



Maternal Centric Measurement and Data Gaps in Addressing Maternal Morbidities: A Scoping Review

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Accepted: 6 September 2022 / Published online: 19 December 2022

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Abstract

Objective The objectives of this project were to (1) describe maternal-centric measures and survey data which are publicly available to evaluate the incidence, frequency, and distribution of maternal morbidity in the postpartum period, and (2) to identify postpartum care quality improvement targets and outline the types of measurement and data required to support them.

Methods We conducted a scoping review of two types of data sources: maternal health quality measures used by providers and payers and nationally-representative survey data sets administered by federal agencies. Each source was searched for keywords associated with pregnancy and the postpartum period. We included quality measures and survey questions that are maternal-centric and addressed the postpartum period. We excluded infant-centric measures and data. Quality measures were organized according to the Donabedian quality model.

Results Our analysis demonstrates that existing maternal-centric quality measures and survey data offer limited insight into diagnosis and patient care delivery experiences associated with maternal morbidities during the postpartum period.

Conclusion There is inadequate maternal-centric data on the incidence, frequency, and distribution of postpartum maternal morbidities and associated care use. This gap reduces the ability of research to estimate the incidence of illness and injury among postpartum women and create targeted quality improvement efforts. Our findings highlight the need for quality measure stewards and data sponsors to enhance data collection and methods to become more inclusive of maternal-centric outcomes during the postpartum period.

Keywords maternal morbidity · postpartum · quality · metrics

Significance

Existing maternal health data are not commensurate with the level of data quality necessary to improve maternal morbidities in the United States. This data gap limits the ability to evaluate maternal health issues and create meaningful payment reforms such as value-based payments that optimize women's postpartum health and health care

experiences. Furthermore, current investigations of the relationship between the provision of maternal care (from prenatal to postpartum periods) and postpartum health outcomes are skewed towards infant-centric information.

Introduction

The United States has a maternal mortality rate of more than 20 per 100,000 live births, which is the highest among comparably developed nations and has been steadily increasing for nearly 30 years (Hoyert, 2022). One-third of these deaths occur during the postpartum period (Petersen et al., 2019). Maternal mortality is generally recognized to be just a small part of a larger series of potentially negative maternal health outcomes (Review to Action, 2018), however, and severe maternal morbidity, sometimes described as “near-miss” events, are estimated to be as much as 70 times higher than

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the maternal mortality rate (Creanga et al., 2014). Maternal morbidities that are not deemed “near-miss” events are likely to be even more common, preventable, and can manifest during and after pregnancy. Improving the delivery of maternal care to reduce the occurrence of these events and severity of these conditions requires collecting high-quality data on maternal-centric health indicators and care experiences. Furthermore, by investigating potential predictors before, during, and after delivery, further linkages between non-severe maternal morbidities, severe maternal morbidities, and maternal mortality can be identified and addressed. We consider there to be a difference in maternal-centric and infant-centric measures and data; maternal-centric captures the direct physical health, mental health, and health care experiences of the woman independent of infant outcomes (D’Alton et al., 2019). We recognize that the health of mother and infant dyad is coupled during pregnancy due to the nature of pregnancy and therefore one set of measures can provide information on both mother and baby (e.g., gestational diabetes). However, in the postpartum period we would expect that the health and health experiences related to maternal morbidity (e.g., postpartum depression, postpartum follow-up care) would require distinct maternal-centric measures and data elements to understand how to improve care quality to align with the recommended clinical guidelines for comprehensive maternal care during the postpartum year. Therefore, this paper had two primary objectives. First, we sought to determine what maternal-centric measures and data are publicly available to evaluate the incidence, frequency, and distribution of maternal morbidity and associated care in the postpartum period. Second, based on these findings, our goal was to identify postpartum care quality improvement targets and outline the types of measurement and data required to support them.

Maternal morbidities in the postpartum period can range from acute physical and mental effects to chronic conditions, including some persisting throughout the life-course if not diagnosed or adequately treated. Physical injuries to the pelvis and abdominal muscles can occur during pregnancy and birth (Bidwell et al., 2018; Miller et al., 2015; Rahmanou et al., 2016). Mental health effects can also manifest, with as many as 20% of women reporting postpartum depression (CDC, 2020a) in addition to other postpartum mood disorders such as anxiety and post-traumatic stress disorder (Iles & Pote, 2015; Jack, 2005). Unidentified and untreated morbidities cause significant harm to women and their families and further strain health care system resources (Patel et al., 2020; O’Neil et al., 2021). Additionally, we may struggle to capture morbidities during postpartum care visits or associated administrative data, as one review found visit attendance rates ranging from 24.9 to 96.5% across 88 studies (Attanasio et al., 2022). While these conditions are known

to exist (Chou et al., 2016), their incidence, frequency, and distribution at the national level remain unclear. This clarity is required to support delivery system changes to improve care quality.

