



Society for Maternal-Fetal Medicine Special Statement: Telemedicine in obstetrics— quality and safety considerations

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The frequency of telemedicine encounters has increased dramatically in recent years. This review summarizes the literature regarding the safety and quality of telemedicine for pregnancy-related services, including prenatal care, postpartum care, diabetes mellitus management, medication abortion, lactation support, hypertension management, genetic counseling, ultrasound examination, contraception, and mental health services. For many of these, telemedicine has several potential or proven benefits, including expanded patient access, improved patient satisfaction, decreased disparities in care delivery, and health outcomes at least comparable to those of traditional in-person encounters. Considering these benefits, it is suggested that payers should reimburse providers at least as much for telemedicine as for in-person services. Areas for future research are considered.

Key words: contraception, diabetes mellitus management, genetic counseling, hypertension management, lactation support, medication abortion, mental health services, postpartum care, prenatal care, ultrasound examination

Introduction

The frequency of telemedicine encounters rose steadily in the United States during the late 2010s¹ and then rose exponentially during the early months of the COVID-19 pandemic, doubling in March 2020,² and rising >40-fold by April 2020.³ Some of this rapid increase was because of the desire to minimize viral spread, and some because of expanded access to telemedicine services. The expansion of access began on March 6, 2020, when the Centers for Medicare & Medicaid Services (CMS) issued a waiver to many of its previously restrictive requirements for reimbursement of telehealth services. Many commercial payers subsequently also relaxed their requirements.

Replacing or supplementing in-person maternal care with telemedicine may result in similar or better clinical outcomes and improved patient satisfaction compared with in-person care, but the effect of telemedicine on access to care, health equity, and harms is unclear.⁴ The aim of this paper is to review what is known about quality of care and patient safety for telemedicine encounters in obstetrical care. The Society for Maternal-Fetal Medicine maintains a website with a variety of resources for telehealth in maternal-fetal medicine (MFM), including patient education and coding guidance⁵ and an issue brief on the use of telemedicine to

improve access to equitable care.⁶ The American College of Obstetricians and Gynecologists has a committee opinion on implementation of telemedicine in practice.⁷ The Institute for Healthcare Improvement (IHI) has a white paper on safety, equity, and person-centeredness in telemedicine care.⁸ Our review is intended to complement these existing documents, with a specific focus on quality and safety in some of the major components of obstetrical care. [Table 1](#) summarizes several types of relevant encounters and some potential advantages of telemedicine for each.

In this review, we follow the definitions of the Health Resources Services Administration⁹: *telehealth* refers broadly to the use of electronic information and telecommunication technologies to support long-distance clinical healthcare, patient and professional education, public health, and health administration, whereas *telemedicine* refers specifically to clinical services provided remotely. The focus of this review is on telemedicine.

Impact of telemedicine on quality domains

In 2001, the National Academy of Medicine (formerly the Institute of Medicine [IOM]) identified 6 domains of healthcare quality, recommending that healthcare should be safe, effective, patient-centered, timely, efficient, and equitable.¹⁰ [Table 2](#) summarizes some of the impacts of telemedicine on these domains. Existing healthcare quality metrics address some domains more extensively than others. The vast majority of measures assess effectiveness

TABLE 1
Selected applications of telemedicine for obstetrical care

Application	Telemedicine considerations
Routine prenatal care	Prenatal care models that incorporate technology and remote patient monitoring improve access to care Universal screening for depression and intimate partner violence can be incorporated into telemedicine encounters
Postpartum care	Reduces barriers to timely access to postpartum care Potential to improve screening for postpartum morbidities such as mental health disorders Provides integrated transition to care for chronic conditions
Diabetes mellitus	Technology allows integration of glucose meters with electronic medical records Cell phone—enabled glucose meters associated with improved glycemic control Telemedicine visits associated with fewer visits and improved patient satisfaction compared with in-person visits Pregnancy outcomes similar between telemedicine and in-person visits (cesarean delivery rates, neonatal macrosomia, or NICU admissions)
Medication abortion	Extends care to remote underserved communities Telemedicine access for medication abortion provides successful, safe outcomes when compared with in-person visits
Breast-milk feeding	Improved breastfeeding rates, reduced cost, improved equity, increased convenience
Hypertension	High compliance rates and patient satisfaction Reduction in labor induction, prenatal hospital admissions, and the diagnosis of preeclampsia without an increase in harm Elimination of a Black–White racial disparity in postpartum blood pressure ascertainment
Genetic counseling	High levels of patient satisfaction
Ultrasound	Feasibility and patient acceptance High levels of patient satisfaction Limited data on accuracy of diagnosis
Contraception	Text messaging support has been shown to promote contraceptive continuation for both oral and injectable forms of contraception Unclear benefit in contraceptive initiation or adherence
Mental health	For postpartum depression, better improvement in depression scores, completion rates, and patient satisfaction compared with in-person visits Potential to expand to other mental health diagnosis and addiction treatment services

