




Giving Birth in the Early Phases of the COVID-19 Pandemic: The Patient Experience

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Abstract

Objective Obstetrical patients are at risk of complications from COVID-19 and face increased stress due to the pandemic and changes in hospital birth setting. The objective was to describe the perinatal care experiences of obstetrical patients who gave birth during the early phases of the COVID-19 pandemic.

Methods A descriptive epidemiological survey was administered to consenting patients who gave birth at The Ottawa Hospital (TOH) between March 16th and June 16th, 2020. The participants reported on prenatal, in-hospital, and postpartum care experiences. COVID-19 pandemic related household stress factors were investigated. Frequencies and percentages are presented for categorical variables and median and interquartile range (IQR) for continuous variables.

Results A total of 216 participants were included in the analyses. Median participants age was 33 years (IQR: 30–36). Collectively, 94 (43.5%) participants felt elevated stress for prenatal appointments and 105 (48.6%) for postpartum appointments because of COVID-19. There were 108 (50.0%) were scared to go to the hospital for delivery, 97 (44.9%) wore a mask during labour and 54 (25.0%) gave birth without a support person. During postpartum care, 125 (57.9%) had phone appointments (not offered prior to COVID-19), and 18 (8.3%) received no postpartum care at all.

Conclusion COVID-19 pandemic and public health protocols created a stressful healthcare environment for the obstetrical population where many were fearful of accessing services, experienced changes to standard care, or no care at all. As the pandemic continues, careful attention should be given to the perinatal population to reduce stress and improve continuity of care.

Keywords COVID-19 · Prenatal anxiety · Postpartum care · Telemedicine · Obstetrics · Patient-centered care · Virtual care

Résumé

Objectif Les patients obstétriques sont à risque de complications de la COVID-19 et font face à un stress accru en raison de la pandémie et des changements dans le cadre de l'accouchement en milieu hospitalier. L'objectif était de décrire les expériences de soins périnataux des patients obstétriques qui ont accouché au cours des premières phases de la pandémie de COVID-19.

Méthodes Un sondage épidémiologique descriptif a été menée auprès de patients qui ont accouché à L'Hôpital d'Ottawa (TOH) entre le 16 mars et le 16 juin 2020. Les participants ont fait un compte rendu de leurs expériences en matière de soins

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prénataux, hospitaliers et post-partum. Les facteurs de stress domestique liés à la COVID-19 ont été étudiés. Les fréquences et les pourcentages sont présentés pour les variables catégorielles et la médiane et l'écart interquartile (IQR) sont présentés pour les variables continues.

Résultats Au total, 261 participants ont répondu au sondage. L'âge maternel médian était de 33 ans (IQR: 30–36). Collectivement, 94 participants (43,5%) ressentait un stress élevé en lien avec les rendez-vous prénataux et 105 (48,6%) pour les rendez-vous post-partum en raison de la COVID-19. Il y avait 108 patients (50,0%) qui avaient peur d'aller à l'hôpital pour accoucher, 97 (44,9%) qui portaient un masque pendant leur travail et 54 (25,0%) qui ont accouché sans personne de soutien. En lien avec les soins post-partum, 125 (57,9%) ont eu des rendez-vous téléphoniques (non offerts avant la pandémie COVID-19) et 18 (8,3%) n'ont reçu aucun soin post-partum.

Conclusion La pandémie de COVID-19 et les politiques de santé publique ont créé un environnement de soins de santé stressant pour la population obstétrique où beaucoup avaient peur d'accéder aux services de soins, ont connu des changements dans les soins de base ou n'ont pas eu de soins du tout. Alors que la pandémie se poursuit, une attention particulière doit être accordée à la population périnatale afin de réduire le stress et améliorer la continuité des soins.

Significance statement

This study has documented the experiences of obstetrical patients who gave birth during the beginning of the COVID-19 pandemic, when there was very little known about COVID-19 and societies were on high alert. The participants in this study went through their pregnancy and post-partum time with heightened stress, reductions in access to their perinatal care, delayed seeking care, and some received no perinatal care at all. There were increases in perinatal appointments by phone, which was well-received by the participants and not previous commonly available before.

Introduction

The novel coronavirus disease (COVID-19) was declared a global pandemic by the World Health Organization in March 2020 (Sharma et al., 2020). This led to global concern over the possible adverse effects of COVID-19 disease on pregnant individuals, particularly as the pregnant population is disproportionately affected by respiratory illnesses (Di Mascio et al., 2020; Liu et al., 2020a, 2020b). Studies of COVID-19 disease identified higher mortality rates, intensive care unit admission and other infectious morbidity among pregnant individuals compared to the non-pregnant population (Khalil et al., 2020). Additionally, COVID-19 disease during pregnancy is associated with higher risk of pre-term birth, cesarian birth, and some cases of fetal and maternal death (Di Toro et al., 2021; McClymont et al., 2020).

