background: We implemented a low-cost education initiative to improve the rate of same-day discharge following hysterectomy performed for malignancy and assessed feasibility and impact on resource utilization.

Methods: Development and implementation of faculty, patient, clinical, and perioperative staff education regarding the goal of same-day discharge for patients undergoing robotic hysterectomy and staging by gynecologic oncologists was started in July 2019. Chart review of 103 patients prior to the intervention and 112 patients after the start of the intervention was completed.

Results: The rate of same-day discharge increased from 5% to 32% following the low-cost process change initiative, and a total of approximately 682 inpatient care hours were saved per 31 patients.

Discussion: The rate of same-day discharges after hysterectomy and staging performed by gynecologic oncologists can be safely increased with a simple educational intervention, which can save significant patient care resources.

BACKGROUND

Hysterectomy is one of the most common surgical procedures for women; by age 60, over one-third of all women in the United States have undergone a hysterectomy.[1] About 9% of all hysterectomies from 2000 through 2004—totaling nearly 300,000 US women—were performed to treat a diagnosis of gynecologic malignancy.[1-4] Minimally invasive surgical approaches, including laparoscopic, vaginal, and robotic methods, frequently are utilized. These techniques repeatedly demonstrate decreased blood loss, improved wound healing, shorter recovery time, less pain, and shorter hospital stays.[5-7] Multiple studies have proven the safety and feasibility of eliminating hospital stays entirely through same-day discharges following minimally invasive hysterectomies for both benign and malignant conditions.[8-10] Nationally, the number of same-day discharges for women with endometrial malignancy, in particular, have increased from 5.6% in 2011 to 16.3% in 2016,[9] without a significant change in hospital readmission rates. In an effort to save hospital costs while also improving patient satisfaction, some institutions have implemented patient and provider education initiatives to promote same-day discharge.[10]

The Division of Gynecologic Oncology at the Medical College of Wisconsin (MCW) sought to align its practice with current literature and increase same-day discharge following robotic-assisted total hysterectomy and staging. The intent was to determine whether same-day discharges after minimally invasive surgery for malignancy could be affected over the course of a year and the approximate number of inpatient care hours saved by same-day discharge. As each inpatient hour of care is associated with significant costs in any institution, hours saved would thus serve as a surrogate marker of improved resource utilization and cost savings.

METHODS

This project was undertaken at Froedtert and the Medical College of Wisconsin, a tertiary academic medical center located in Milwaukee, Wisconsin. Retrospective data on the rate of same-day discharge and postoperative emergency department visits and hospital admissions were collected for the period of July 2018 through June 2019 (Group A). This served as the

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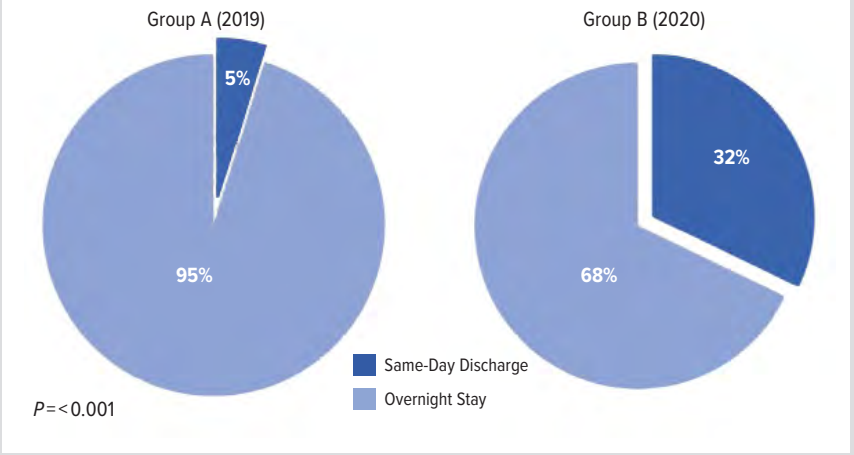
Figure. Hysterectomy Discharges



baseline same-day discharge rate. We then sought to improve the rate of same-day discharge after robotic hysterectomy and staging performed by gynecologic oncologists through an educational and process change initiative. Data on same-day discharge were collected post-intervention from July 2019 through June 2020 (Group B) to determine the educational intervention's efficacy.