NICU, neonatal intensive care unit.

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and safety, a smaller number examine timeliness and patient-centeredness, and very few assess the efficiency or equity of care.¹¹

Safe healthcare was defined by IOM as the avoidance of injuries to patients from the care that is intended to help them.¹⁰ In a 2014 systematic review of patient safety risks associated with telemedicine, poor technical quality of systems was found to hinder good and timely communication between staff and patients.¹² A lack of clinical practice guidelines and quality assurance systems for the delivery of telecare services was observed in some studies. The authors of the systematic review advocated training for all telecare users, including healthcare professionals, addressing a wide variety of concerns to increase awareness of potential patient safety risks and prepare healthcare staff for new ways of working. They proposed that training and education that raise awareness of safety and quality issues can promote user confidence and skill in the provision of safe telemedicine services, thereby minimizing potential harm to patients associated with the introduction of these services. They also stressed the need for system-wide professional protocols, clinical practice guidelines, and

quality assurance systems to guide and assess the use of telecare in the complex domestic setting.

With the dramatic increase in telemedicine services during the COVID-19 pandemic, the Joint Commission (TJC) published strategies that providers and healthcare organizations can adopt to optimize the use of telehealth to deliver safe and effective care to patients.¹³ Establishing key metrics for success at the outset will allow for the collection of data that can be used to look for opportunities to restructure the program for improvement. Hard metrics to consider include the number of patients seen via telehealth, reductions in no-show visits, and clinical outcomes. It is also important to set qualitative metrics, such as how telehealth has affected patient and staff satisfaction and compliance with treatment as a result of access, convenience, and continuity of care. Another consideration is how to deliver clinical services most effectively. Protocols should be developed for virtual care that seek to reduce variation between providers and specialties and that outline standards by which symptoms and conditions can be managed virtually. An important challenge is determining how to safely and accurately obtain vital signs, when needed. Staff

TABLE 2
Impact of telemedicine on quality domains

Quality domain	Telemedicine considerations
Safe	Potential for communication errors if telemedicine platform is poorly integrated with electronic health record Potential for breeches of privacy/confidentiality Psychological or emotional safety considerations Potential for diagnostic inaccuracies (eg, if blood pressure or other examination findings are not obtained or are reported inaccurately)
Effective	Ability to monitor and modify medication regimens for diabetes mellitus, chronic hypertension, and asthma remotely Ability to observe patients performing personal assessments of their blood pressure, blood sugar, and peak flow, and educate on optimal use
Patient-centered	Negative impact on traditional clinician—patient—staff relationships Patient preference for in-person visits vs telemedicine and type of technology used with telemedicine (eg, phone vs video) Family member(s)/support person(s) engagement in the discussion of symptoms to provide a more complete picture of the patient's condition
Timely	Avoidance of delays in adjusting medication regimens for conditions requiring home monitoring of values that may not be available at all in-person visits (eg, forgotten blood pressure or blood sugar home monitoring logs)
Efficient	Reduction in time and cost of travel to in-person visits
Equitable	Access to broadband internet in the home Low health and/or digital literacy Access to timely and appropriate language interpretation services Payment parity for audio-only (telephonic) telehealth visits Health insurance coverage for medical equipment necessary for remote prenatal visits (eg, blood pressure cuffs, scales, fetal Dopplers)