Along with the clinical risks of COVID-19 disease, public lockdown protocols and new hospital guidelines caused drastic changes to clinical service provision. Many health care services transitioned to virtual or remote care or cancelled services altogether to reduce in-person visits and limit exposure to COVID-19 (Peahl et al., 2020). Pregnant and

post-partum individuals are typically highly engaged with the healthcare system seeing many providers throughout the perinatal period. However, alternatives to face-to-face clinical care, such as phone or video appointments, while effective for infection control, can reduce opportunities for early identification of perinatal and neonatal health concerns (Fryer et al., 2020). Additionally, many hospitals and obstetric departments had restricted visitation to prevent the spread of COVID-19, contributing to increased isolation during labour and birth (Viaux et al., 2020). Increased use of personal protective equipment (PPE), such as masks and shields, by the obstetrical medical team and the patients can contribute to increased stress and limit communication (Rimmer et al., 2020).

Several studies have documented that the COVID-19 pandemic has negatively affected the mental health of pregnant individuals and that their level of anxiety and depression symptoms was significantly increased (Abdoli et al., 2020;). Other household stress factors such as income loss and financial strain contribute to anxiety and depressive symptoms (Dijkstra-Kersten et al., 2015). In addition to the substantial clinical risks associated with perinatal COVID-19 disease, more information is needed on the experiences of the obstetrical population navigating pregnancy throughout the COVID-19 pandemic, including changes to their home environments and their health care experiences during the pandemic.

The objective of this study was to describe the perinatal experiences during the COVID-19 pandemic including: (1) household stress factors related to COVID-19 lockdown protocols, (2) patients health care utilization patterns during the COVID-19 pandemic and (3) patient perinatal health care experiences.

Methods

Study Setting and Context

The study was conducted in Ottawa, Ontario. Ottawa is the capital city of Canada, with a metropolitan population of 1.3 million (Statistics Canada, 2016). At the beginning of the study (June 2020), Ottawa had a cumulative total of 2 650 COVID-19 cases (2 240 recovered), 40 161 cases in Ontario (36 381 recovered), and 119 451 cases in Canada (112 709 recovered) (Public Health Agency of Canada, 2020). The state of emergency was declared by the Ontario provincial government on March 17, 2020, granting the government broad control to shut down institutions and businesses, such as schools and workplaces and to restrict movement and travel.

Our study took place at The Ottawa Hospital (TOH) Department of Obstetrics, Gynecology and Newborn Care. TOH has Obstetrical Units at two of its three campuses and delivers approximately 6 000 infants per year. TOH is the only hospital in the region that provides obstetrics tertiary care, and serves as the referral base for most of Eastern Ontario. Safety protocols were implemented by Department of Obstetrics, Gynecology, and Newborn Care to prevent the spread of COVID-19, including limiting visitors and verbal screening of all patients and their support person upon entry to the Birthing Unit. Antenatal patients who were admitted were not allowed to have a support person until in active labour and only one support person was permitted to be present during labour and could only enter once (i.e., no in-and-out privileges) after screening negative for COVID-19. No additional children or family members could visit during a patient's hospital stay.

Study Design and Recruitment

This was a descriptive cross-sectional study of pregnant patients who delivered at TOH from March 16th to June 16th, 2020. Study participants completed a one-time online survey investigating the patient's experiences and how the COVID-19 pandemic impacted their perinatal experience.

Eligible participants were identified through a query of the hospital electronic medical health records for individuals who had given prior consent to be contacted for research purposes through the TOH Permission to Contact Program. To be included in the study, participants must have delivered a live infant at TOH during the first three months of the COVID-19 pandemic, be 16 years of age or over, and have an understanding of English or French. Patients whose pregnancies resulted in stillbirth or neonatal death were not contacted.

To improve response rate, eligible patients were contacted by phone, and after obtaining verbal informed consent, a link to the online survey was sent to a private email address. This allowed for private completion of the survey on a personal computer or device. The survey questions were not validated.

Patient Partner

The survey and all study materials were developed in collaboration with a Patient Partner (O'Hare-Gordon), who was admitted to TOH at the beginning of the COVID-19 pandemic and unable to see her partner and children for 5 weeks (22nd April – 27th May 2020). She gave birth to pre-term twins who admitted to Neonatal Intensive Care Unit. Our Patient Partner helped to develop survey questions and interpret the results to best reflect the experiences of pregnancy and labour during the pandemic.