The initiative included review and discussion of the current literature on same-day discharge for oncology patients by the gynecology oncology faculty, residents, advance practice providers, and clinic staff. Time spent reading was approximately 1 to 2 hours per clinician, and group discussion of literature was approximately 1 to 2 hours total. The goal to implement same-day discharge was accepted by the practice after clinicians agreed upon the initiative's overall safety and feasibility. The team discussed ways to set expectations for same-day discharge with patients and reviewed standard institutional criteria patients needed to meet in order to be discharged to home: appropriate pain control, ability to tolerate oral intake without nausea, ambulating at baseline, voiding, hemodynamic stability, appropriate respiratory status, transportation home, and supervision for the first 24 hours after surgery. In addition, the initiative was shared institutionally with perioperative clinic staff, anesthesia providers in the pre-anesthesia testing clinic, and nursing staff in the pre- and postoperative care units so that all patient contacts were aware of the initiative. During their initial clinic consultation, all patients deemed surgically appropriate and undergoing minimally invasive hysterectomy with staging surgery were included in this initiative. Patients with a surgical plan that included laparotomy were not included. At the initial consultation, patients were provided verbal and printed information regarding their procedure and the expectation for same-day discharge if meeting institutional standard discharge criteria. Hospital admission following a minimally invasive hysterectomy was reserved for patients not meeting the standard discharge criteria.

Interval assessments were performed to determine progress and safety of increasing same-day discharges. Interval reminders to clinicians in care units outside of gynecologic oncology occurred ad hoc to reinforce the process change. Initially, reminders were needed approximately every few months, as we found the perioperative teams that were not accustomed to same-day discharge would make the assumption that patients were to be admitted. This, in turn, resulted in patient confusion and altered patient expectations. The progress updates were disseminated at regular intervals in the monthly gynecologic oncology division meetings where additional reminders to clinicians in gynecologic oncology were needed for the first few months. Repeat reminders for gynecologic oncology clinicians became unnecessary after about 6 months, whereas occasional reminders to perioperative teams were still needed throughout the year. Retrospective chart review was utilized to collect clinical information about patients and surgical procedures performed. The Honest Broker tool (CTSI Clinical Research Data Warehouse, 2020, https://ctsi.mcw.edu/ctri/) was used to extract self-reported demographic information from patient charts. Surgical data, such as operative procedures performed and time of completion in the recovery room visit, were detailed. Approximate hours saved by same-day discharge were calculated by using the mean duration/hours of patient stay (admitted) versus the mean duration/hours of patient stay (discharged).

All statistical analyses were carried out using R (R Core Team, 2020, http://www.R-project.org/) and a 2-sided P value of less than 0.05 was considered statistically significant, unless otherwise noted. For continuous data, median and interquartile range were utilized. For categorical data, results were summarized as percentages and compared by chi-square or Fisher exact tests. Continuous variables between groups were compared using Mann-Whitney, Wilcoxon, or Kruskal-Wallis tests.

RESULTS

One hundred three patients underwent robotic hysterectomy and staging by a gynecologic oncologist during July 2018 – June 2019 (Group A); 4.9% (5 patients) were discharged home on the day of surgery. One hundred twelve patients underwent robotic hysterectomy during July 2019 – June 2020 (Group B); 32% (36 patients) were discharged home on the day of surgery ($P<0.001$) (Figure). The rate of same-day discharge after robotic hysterectomy performed by gynecologic oncologists at our institution was significantly increased ($P<0.001$). Of the 5 patients in Group A who were discharged on the day of surgery, there were no readmissions or ED visits. In Group B, of the 36 patients undergoing same-day discharge, there was 1 ED visit, 1 urgent care visit, and no readmissions.