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should be trained on the telehealth workflow, and a super-user should be identified who can provide support and training. Finally, TJC emphasizes the importance of using data and other feedback to make improvements. Clinicians should have access to real-time patient data; therefore, remote patient monitoring data, such as blood pressure and glucose, should be reliably collected into the electronic health record.¹³

Effective healthcare provides services based on scientific knowledge to all potential beneficiaries and refrains from providing services to unlikely beneficiaries (ie, care that avoids underuse and misuse, respectively).¹⁰ In a recent systematic review of meta-analyses, telemedicine was found to be equivalent or more clinically effective when compared with conventional forms of health service delivery.¹⁴ Although the review focused largely on evidence from nonobstetrical specialties, such evidence may inform pregnancy-related care for a variety of conditions. For example, remote monitoring and management of chronic kidney disease using multimodality telehealth were found to be similarly effective compared with in-person visits for controlling systolic and diastolic blood pressure. Psychology and telepsychiatry services also showed more favorable or similar results for patients when compared with usual care for depression and posttraumatic stress disorder. Mixed-modality telehealth in diabetes mellitus care was consistently successful in the provision of monitoring support and tailored advice. Effectiveness of telemedicine for

mental health and diabetes mellitus in pregnancy is discussed in later sections.

Patient-centered healthcare is respectful of and responsive to individual patient preferences, needs, and values, and ensures that patient values guide all clinical decisions.¹⁰ A 2014 systematic review¹² noted that information and communication technologies were observed to have a negative impact on the traditional clinical relationship. The use of technology adversely affected staff—patient interaction and hindered good communication, the process of “getting to know” the patient, and consequently the development of good clinical relationships. The IHI framework emphasizes that patient preference should be considered with regard to in-person visits vs telemedicine and the type of technology used with telemedicine (eg, phone vs video).⁸ This includes respecting the patient's choice if they are uncomfortable using video because it invades their privacy; offering alternatives such as phone-based visits or virtual or blurred background video visits can obscure the patient's surroundings. To enhance communication, interpretive services (eg, language, hearing, or vision-assistive technologies), if needed, should be offered and set up in advance. Other aspects of patient-centeredness may include inviting the patient to demonstrate various health-related behaviors in the context of their home environment or engaging a family member or patient advocate in the discussion of symptoms to provide a more complete picture of the patient's condition.

Patient satisfaction is at the heart of patient-centeredness. Satisfaction has many facets and is influenced by a variety of inputs, including perception of improved outcome, preference for visit modality, ease of use, cost, communication, travel time, and convenience.¹⁵

Timely and efficient healthcare reduces waits and sometimes harmful delays for both those who receive and those who provide care while avoiding waste of equipment, supplies, money, time, ideas, and energy.¹⁰ A study of a MFM telemedicine program in a large health system suggested that patients may benefit financially and experience similar outcomes when telemedicine programs are appropriately designed to eliminate access barriers and provide high-quality care.¹⁶ One focus of the study was on patient travel costs related to gas expenditure and work time lost. On the basis of average gas prices and the average hourly pay rate at the time, the study reported a total of \$90,103.90 saved from reductions in gas expenditure and lost work time for 998 completed teleconsults, which equates to a saving of \$90.28 per completed consult. Over half (56%) of patients reported that having a telemedicine visit as opposed to an in-person visit saved over 2 hours in round-trip driving time. Importantly, 11% of patients reported that they would have forgone MFM care without the telemedicine consultation center.

Equitable healthcare is care that does not vary in quality by personal characteristics such as gender, race, ethnicity, geographic location, or socioeconomic status. The absence of technology or reliable internet coverage, low health and digital literacy, and being a non-English speaker can present barriers to telemedicine use. These social determinants of health disproportionately affect individuals in rural areas, those identifying as Black, Indigenous, or People of Color, and those living on low incomes.¹⁷ A recent commentary outlined recommendations to promote equitable implementation of telemedicine, with a focus on strategies at the level of the individual practitioner, the healthcare delivery system, the payer, the policy maker, and the research enterprise.¹⁷ The recommendations addressed the social determinants of health within each level of the system and highlighted actions that healthcare stakeholders and researchers can take to ensure that care equity is prioritized. Telemedicine should be offered to every medically eligible patient, and healthcare delivery systems should allow for telephone visits when video visits are not feasible or not desired, even if reimbursement is lower. Healthcare systems should conduct rigorous quality assurance efforts, including assessment of patient and clinician experience and stratification of data by patient sociodemographic characteristics.