Variables

Demographic characteristics included participants age (years), infant age (days), month of childbirth and parity. Participants race/ethnicity was categorized using questions developed locally by Ottawa Public Health and included White, Asian (i.e., South, South-East, East), Middle Eastern, Black, and Another Person of Color (POC). Participants reported on immigration status and marital status (married/common law vs single/separated/divorced). Economic status was measured as gross household income below the Ottawa median (CAD \$120,000) as determined by the Canadian Census (Statistics Canada, 2017). Level of education was determined as completion of an undergraduate, university degree, college education or higher.

Household stress factors related to the COVID-19 lockdown included any parental income loss, partner is an essential worker, increase in substance use by partner and changes in child schedules (e.g., stopped school/daycare). Pregnancy stress related variables included not being able to have a baby shower (or other planned celebration), a family member could not come and stay with them as planned, friends and family could not visit the new infant, or missing out on community resources.

Perinatal stress associated with care during the COVID-19 pandemic included questions on feelings of stress or anxiety surrounding prenatal care, labour and delivery, and postpartum care. Thirteen questions were asked on a 5-point Likert scale from strongly agree to strongly disagree. The answers were dichotomized into strongly agree/agree vs neutral/disagree/strongly disagree.

The survey investigated the mode and frequency of prenatal and postpartum care appointments (phone call, video call or in person). The in-hospital patient experience included

wearing a mask during delivery and if support persons were with participants for early labour, active labour/delivery, and postpartum.

Other questions investigated postpartum or infant health issues in addition to any postpartum visit to an emergency department for perinatal or neonatal medical attention. Lactation variables were included such as planned and current method of feeding the infant (e.g., breast/chest milk, formula, or both) and difficulties experienced with breast/chestfeeding. These variables are available in the supplementary material.

Statistical Analyses

A descriptive approach was used to summarize the patient experience and no hypothesis testing or tests of association were conducted. Descriptive statistics included frequencies and percentages for categorical variables. Continuous variables were summarized using median and interquartile range (IQR). In accordance with privacy guidelines, all collected data of $N < 5$ was suppressed to ensure non-identification.

Results

From March 16th to June 16th, 2020, 1568 individuals delivered at TOH, 613 agreed to be contacted for research, 572 had valid phone numbers, 302 gave consent to participate in the study, and 261 finished the survey, for an overall response rate of 42.6%. The analytic sample was restricted to 216 patients with complete survey responses. No COVID-19 diseases were reported among the survey participants.

Table 1 presents the general demographic information among participants who delivered a live birth during the COVID-19 pandemic. The participants median age was 33 years (IQR:30–36) and the infant median age was 76 days (IQR:66–90). The sample was composed of 147 (68.1%) participants who identified as White, 31 (14.4%) South/South-East or East Asian, 18 (8.3%) Middle Eastern, 17 (7.9%) Black, and 25 (11.6%) who identified as another person of color. In total, 212 (98.2%) spoke English and 80 (37.0%) had household incomes below the municipal median.

Table 2 summarizes the household stress factors related to COVID-19 lockdown protocols. A total of 55 (25.5%) participants reported that their partner was an essential worker. Since the start of the COVID-19 pandemic, 64 (29.6%) experienced household income loss. The most common household stressors included having safety concerns when going outside the house with their newborn (85.7%), missing out on community resources/supports (84.7%), and not being

Table 1 General demographic information among participants who delivered a live birth during the first three months of the COVID-19 pandemic (n = 216)

Variables	n (%)
Participants age (years, median, IQR)	33 (30–36)
Age of infant at survey completion (days, median, IQR)	76 (66–90)
Month of child's birth	
March	39 (18.06)
April	82 (37.96)
May	64 (29.63)
June	31 (14.35)
Nulliparous	118 (54.63)
Ethnicity ^a	
White	147 (68.06)
Middle Eastern	18 (8.33)
Asian – South/East/South-East	31 (14.35)
Black	17 (7.87)
Another person of color	25 (11.57)
Born in Canada	159 (73.61)
Marital status	
Married/Comment Law vs single/separated/divorced	204 (94.44)
Household incomes below municipal median ^b	80 (37.0)
Completed University or College Education	188 (87.04)
Language ^a	
Speak English	212 (98.15)
Speak French	74 (34.26)
Speak another language	29 (13.43)

NB. The study took place between March 16th and June 16th, 2020. No study participant had COVID-19 infection (current or resolved) at the time of the study

^aPatients can choose multiple ethnicities and multiple languages

^bHousehold median income for Ottawa is 120,000 \$ (Statistics Canada)

able to have their family and friends visit their new infant (78.7%).

Table 3 summarizes care utilization patterns during COVID-19 pandemic. Many participants reported having perinatal appointments by phone (a service not previously provided) including 102 (47.2%) for prenatal appointments and 125 (57.9%) for postpartum appointments. The majority of participants (184 (85.2%)) reported that their support person was unable to attend one or more in-person prenatal appointments due to COVID-19. Furthermore, 66 (30.6%) and 91 (42.1%) participants reported fewer overall appointments than expected for prenatal and postpartum care, respectively. Regarding labour and delivery, 97 (44.9%) participants were required to wear a mask during the labour and delivery period and 16 (7.4%) did not have a support person present at any point during labour or delivery.