Table 1. Demographic Factors All Patients

Characteristic	Group A (2019) N = 103	Group B (2020) N = 112	*P* value
Age[a]	62 (57-71)	65 (58-70)	0.3
Body Mass Index[a]	35 (29-43)	34 (28-42)	0.7
Same-Day Discharge[b]			< 0.001
Overnight Stay	98 (95%)	76 (68%)	
Same-Day Discharge	5 (4.9%)	36 (32%)	
Malignant[b]	86 (83%)	92 (82%)	0.8
Stage[b]			0.3
Benign	17 (17%)	20 (18%)	
IA	52 (50%)	56 (50%)	
IB	23 (22%)	17 (15%)	
II	5 (4.9%)	5 (4.5%)	
III	3 (2.9%)	11 (9.8%)	
IV	3 (2.9%)	3 (2.7%)	
Histology[b]			0.2
Benign	10 (9.7%)	6 (5.4%)	
Endometrial intraepithelial neoplasia	7 (6.8%)	12 (11%)	
G1 endometrioid	54 (52%)	43 (38%)	
G2 endometrioid	12 (12%)	18 (16%)	
High grade	17 (17%)	29 (26%)	
Ovary malignancy	3 (2.9%)	4 (3.6%)	
Prior abdominal surgery[b]	64 (62%)	70 (62%)	> 0.9
Marital status[b]			0.7
Married	59 (57%)	60 (54%)	
Single	23 (22%)	25 (22%)	
Widowed	10 (9.7%)	17 (15%)	
Other	11 (11%)	10 (8.9%)	
Employment[b]			0.8
Employed	44 (43%)	43 (38%)	
Not employed	12 (12%)	13 (12%)	
Retired	47 (46%)	56 (50%)	
Race[b]			0.010
Asian	0 (0%)	4 (3.6%)	
Black or African American	4 (3.9%)	13 (12%)	
White or Caucasian	98 (95%)	95 (85%)	
Ethnicity[b]			0.051
Hispanic	4 (3.9%)	0 (0%)	
Non-Hispanic	99 (96%)	112 (100%)	

[a]Median (interquartile range), n (%).
[b]Wilcoxon rank sum test; Pearson's chi-square test; Fisher exact test; n (%).

Table 2. Demographic and Clinical Factors Group B Post-Intervention

Characteristic	Overnight Stay N = 76	Same-Day Discharge N = 36	*P* value
Age[a]	66 (59-72)	60 (55-66)	0.024
Body Mass Index[a]	35 (29-42)	32 (26-41)	0.2
Malignant[b]	65 (85%)	27 (75%)	0.2
Stage[b]			0.7
Benign	11 (14%)	9 (25%)	
IA	38 (50%)	18 (50%)	
IB	13 (17%)	4 (11%)	
II	3 (3.9%)	2 (5.6%)	
III	8 (11%)	3 (8.3%)	
IV	3 (3.9%)	0 (0%)	
Histology[b]			0.10
Benign	3 (3.9%)	3 (8.3%)	
Endometrial intraepithelial neoplasia	6 (7.9%)	6 (17%)	
G1 endometrioid	26(34%)	17 (47%)	
G2 endometrioid	13 (17%)	5 (14%)	
High grade	25 (33%)	4 (11%)	
Ovary malignancy	3 (3.9%)	1 (2.8%)	
Prior abdominal surgery[b]	56 (61%)	24 (67%)	0.5
Marital status[b]			0.015
Married	41 (54%)	19 (53%)	
Single	15 (20%)	10 (28%)	
Widowed	16 (21%)	1 (2.8%)	
Other	4 (5.3%)	6 (17%)	
Employment[b]			0.028
Employed	23 (30%)	20 (56%)	
Not employed	9 (12%)	4 (11%)	
Retired	44 (58%)	12 (33%)	
Race[b]			0.08
Asian	3 (3.9%)	1 (2.8%)	
Black or African American	10 (13%)	3 (8.3%)	
White or Caucasian	63 (83%)	32 (89%)	
Time recovery room complete[b]			< 0.001
8 a.m. – 11:59 a.m.	3 (3.9%)	9 (25%)	
12 p.m. – 3:59 p.m.	30 (39%)	26 (72%)	
4 p.m. – 7:59 p.m.	37 (49%)	1 (2.8%)	
8 p.m. – 12 a.m.	6 (7.9%)	0 (0%)	
Operative procedures[b]			
Sentinel lymph node dissection	52 (68%)	31 (86%)	0.046
Pelvic lymph node dissection	35 (46%)	13 (36%)	0.3
Para-aortic lymph node dissection	27 (36%)	3 (8.3%)	0.002
Other procedures	8 (11%)	2 (5.6%)	0.5

[a]Median (interquartile range), n (%).
[b]Wilcoxon rank sum test; Pearson's chi-square test; Fisher exact test; n (%).