Measuring the impact of telemedicine

The traditional Donabedian model for measuring the quality of healthcare considers 3 types of health quality metrics: outcomes, processes, and structures. In contrast, the modern, expanded model considers the additional

dimensions of access to care, patient experience, and patient satisfaction.¹⁸ The value of healthcare, defined as health outcomes achieved per dollar spent, is yet another dimension.¹⁹ All these dimensions of quality can be quantified with metrics and compared between telemedicine and traditional in-person encounters. Because there are so many dimensions to consider, it is often not a simple matter to state whether telemedicine is better than in-person care; telemedicine may be superior in some aspects, inferior in some, and comparable in others. For example, telemedicine and in-person visits may have similar health outcomes, but telemedicine may be associated with better patient access but lower patient experience scores. There is a paucity of literature that systematically assesses all the dimensions of quality for telemedicine; thus, we are left with a patchwork of assessments that compare some aspects but not others.

Prenatal visits via telemedicine

Prenatal care models incorporating telemedicine have been introduced and implemented,²⁰ but their effects on obstetrical and neonatal quality and patient and provider satisfaction have only recently been examined. Duryea et al²¹ demonstrated that patients who delivered in 2020 in a high-volume prenatal clinic system following the implementation of an audio-only virtual prenatal visit program did not experience a deleterious composite outcome including placental abruption, neonatal intensive care unit admission of full-term infants, or umbilical cord blood pH <7.0 compared with patients who delivered receiving routine prenatal care in-person. When the frequency of routine prenatal care is reduced and augmented with remote home monitoring, including blood pressure cuffs and scales, and nursing support, there can be higher patient satisfaction with care and lower prenatal period-related stress.²² Technology that incorporates mobile prenatal care apps in low-risk pregnancy populations provides the opportunity for patient care and education and facilitates monitoring without a reduction in provider or patient satisfaction.²³

Implementation of telemedicine for high-risk obstetrical care during the pandemic was reported in a study from a large urban/suburban healthcare system.²⁴ Visit types included high-risk prenatal care appointments, diabetes mellitus education sessions, genetic counseling, and MFM consultations. Over 86% of patients and 87% of providers were satisfied with telemedicine visits, although 73% of patients desired a combination of in-person and telemedicine visits during their pregnancy, and 56% of providers preferred in-person visits. In the comparison of selected months in 2019 (preimplementation) vs 2020 (postimplementation), the telemedicine program was associated with fewer canceled and no-show appointments. Another telemedicine program for high-risk obstetrical care was reported from an urban academic medical center²⁵ and outlined specific considerations for telemedicine visits for a variety of conditions, including hypertensive disorders, diabetes mellitus, cardiovascular disease, neurologic

conditions, history of preterm birth or poor obstetrical outcome, fetal conditions (growth restriction, anomalies, multifetal pregnancy), genetic counseling, mental health conditions, anesthesia consultation, and postpartum care.

Utilizing telemedicine for prenatal care can be beneficial to patient care access and improved and timely communication between providers and patients. However, further study is needed to examine the perceptions of the benefits of telehealth, the reassurance that comes from in-person clinical visits compared with telehealth, and the long-term impact of telehealth on patient experience with pregnancy and prenatal care.²⁶ Equitable implementation of telemedicine in the obstetrical population is the responsibility of both individual practitioners and healthcare delivery systems, and payers and researchers. Deliberate actions to address social determinants of health must be considered when implementing obstetrical telemedicine.¹⁷ For example, additional patient-level and operational support may be needed to optimize access to telemedicine prenatal services for Medicaid patients compared with those with commercial insurance.²⁷ Screening for intimate partner violence during telemedicine encounters can be performed effectively using a standardized approach that starts with asking whether the patient is alone, and if not, by explaining that “Privacy laws require that I conduct the telehealth visit with no one else present.”²⁸

Postpartum care

Telemedicine can reduce the multiple barriers to providing essential postpartum care. It provides a mechanism for patients to feel supported during the transition from pregnancy to the postpartum period, and the ability to screen for postpartum morbidities. It is often difficult for new mothers to travel to a postpartum appointment, and thus the “no-show” rate for postpartum visits is often high. Telemedicine can facilitate patient and provider interaction by enabling virtual meetings.