Table 4 focuses on stress associated with perinatal care during COVID-19 pandemic. A total of 146 (67.6%)

Table 2 Household stress factors related to COVID-19 lockdown protocols (n = 216)

Variables	n (%)
Any parental income loss	64 (29.63)
Partner is essential worker	55 (25.46)
Partner substance use ^a increase	45 (20.83)
Childcare schedule changes	
No children	118 (54.63)
Children stopped daycare/school	84 (38.89)
Children schedule did not change	14 (6.48)
Family, friends, and community resources	
Not able to have a baby shower or other celebration	99 (45.83)
A family member/friend was going to stay to help but couldn't	108 (50.00)
Missing out on community resources/support	170 (78.70)
Friends and family cannot come visit the new infant	183 (84.72)
Safety concerns about taking the new infant out of the house	185 (85.65)

NB: The study took place between March 16th and June 16th, 2020

^aSubstance use includes tobacco, alcohol, cannabis

Table 3 Patients health care utilization patterns during the COVID-19 pandemic (n = 216)

Variables	n (%)
<i>Prenatal care</i>	
Type of prenatal care appointments	
In person	212 (98.15)
Phone call	102 (47.22)
Video call	6 (2.78)
Support person unable to attend one or more prenatal appointments	184 (85.19)
Frequency of prenatal health care encounters	
More than expected	19 (8.80)
Same	131 (60.65)
Less than expected	66 (30.56)
<i>Labour and delivery</i>	
Required to wear a mask during delivery	97 (44.91)
Timing when support person was present	
Early labour	77 (35.65)
Active labour/delivery	162 (75.00)
Postpartum	151 (69.91)
Support person was not present at any point during labour/delivery	16 (7.41)
<i>Postpartum care</i>	
Type of postpartum care appointments	
In person	139 (64.35)
Phone call	125 (57.87)
Video call	12 (5.56)
Did not get postpartum care	18 (8.33)
Frequency of postpartum health care encounters	
More than I expected	18 (8.33)
The same as I expected	97 (44.91)
Less than I expected	91 (42.13)

NB: The study took place between March 16th and June 16th, 2020

Table 4 Participants stress associated with perinatal care during COVID-19 pandemic (n = 216)

Variables	n (%)
<i>Prenatal care</i>	
Worried about health and safety for myself and/or my unborn infant due to COVID	146 (67.59)
Felt stressed going to prenatal appointments because of COVID	94 (43.52)
PPE impacted communication with healthcare providers	5 (2.31)
COVID did not impact the quality of prenatal care	102 (47.22)
<i>Labour and delivery</i>	
Delayed seeking care/coming to hospital for any pregnancy concern or in labour	57 (26.39)
Scared to go to hospital to deliver my infant because of COVID	108 (50.00)
Stressed/anxious that I could not bring more family/support people with me	136 (62.96)
PPE negatively impacted birthing experience	41 (18.98)
COVID did not impact the quality of my healthcare during labour/delivery	127 (58.80)
COVID did not impact the quality of postpartum care during hospital stay	91 (42.13)
<i>Postpartum care</i>	
Worried about health and safety for myself and/my newborn infant due to COVID	168 (77.78)
Felt stressed going to postpartum appointments because of COVID	105 (48.61)
COVID did not impact the quality of my postpartum care after I left hospital	68 (31.48)

NB: The study took place between March 16th and June 16th, 2020

participants reported being worried about their health and safety and/or their unborn infant because of COVID-19. Over a quarter of participants (57 (26.4%)) delayed seeking care/coming to hospital for pregnancy concerns or during labour, 108 (50.0%) were scared to go to the hospital to deliver their infant, and 105 (48.6%) felt stressed about going to their postpartum appointments. Despite stress and increased barriers in care, 102 (47.2%) participants reported that COVID-19 did not affect the quality of their prenatal care, 127 (58.8%) for labour/delivery care, and 68 (31.5%) for postpartum care.

Discussion

The COVID-19 pandemic has caused tremendous stress for the perinatal population, particularly in the early phases when there was much less known about the disease. Study participants described feeling anxiety about accessing all forms of prenatal, delivery and postpartum care, and many attended appointments alone, without a support person. Of concern, many participants reported that they delayed seeking care because of fear of contracting COVID-19. Major changes in health care delivery during COVID-19 included the introduction of appointments by phone in place of face-to-face clinical care, and many participants reported receiving fewer perinatal care appointments than expected, or no care at all.