In the post-intervention group (Group B), the mean hours an admitted patient stayed in the hospital was 25. Patients discharged home the same day stayed a mean of 3 hours. Thus, approximately 22 hours of patient care could be saved for each patient discharged home the same day. Given we increased same-day discharges from 5 patients in Group A to 36 patients in Group B, we calculated that approximately 682 inpatient care hours were saved by this intervention over the course of 1 year.

One hundred three patients in Group A and 112 patients in Group B underwent robotic hysterectomy with a gynecologic oncologist at our institution. There was no significant difference between most demographic and clinical factors of patients in the 2 groups (Table 1). However, a difference in race and ethnicity was noted between the groups as Group B had more Asian and African American patients ($P = 0.010$), and Group A had 4 patients identifying as Hispanic, compared to none in Group B ($P = 0.051$); these represent small numbers of patients overall.

When comparing the patients post-intervention (Group B) who were discharged on the day of surgery (n = 36) to those who stayed overnight (n = 76), several differences were noted (Table 2). Patients discharged on the same day often were employed and younger than those who stayed overnight. There was no significant difference between stage of malignancy, histology, or history

of prior abdominal surgery between patients with overnight stay versus the same-day discharge group (Table 2).

Among patients in Group B, additional procedures were performed as follows: pelvic sentinel lymph node dissection (83/112, 74%), pelvic lymphadenectomy (48/112, 43%), and para-aortic lymphadenectomy (30/112, 27%), as well as other procedures, including midurethral sling, pelvic organ prolapse surgery, and hernia repair (10/112, 9%). There was a significant difference between the overnight and same-day discharge groups, with more same-day discharge patients having undergone a sentinel lymph node biopsy ($P = 0.046$) and more overnight stay patients having undergone a para-aortic lymph node dissection ($P = 0.002$) (Table 2), the latter of which adds complexity and time to the surgical operation. More same-day discharge patients completed their recovery room stay between noon and 4 PM (72%), whereas more overnight stay patients completed the recovery room between 4 PM and 8 PM (49%) ($P < 0.001$).

DISCUSSION

Same-day discharge after minimally invasive hysterectomy previously has been determined safe in gynecologic oncology patients.[9-10] Same-day discharge in this population has the potential for substantial cost savings without compromising safety or patient satisfaction. By instituting an effective educational intervention and process change management strategy across multidisciplinary clinical teams, our practice significantly increased the rate of same-day discharges from 5% to 32% in 1 year. This low-cost intervention saved approximately 682 inpatient hours of care. This process change was supported by evidence-based practice, but reminders to all clinicians and teams were needed initially. After approximately 6 months, reminders were needed mainly for the perioperative teams to reinforce the new protocol. Safety of the new protocol was confirmed in our study as there was only 1 subsequent ED visit for pain control, 1 urgent care visit for rash, and no readmissions to either our facility or any other local facility during the postoperative period.

A number of trends in our study have been noted previously in the literature. Younger patient age, lower surgery complexity, and earlier procedure completion time all have been associated with higher likelihood of same-day discharge. Although we did not explore reasons for this finding specifically, it is conceivable that it may be attributed to several factors, such as additional medical comorbidities, extended traveling distance from hospital, lack of comfort with evening discharge by either patient or support person, or possibly lack of an available support person in the first 24 hours after anesthesia.

The primary objective of this initiative was to successfully execute a process change surrounding same-day discharges in the division of gynecologic oncology. The minimal cost of educating patients and staff members and significant increase in same-day discharges achieved in 1 year's time demonstrate the feasibility of promoting same-day discharge, but several limitations to our findings are present. The correlation of decreased inpatient hours with cost savings seems intuitive but does not provide an actual dollar amount per hour saved. We did not perform a formal cost analysis, and the approximate number of clinical hours of care saved is calculated based on mean values of groups studied. The complexity of calculating cost (direct and indirect costs, variable or fixed) is challenging on many levels and can be affected by myriad factors. Being mindful of resource utilization to control costs is an important consideration, as the majority of hospital care costs are related to building space, equipment, salaried labor, and overhead.[11] Thus, we concluded that decreasing inpatient hours was an important surrogate for cost reduction. This initiative took place at an academic tertiary care institution and our results, while not generalizable to all institutions, provide an example for others who seek to promote same-day discharge and save valuable resources while dedicating minimal time and costs toward an intervention. This initiave also demonstrates that impactful results can be achieved safely in the short time period of 1 year.

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