An early study evaluated an asynchronous mobile app that included chat, a knowledge base, and automated messaging with the patient’s provider.²⁹ The authors reported that parents were confident in using the app, experienced no barriers in contacting providers, and felt that they received timely information and felt supported.

A recent report on the use of telemedicine for postpartum care during the COVID-19 pandemic focused on visit attendance at an urban federally qualified healthcare center.³⁰ Telemedicine was used for 1% of postpartum visits before the pandemic, 60% in the early months of the pandemic, and 48% in later months. Postpartum visit attendance rates were similarly low during the 3 time periods (52%, 43%, and 56%, respectively), and there were no differences in the rates of hospital visits or readmissions. Postpartum depression screening was performed less often during the latter time periods (74%, 22%, and 33%, respectively). Conversely, both increased postpartum visit attendance and depression screening were demonstrated in another report involving the implementation of telehealth

during the COVID-19 pandemic.³¹ The use of telemedicine for treatment of postpartum depression is discussed in the section on mental health below.

Multiple private companies are developing telemedicine platforms to ease the transition for patients into postpartum care, to support patients both synchronously and asynchronously, and to collect data for quality metrics.

Diabetes mellitus

Much of the published experience in telemedicine for diabetes mellitus care came from nonpregnant patients and demonstrated improved patient satisfaction and quality. A 2019 meta-analysis³² examined data on experiences from several university hospitals in France and analyzed 42 randomized controlled trials investigating the use of telemedicine. These trials included 8 hospitals using teleconsultation and 34 studies using device-based telemonitoring vs usual care in diabetes mellitus management. A significantly greater mean reduction in hemoglobin A1C was demonstrated in the telemedicine group compared with usual care ($P < .001$). These findings are consistent with a previous meta-analysis of 19 studies, which demonstrated better glycemic control with telehealth compared with usual care.³³

In pregnancy, diabetes mellitus outcomes are generally similar between in-person visits and telemedicine.³⁴ Telemedicine patients appreciated the convenience of telemedicine and reported improved overall satisfaction. Telemedicine for management of gestational diabetes mellitus has not shown different rates of cesarean delivery, macrosomia, or neonatal admission.^{35,36}

Telehealth interventions for diabetes mellitus care in pregnancy often involve glucose meters with integrated electronic logbooks, text messaging, home internet-based telehealth systems, and the ability for glucose meters to interact with electronic medical records. The use of such interventions was associated with a significantly greater improvement in hemoglobin A1C compared with standard monitoring practices ($P = .03$).³⁷

In a retrospective study, 400 singleton pregnancies complicated by complex morbidities including gestational diabetes mellitus were followed using remote patient monitoring, including nonstress tests, vital signs, and questionnaires concerning maternal and fetal well-being. No severe maternal complications were observed. There were 9 perinatal deaths, all of which were attributed to malformations, severe fetal growth restriction, extreme prematurity, or lung hypoplasia, and none were attributable to the remote monitoring program per se.³⁸ This modality of self-monitoring of high-risk pregnancies could be a safe alternative to inpatient care in select populations.

A meta-analysis of 8 trials evaluating telehealth interventions in the management of diabetes mellitus during pregnancy found a trend toward reduction in outpatient clinic visits while maintaining maternal and neonatal clinical outcomes.³⁹

Medication abortion

The World Health Organization's abortion care guideline⁴⁰ recommends the option of telemedicine as an alternative to in-person care to deliver abortion services in whole or in part, including assessment of eligibility for medication abortion, counseling and instruction, prescription and facilitation of administration of medications, and follow-up postabortion care. Medication abortion can be safely and effectively administered via telehealth, which can help extend care to remote, otherwise underserved communities.⁴¹ Telehealth abortion enables providers to offer services remotely beyond the office setting. Equity may be improved with increased access.