A major strength of the study is the detailed information from the patient on their experiences giving birth during COVID-19, providing an important contribution to the literature on experiences of pregnancy during the COVID-19

pandemic. Our results describe patients' experiences accessing care, and household factors that were shaped by the COVID-19 pandemic protocols. Our sample was ethnically diverse and contributes to a more accurate representation of the challenges faced by Canada's diverse population.

During the COVID-19 response, rapid changes to care delivery were made to accommodate infection control policies. In Canada, physicians typically follow a prenatal examination schedule where pregnant individuals are seen every 4 weeks until 28 weeks of pregnancy, every 2–3 weeks through week 36 of pregnancy, and every week during the final month of pregnancy (B.C. Perinatal Health Program, 2010). During COVID-19, half of the study participants had prenatal care by phone (47.2%) and almost 60% had postpartum care by phone (57.9%). Video calls were less common (3–6%). Our results are similar to those of studies conducted in the United States (Dijkstra-Kersten et al., 2015) and United Kingdom, where a large-scale shift to telemedicine took place in March and April 2020, resulting in a decline of over 70–80% of in-person visits (Pehl et al., 2020). (Mann et al., 2020; Rimmer et al., 2020).

A change to virtual care and phone-based encounters has both the potential for innovative improvements in health care delivery (Butler Tobah et al., 2019), but does not replace in-person visits for some high-risk pregnancies (Aziz et al., 2020). Obstetrical care is not easily replaced by virtual care because of the need for in-person services that cannot be done virtually. Sample prenatal care regimens that incorporate telehealth have been developed to ensure that important in-person visits are maintained (e.g. urine screening, genetic counselling, ultrasounds, gestational diabetes screening, review of vital signs etc.), however, home blood pressure

and weight measurements can be managed virtually (Aziz, 2020).

Encouragingly, studies have found high patient satisfaction with telemedicine during the COVID-19 pandemic as we see a shift from traditional in-person clinic visits (Ramaswamy et al., 2020). Additional studies have shown that obstetrical providers found it feasible, appropriate and acceptable to integrate telemedicine into their perinatal care practice and many reported the desire to continue using telemedicine as an option for future visits (Tozour, 2021). Importantly, studies have also identified that shifts to virtual prenatal care was not associated with changes in perinatal outcomes. With appropriate measures and guidelines to mitigate legal and safety implication, this practice could become a new normal in future health care (Fryer 2020).

Despite the encouraging findings of successful uptake of virtual care, the COVID-19 protocols also contributed to isolating experiences where most participants reported that their spouse or support person was not permitted to attend one or more prenatal appointments and almost 8% gave birth without their spouse or support person. In fact, only 35% in early labour, 75% in active labour, and 70% in post-partum recovery with a spouse/support person present. These restrictions could have adverse effects on health and coping as evidence showed the positive effect of support during labour on mental health and pregnancy outcomes such as reduced pain and need for analgesia, shorter labour, reduced operative vaginal and cesarian delivery and a greater satisfaction with the overall labour experience (Ma et al., 2019).

Ensuring quality of care during the COVID-19 pandemic remains a health care priority. An encouraging finding in this study is that only a small portion of participants felt that PPE negatively impacted communication with health care providers, and a majority felt that the COVID-19 protocols did not impact the quality of their care during labour and delivery. This result is a testament to the staff and health care providers who have worked tirelessly to support patients and provide the best possible care under the intense protocols (Heath et al., 2020). A potential explanation for this finding could be that standard obstetric protocols require health professionals to wear masks during delivery and that the actual clinical conditions did not change drastically from pre-COVID-19 protocols. However, it is atypical for pregnant patients to wear masks, and in this sample, 45% wore a mask during delivery and almost 20% felt it negatively impacted birthing experience. The variability in patients who were required to wear a mask during delivery could be explained by changes in PPE guidelines as the pandemic evolved, resulting in mandatory use of face masks at TOH half-way during the study period. Amid continued rises in COVID-19 cases, there is a pressing need to review the way care is provided so that hospitals can adapt to better address the needs of patients.

An important finding from this analysis is the high levels of reported stress and anxiety among the participants. From a household perspective, almost 30% reported some reduction in household income due to COVID-19 pandemic, similar to results released by Statistics Canada (Statistics Canada, 2020). From a health care seeking perspective, many of the participants felt stressed going to any perinatal appointment, largely driven by fear of COVID-19 disease or general societal stress. Studies have shown that high levels of stress can contribute to adverse perinatal and neonatal outcomes and must seriously be taken into consideration when providing obstetrical care during high risk times (Rose et al., 2016). A recent study established that the COVID-19 pandemic increased pregnant individuals's anxiety and affected their decision-making relating to type of prenatal care, mode of delivery and infant feeding (Liu et al., 2020a, 2020b). Access to community-based resources and services is an important part of postpartum health, however almost 80% reported they missed out on services they would typically seek (e.g., parent-baby groups, breast/chestfeeding support group, prenatal exercise classes etc.) Social support is recognized as a factor of resilience during pregnancy and is associated with important perinatal health implications and obstetric outcomes (Schetter, 2011). This highlights the importance of understanding the impact of COVID-19 on the mental health of obstetric patients to provide guidelines for patient-centered care and attempt to mitigate the stress associated with public health restrictions.

Limitations

Self-selection bias into this study represents the main limitation and we do not have information on patients who declined to participate or those who did not sign the institutional approval for research, and therefore cannot examine response bias. Therefore, these results do not represent the population of individuals who gave birth at the hospital, but rather those who consented to participate in the survey. As this study is cross-sectional, we do not have temporal information on changes to care, but rather the patients' perspectives of the changes that occurred. Measurement bias was reduced by contacting participants between 20 and 90 days postpartum and reducing recall bias. Since the pandemic evolved quickly, regulations and restrictions put in place by local authorities changed daily, potentially influencing the patient experience depending on their date of delivery during the 3-month study period.

Conclusion

As the COVID-19 pandemic continues, we need to constantly review and evaluate the way care is provided so that hospitals can adapt to better answer the needs of patients and manage pregnancy-related stress and obstetrical care. More than half the study participants reported increased stress and anxiety while accessing perinatal care and delivery, attributable to the management of the COVID-19 pandemic. An increased number of perinatal appointments were completed using alternatives to face-to-face clinical care, such a phone or video appointments. In addition, the COVID-19 pandemic has driven rapid changes in hospital policies including the use of PPE and restrictions on the amount of support people allowed during prenatal appointments and delivery. Of importance, PPE did not result in a major barrier for communication with health care providers and did not contribute to a negative birth experience for most participants. The results of this study demonstrate the importance of adopting a patient-centered approach when providing care during a pandemic or other disaster to better address the need for physical and psychological support of pregnant individuals and to ensure continued high quality obstetric care. As the pandemic evolves, it is critical to understand how current practices impact the health and safety of the perinatal population. The establishment of an adapted COVID-19 prenatal framework for safe and effective delivery of obstetric care would allow for management of pregnancy-related stress and ensure that obstetric patients are fully supported to mitigate the risk of prejudice.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10995-022-03495-2>.

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Author Contributions KM, KD, RT, CB, OF, AH, RRW, KS, DE conceived and designed the study. KS, MW, DE provided clinical expertise and content. RT conducted the statistical analyses and KM, DF, YG, MM, DC, SW provided methodological and analytic expertise. CB, OF, KD collected the data. MOG is the patient partner. All authors critically reviewed the manuscript and approved the final version. KM has primary responsibility for the final content.

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Data Availability Data are available upon reasonable request. The datasets generated and analysed during the current study are not publicly available due to the Ottawa Hospital privacy protocols; but with a data sharing agreement, de-identified data, the data dictionary, and ethics protocol are available from the corresponding author.

Code Availability The code is available upon request.

Declarations

Conflict of interest All authors declare no conflict of interest.

Ethical Approval The Ottawa Health Sciences Network Research Ethics Board approved the study (Protocol Number: 20170390-01H). All methods were performed in accordance with standard ethical guidelines and regulations (Declaration of Helsinki). All participants in this study signed the institutional approval for research purpose. Participants were then contacted by phone, and verbal consent was obtained prior to sending the survey.

Consent to Participate All participants in this study signed the institutional approval for research purpose. Participants were then contacted by phone, and verbal consent was obtained prior to sending the survey.

Consent for Publication Not applicable.