A recent meta-analysis reported that medication abortion through telemedicine is highly acceptable to patients and providers, with success rates and safety outcomes similar to those of in-person abortion care, but surgical evacuation rates are higher (1%–19%).⁴² Another systematic review included 4 studies that evaluated interventions related to induced abortion, all of which were medication abortion. Findings suggested that utilizing telehealth for medication abortion improves access to early abortion and that clinical outcomes are similar compared with in-person care.³⁹

Concerns regarding adverse outcomes and the safety of medication abortion remain a barrier to implementation. A recent retrospective cohort study involving 8765 telemedicine and 10,405 in-person medication abortions⁴³ reported that adverse events were rare with medication abortion and that telemedicine was noninferior to in-person care in regard to clinically meaningful adverse outcomes.

Even before the Supreme Court of the United States struck down the nationwide right to abortion in June 2022, the COVID-19 pandemic raised barriers to access to abortion care. In a review of 49,935 requests for medication abortion care up to 10 weeks of gestation from 2019 to 2020, Aid Access identified 2 distinct trends: first, more people were seeking abortion care through all channels including telemedicine and in-person care; and second, there was a shift in demand from in-clinic to self-managed abortion during the pandemic.⁴⁴

The Supreme Court decision has left us with a patchwork of state laws and regulations regarding abortion services. It is presently not clear to what extent providers in states that permit abortion may be able to conduct telemedicine counseling and prescribe abortion medications to patients who reside in states that prohibit abortion, or whether patients in those states may receive such medications through mail or other delivery services.

Breast-milk feeding

The American Academy of Pediatrics recommends exclusive breastfeeding for 6 months. However, this occurs only 22% of the time in the United States, and by the age of 6 months, only one-half of all infants born in the United States receive any breast milk.⁴⁵ Professional and peer breastfeeding support is a key mechanism to improve

breastfeeding rates. Potential advantages to telehealth and telelactation compared with traditional breastfeeding support include decreased cost, improved equity, access to telemedicine from the home, and availability outside traditional work hours.

A qualitative interpretive review summarized 23 studies on telemedicine lactation support from 2000 to 2018.⁴⁶ Several of the cited studies found that telelactation support was associated with increased rates of initiation of exclusive breast-milk feeding, increased continuation at 4 weeks and 6 months, and high satisfaction of participants. However, the authors concluded that further studies are needed with more rigorous methodologies and larger sample sizes. The implementation of a smartphone-based daily feedback and counseling platform between postpartum patients and a multidisciplinary lactation support team increased the lactation rates after delivery, with excellent patient satisfaction.⁴⁷

Several commercial vendors provide telelactation support services, as noted in a recent review.⁴⁸ Potential advantages of outpatient telelactation services include: lower costs, which in turn improve access and equity; more efficient triage of mother–infant dyads that need an urgent in-person visit; and a “hands-off” approach to allow mothers to gain confidence and skills. Telelactation services are emerging as one of the only viable options for patients in rural areas. However, the authors of the review also cite several challenges. First, there is often no direct communication with obstetricians and pediatricians, and thus the advice given by telelactation consultants may be inconsistent with the advice of the physicians. Second, patients in rural areas who might benefit most from telelactation support have technical challenges such as inadequate broadband access and less comfort with technology. Third, there is a dearth of research on the effectiveness or safety of direct-to-consumer telelactation. Fourth, health plans do not consistently cover lactation support services, and even if they do, they may not cover these services via telemedicine or via commercial vendors rather than traditional providers.

Hypertension

Telemedicine has been found to improve quality of care in nonobstetrical patients with hypertension and comorbid diabetes mellitus.⁴⁹ Home blood-pressure monitoring (HBPM) has been endorsed in both national and international guidelines.^{50,51} However, the impact in hypertensive populations has been inconsistent. Because hypertensive disorders of pregnancy represent a leading cause of maternal morbidity and mortality,^{52–54} there are potentially substantial opportunities for telemedicine within this population. Although data pertaining to quality and safety are limited, both high patient compliance and satisfaction have been demonstrated.⁵⁵ In a meta-analysis of 9 trials in patients with hypertensive disorders of pregnancy or at risk for hypertensive disorders,

antenatal HBPM was associated with reductions in labor induction, prenatal hospital admission, and diagnosis of preeclampsia, without adverse impact on composite maternal, fetal, or neonatal outcomes.⁵⁶