References

- Abdoli, A., Falahi, S., Kenarkoohi, A., Shams, M., Mir, H., & Jahromi, M. A. M. (2020). The COVID-19 pandemic, psychological stress during pregnancy, and risk of neurodevelopmental disorders in offspring: A neglected consequence. *Journal of Psychosomatic Obstetrics and Gynecology*, 41(3), 247–248. <https://doi.org/10.1080/0167482X.2020.1761321>
- Obstetric Anesthesiology | The Ottawa Hospital*. (n.d.). Retrieved December 13, 2020, from <https://www.ottawahospital.on.ca/en/clinical-services/deptpgrmcs/departments/anesthesiology/obstetric-anesthesiology/>
- Aziz, A., Zork, N., Aubey, J. J., Baptiste, C. D., D'alton, M. E., Emeruwa, U. N., Fuchs, K. M., Goffman, D., Gyamfi-Bannerman, C., Haythe, J. H., Lasala, A. P., Madden, N., Miller, E. C., Miller, R. S., Monk, C., Monk, C., Monk, C., Moroz, L., Ona, S., & Friedman, A. M. (2020). Telehealth for high-risk pregnancies in the setting of the COVID-19 pandemic. *American Journal of Perinatology*, 37(8), 800–808. <https://doi.org/10.1055/s-0040-1712121>
- B.C. Perinatal Health Program, (2010). BCPHP Obstetric Guideline 19 MATERNITY CARE PATHWAY Who Designed this Pathway ? Statement of Women- Statement of Woman-. *Program, February*, 1–23. <http://www.perinatalservicesbc.ca/Documents/Guidelines-Standards/Maternal/MaternityCarePathway.pdf>
- Butler Tobah, Y. S., LeBlanc, A., Branda, M. E., Inselman, J. W., Morris, M. A., Ridgeway, J. L., Finnie, D. M., Theiler, R., Torben-son, V. E., Brodrick, E. M., Meylor de Mooij, M., Gostout, B., & Famuyide, A. (2019). Randomized comparison of a reduced-visit prenatal care model enhanced with remote monitoring. *American Journal of Obstetrics and Gynecology*, 221(6), 638.e1-638.e8. <https://doi.org/10.1016/j.ajog.2019.06.034>
- COVID-19 Obstetrics Patient Information and Visitor Restrictions | The Ottawa Hospital*. (n.d.). Retrieved December 13, 2020, from <https://www.ottawahospital.on.ca/en/clinical-services/deptpgrmcs/departments/obstetrics-gynecology-and-newborn-care/patient-and-visitor-restrictions/>
- Di Mascio, D., Khalil, A., Saccone, G., Rizzo, G., Buca, D., Liberati, M., Vecchiet, J., Nappi, L., Scambia, G., Berghella, V., & D'Antonio, F. (2020). Outcomes of coronavirus spectrum infections SARS, MERS, COVID-19 during pregnancy: a systematic

- review and meta-analysis. *American Journal of Obstetrics & Gynecology*, 2, 100107.
- Di Toro, F., Gjoka, M., Di Lorenzo, G., De Santo, D., De Seta, F., Maso, G., Risso, F. M., Romano, F., Wiesenfeld, U., Levi-D'Ancona, R., Ronfani, L., & Ricci, G. (2021). Impact of COVID-19 on maternal and neonatal outcomes: A systematic review and meta-analysis. *Clinical Microbiology and Infection*, 27(1), 36–46. <https://doi.org/10.1016/j.cmi.2020.10.007>
- Dijkstra-Kersten, S. M. A., Biesheuvel-Leliefeld, K. E. M., van der Wouden, J. C., Penninx, B. W. J. H., & van Marwijk, H. W. J. (2015). Associations of financial strain and income with depressive and anxiety disorders. *Journal of Epidemiology and Community Health*, 69(7), 660–665. <https://doi.org/10.1136/jech-2014-205088>
- Emergency information | Ontario.ca. (n.d.). Retrieved December 13, 2020, from <https://www.ontario.ca/page/emergency-information>
- Fryer, K., Delgado, A., Foti, T., Reid, C. N., & Marshall, J. (2020). Implementation of obstetric telehealth during COVID-19 and beyond. *Maternal and Child Health Journal*, 24(9), 1104–1110. <https://doi.org/10.1007/s10995-020-02967-7>
- Heath, C., Sommerfeld, A., & von Ungern-Sternberg, B. S. (2020). Resilience strategies to manage psychological distress among healthcare workers during the COVID-19 pandemic: a narrative review. *Anaesthesia*, 75(10), 1364–1371. <https://doi.org/10.1111/anae.15180>
- Khalil, A., Kalafat, E., Benlioglu, C., O'Brien, P., Morris, E., Draycott, T., Thangaratinam, S., Le Doare, K., Heath, P., Ladhani, S., von Dadelszen, P., & Magee, L. A. (2020). SARS-CoV-2 infection in pregnancy: A systematic review and meta-analysis of clinical features and pregnancy outcomes. *Eclinical Medicine*, 25, 100446. <https://doi.org/10.1016/j.eclinm.2020.100446>
- Liu, H., Wang, L. L., Zhao, S. J., Kwak-Kim, J., Mor, G., & Liao, A. H. (2020a). Why are pregnant women susceptible to COVID-19? An immunological viewpoint. *Journal of Reproductive Immunology*, 139, 103122. <https://doi.org/10.1016/j.jri.2020.103122>
- Liu, X., Chen, M., Wang, Y., Sun, L., Zhang, J., Shi, Y., Wang, J., Zhang, H., Sun, G., Baker, P. N., Luo, X., & Qi, H. (2020b). Prenatal anxiety and obstetric decisions among pregnant women in Wuhan and Chongqing during the COVID-19 outbreak: a cross-sectional study. *BJOG: an International Journal of Obstetrics and Gynaecology*, 127(10), 1229–1240. <https://doi.org/10.1111/1471-0528.16381>
- Ma, B., Bo, B., & Tunçalp, Ö. (2019). Perceptions and experiences of labour companionship : A qualitative evidence synthesis (Review) summary of findings for the main comparison. *Cochrane Database of Systematic Reviews*. <https://doi.org/10.1002/14651858.CD012449.pub2>. www.cochranelibrary.com
- Mann, D. M., Chen, J., Chunara, R., Testa, P. A., & Nov, O. (2020). COVID-19 transforms health care through telemedicine: Evidence from the field. *Journal of the American Medical Informatics Association : JAMIA*, 27(7), 1132–1135. <https://doi.org/10.1093/jamia/ocaa072>
- McClymont, E., Fell, D. B., Albert, A., Alton, G. D., Barrett, J., El-Chaar, D., Harrold, J., Krajden, M., Lipsky, N., Maan, E., Malinowski, A. K., Othman, M., Raeside, A., Ray, J., Roberts, A., Ryan, G., Sadarangani, M., Sauve, L., van Schalkwyk, J., & Money, D. (2020). Canadian surveillance of COVID-19 in pregnancy: Epidemiology and maternal and infant outcomes. *American Journal of Obstetrics and Gynecology*, 223(6), 969–970. <https://doi.org/10.1016/j.ajog.2020.08.137>
- Peahl, A. F., Powell, A., Berlin, H., Smith, R. D., Krans, E., Waljee, J., Dalton, V. K., Heisler, M., & Moniz, M. H. (2020). Patient and provider perspectives of a new prenatal care model introduced in response to the coronavirus disease 2019 pandemic. *American Journal of Obstetrics and Gynecology*. <https://doi.org/10.1016/j.ajog.2020.10.008>
- Public Health Agency of Canada. (2020). *Epidemiological summary of COVID-19 cases in Canada*. 2020–11–23. <https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html>
- Ramaswamy, A., Yu, M., Drangsholt, S., Ng, E., Culligan, P. J., Schlegel, P. N., & Hu, J. C. (2020). Patient satisfaction with telemedicine during the COVID-19 pandemic: retrospective cohort study. *Journal of Medical Internet Research*, 22(9), e20786. <https://doi.org/10.2196/20786>
- Rimmer, M. P., Al Wattar, B. H., Barlow, C., Black, N., Carpenter, C., Conti-Ramsden, F., Dalton, J. A. W., Davies, R., Davies, R., Dunlop, C., Guyett, E., Jamison, L., Karavadra, B., Kasaven, L., Lattey, K., Long, E., Macmahon, C., Navaratnam, K., Nijjar, S., & Wyeth, C. (2020). Provision of obstetrics and gynaecology services during the COVID-19 pandemic: a survey of junior doctors in the UK National Health Service. *BJOG: an International Journal of Obstetrics and Gynaecology*, 127(9), 1123–1128. <https://doi.org/10.1111/1471-0528.16313>
- Rose, M. S., Pana, G., & Premji, S. (2016). Prenatal maternal anxiety as a risk factor for preterm birth and the effects of heterogeneity on this relationship: a systematic review and meta-analysis. *BioMed Research International*. <https://doi.org/10.1155/2016/8312158>
- Schetter, C. D. (2011). Psychological science on pregnancy: Stress processes, biopsychosocial models, and emerging research issues. *Annual Review of Psychology*, 62, 531–558. <https://doi.org/10.1146/annurev.psych.031809.130727>
- Sharma, A., Tiwari, S., Deb, M. K., & Marty, J. L. (2020). Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2): a global pandemic and treatment strategies. *International Journal of Antimicrobial Agents*, 56(2), 106054. <https://doi.org/10.1016/j.ijantimicag.2020.106054>
- Statistics Canada. (2016). *Focus on Geography Series, 2011 Census: Census metropolitan area of Vancouver, British Columbia*. <https://www12.statcan.gc.ca/1110001201>
- Statistics Canada. (2017). *Distribution of total income by census family type and age of older partner, parent, or individual*. <https://www150.statcan.gc.ca/n1/en/catalogue/1110001201>
- Statistics Canada. (2020). Canadian Perspectives Survey Series 1 : Impacts of COVID-19. In *Statistics Canada*. <https://www150.statcan.gc.ca/n1/en/daily-quotidien/200408/dq200408c-eng.pdf?st=AhCEAktc>
- Viaux, S., Maurice, P., Cohen, D., & Jouannic, J. M. (2020). Giving birth under lockdown during the COVID-19 epidemic. *Journal of Gynecology Obstetrics and Human Reproduction*, 49(6), 101785. <https://doi.org/10.1016/j.jogoh.2020.101785>

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