Despite these encouraging results from smaller studies, a large randomized trial of patients with chronic or gestational hypertension failed to demonstrate that antepartum HBPM resulted in any improvement in blood pressure control or obstetrical outcomes compared with usual antenatal care.⁵⁷ Another large randomized trial of HBPM vs usual care in patients at high risk of preeclampsia found no difference in the rates of diagnosis of preeclampsia, development of hypertension, or other maternal or perinatal outcomes.⁵⁸

Postpartum, telemedicine has been utilized successfully to improve both blood-pressure monitoring and follow-up. HBPM and text-message–based monitoring programs have high rates of patient acceptance, engagement, satisfaction, and willingness to recommend to others.^{59–61} HBPM has been found to improve attendance at protocol-driven in-person appointments and 6-week postpartum visits.⁶⁰ Lower readmission rates and improved blood pressure follow-up within the first 10 days postpartum have also been observed through the use of telemedicine.⁶² The use of telemedicine has been shown to reduce or eliminate Black–White racial disparities in postpartum blood pressure ascertainment.^{63,64}

Genetic counseling

Although prenatal genetic counseling has traditionally been performed in-person, telemedicine options are becoming more popular. Remote options can increase otherwise limited access to genetic counseling services including aneuploidy and carrier screening and counseling regarding specific fetal anomalies for patients and families. Alternate service delivery models have been more widely studied for cancer genetics to improve access to care for individuals in underserved areas who are unable to travel to meet with a counselor. These models include telephone and video conference–based approaches. Randomized trials have demonstrated cost savings without any difference in patient knowledge, psychosocial outcomes, and patient satisfaction.⁶⁵

In obstetrics, the safety and quality data supporting remote genetic counseling are more limited. When compared with an in-person experience, patient response to learning that their pregnancy has a poor prognosis via telemedicine was viewed positively.⁶⁶ Another small study reported high levels of patient satisfaction with video conference–based counseling.⁶⁷ Larger studies are needed to evaluate efficacy and safety.

Ultrasound

Remote reading of ultrasound images has been technically feasible for over 20 years.⁶⁸ Successful implementation requires appropriate equipment and skilled sonographer(s) at the remote site, capacity to transfer the images, and patient acceptance. Implementation is technically simpler if

the interpretation involves static images and video clips already captured (asynchronous interpretation). Real-time (synchronous) interpretation requires higher bandwidth but is feasible if desired. Remote reading of ultrasound examinations is in high demand given the limited number of MFM providers, especially in more rural settings. The published experience has demonstrated feasibility and patient acceptance of teleultrasonography.^{69–74} Advantages include reduced travel times and reduced expenses.⁷⁴ However, quality and safety data are limited.

A quality assurance study evaluated the interpretation of video clips obtained remotely by minimally trained personnel using standardized sweeps directed by maternal surface anatomic landmarks.⁷⁵ Review of the clips by trained obstetricians and radiologists showed excellent agreement with the “gold-standard” formal ultrasound report observations such as placental location and fetal number but only fair agreement on fetal presentation and gestational age. This study did not evaluate the interpretation of fetal anatomy findings.

Contraception

Approximately 50% of pregnancies are unintended; thus, the ability to access and utilize contraception can profoundly affect a person’s life. Contraception can prevent unintended pregnancies, promoting reproductive autonomy and overall health. Telehealth may be utilized to counsel patients requesting contraception and screen for medical eligibility, provide prescriptions for new and established users, and manage and treat side effects. Despite these potential opportunities, the benefits of telehealth in this area have been inconsistent. A systematic review of 12 studies concluded that various types of text-message interventions did not have a beneficial effect on contraceptive initiation or adherence.³⁹ However, 3 studies that used daily interactive text-message reminders showed higher rates of continuation for oral and injectable contraception.^{76–78}

Mental health

Behavioral health saw much more rapid growth in telemedicine utilization during the pandemic than primary or specialty care.⁷⁹ Of the 2020 Medicare Part B claims, 38.1% of behavioral health visits were by telemedicine, as opposed to the 8.3% of primary care and 2.6% of specialty care visits, reflecting increases of 32-, 24-, and 38-fold, respectively, compared with 2019. To the extent that psychiatric visits often do not rely on assessment of vital signs or hands-on physical examination, the use of telemedicine is readily understandable.

Treatment of postpartum depression via web-based, video visits or telephone-only encounters was reviewed in a meta-analysis of 10 randomized clinical trials in 2366 participants.⁸⁰ Patients randomized to telemedicine had significantly greater improvement in depression scores ($P < .0001$), higher completion rates, and high satisfaction scores. Expansion of access to telepsychiatry for

comprehensive maternal mental health services and addiction services has been proposed as one way to reduce maternal mortality.⁸¹

Measuring quality improvement

Disparities in health outcomes and quality of care are most notable for individuals with the greatest access barriers to their healthcare providers because of social determinants such as poverty, education, language, and race/ethnicity. Telemedicine has tremendous potential to reduce health-care disparity by improving access, experience, and outcomes. Therefore, the process of quality improvement in obstetrical care requires reengineering the traditional care models, both for antepartum and postpartum care. To evaluate whether telemedicine is leading to similar or better patient-related outcomes, appropriate quality metrics should be defined and tracked. One goal would be to measure maternal and perinatal health outcomes, especially for patients with conditions such as diabetes mellitus, hypertension, epilepsy, asthma, and mental health disorders. However, the “low-hanging fruit” will be simpler metrics such as attendance rates at visits, patient satisfaction, and other potential metrics summarized in Table 3.

After implementing a telemedicine program, the goal would be to demonstrate a positive impact on pregnancy outcomes or at least show that telemedicine is as effective as traditional in-person care. Ideally, telemedicine should also be cost-effective and efficient in saving time for both the patient and the healthcare team. Measuring processes and outcomes is the only way to demonstrate to payers and patients that telemedicine is effective.

Conclusions

Care for obstetrical patients utilizing telemedicine will continue to expand in the years to come. Given the evidence that telemedicine can result in comparable or improved health outcomes compared with in-person visits, with improved access, improved patient satisfaction, and decreased disparities based on social determinants of health, it seems evident that payers should reimburse providers at least as much for telemedicine as for in-person services.

The results in this review suggest that telemedicine has several benefits, including patient/provider satisfaction and the potential for substantial cost savings in a variety of clinical conditions. However, more data supporting non-inferiority to standard, in-person prenatal care systems, for both low- and high-risk patients are needed. Future research must also focus on how telemedicine models affect specific quality domains and categories. Standardization of telemedicine care models is imperative not only to limit variation but to optimize the ability to monitor the impact of these novel care approaches within facilities and across healthcare systems. The use of protocol-driven models to deliver care will provide the necessary framework for continued improvement.

TABLE 3

Potential quality metrics to evaluate telemedicine programs

Number of patients seen via telemedicine
Percentage of appointments scheduled that are completed
Percentage of telemedicine visits that were not completed because of technological difficulties (eg, poor internet connection)
Percentage of telemedicine visits that used interpretive services when the patient's preferred language was not English
Diabetes mellitus (pregestational or gestational): percentage of large-for-gestational age infants
Mental health: percentage of patients with positive screening for postpartum depression who have a subsequent visit with a mental health provider
Percentage of patients screened for IPV
Tobacco cessation discussed/success
Screened for substance use disorder and appropriate referral made
Number of postpartum acute care visits
Total number of days as an inpatient
Reimbursement: telemedicine compared with face-to-face visits
Patient satisfaction (wait times, travel times, percentage of patients rating high satisfaction on postvisit survey)
Provider/staff satisfaction

IPV, intimate partner violence.

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SMFM recognizes that obstetrical patients have diverse gender identities and is striving to use gender-inclusive language in all of its publications. SMFM will be using terms such as “pregnant person” and “pregnant individual” instead of “pregnant woman” and will use the singular pronoun “they.” When describing study populations used in research, SMFM will use the gender terminology reported by the study investigators.

Reprints will not be available.