We sought to determine what, if any, quality standards exist to characterize the maternal postpartum period as a way of identifying where the current baseline for quality improvement lies. The delivery of high-quality maternal care that is accessible, appropriate, and timely requires a strong source of measurement and data to support the design and implementation of payment reforms and quality improvement initiatives. Across all health conditions, improving quality and reducing health care costs through payment reforms have permeated the national health care system over the last decade (Burwell, 2015). Value-based payment (VBP) models are a type of payment mechanism being tested frequently across the country, however, only a few states are testing VBP in maternity care settings despite Medicaid financing over 40% of births nationally. These models are around episodes of care, pay-for-performance, and pregnancy medical homes (MACPAC, 2021). Robust and meaningful quality measurement is required to create outcomes-driven accountability among relevant stakeholders in all of these maternity models. Quality measures, such as those endorsed by the National Quality Foundation (National Quality Forum, 2021) and the National Committee for Quality Assurance (National Committee for Quality Assurance, 2021) are designed and intended to serve as benchmarks for quality improvement and have been utilized across several health care settings to improve performance. These measures are categorized across four domains: process, structure, outcome, and patient experience (Donabedian, 1988). In the context of maternal health we interpreted these categories in the following manner: process measures could include clinical care standards and recommended set of prenatal and postpartum exams; structure measures could capture facility, provider, and policy characteristics of the institution delivery care during pregnancy, labor and delivery, or postpartum; outcome measures could capture the health status of the patient related to care or counseling provided or not provided; and patient experience could be inclusive of the communication between providers and pregnant and laboring women and a woman’s perception of experiencing respectful care during labor and delivery.

National quality measures can take years and are costly to develop and must be created and validated with available data underscoring that a health issue is sufficiently problematic and widespread to merit quality measurement. Recognizing these limitations, we were also interested in identifying if current public data sources exist that can be used to justify development of maternal-centric quality measures. Nationally-representative data sets, primarily

provided by the National Center for Health Statistics, which is the key clearinghouse for epidemiologic surveillance data that might capture information on the frequency and distribution of maternal morbidities, serve this purpose and are therefore included in our analysis.

Examining quality measures and survey data as our two sources of maternal health data, we conducted a scoping review to determine what maternal-centric measures or data elements are available which capture care and experiences in the maternal postpartum period. We chose a scoping review because there was no prior assessment of available quality measures or data sets that we could identify in the literature. The findings can inform state and federal health agencies considering additional investments in survey collection tools focused on postpartum experiences and support the development of maternal-centric measurements that go beyond mortality indicators.

Methods

Data Collection

Our review protocol is in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidance and checklist (Tricco et al., 2018). We identified the following measure stewards (organizations that collect and verify quality metrics) as sources of quality measures used nationally by hospitals and providers: the National Quality Forum (National Quality Forum, 2021), the National Center for Quality Assurance (National Committee for Quality Assurance, 2021), Hospital Compare (Medicare, 2021), the Joint Commission (The Joint Commission, 2019), and Hospital Consumer Assessment of Healthcare Providers and Systems (Centers for Medicare and Medicaid Services, 2021). These organizations, which we consider as *quality measure stewards*, have as their missions or mandates the role of identifying and managing measures of care quality and are recognized as authoritative sources for these measures. Their collected measures represent the majority, if not the full extent, of quality measures used across the country by hospitals and care providers.

Additionally, we identified nationally-representative surveys to include in this analysis by focusing on those surveys conducted by or available through the National Center for Health Statistics, the Agency for Health Research and Quality (AHRQ), and the Centers for Disease Control and Prevention. The National Center for Health Statistics is the primary health statistics clearinghouse in the United States and as such is a key source for federally-run, nationally-representative surveys addressing health (CDC, 2020b). The

Agency for Health Research and Quality manages several additional national data sets, which we sought to include in this analysis. Finally, the CDC also manages the Pregnancy Risk Assessment Monitoring System, which is not included in the NCHS directory but is the only nationally-representative survey specific to pregnancy and therefore was an important source to include in our search (CDC, 2020c).

Among the surveys, we focused on those whose missions and focuses might relate to maternal postpartum care, including the National Inpatient Survey (NIS), National Hospital Care Survey (NHCS), National Health Interview Survey (NHIS), Medical Expenditures Panel Survey (MEPS), National Survey of Family Growth (NSFG), Pregnancy Risk Assessment Monitoring System (PRAMS), and Vital Statistics Birth Data. This list was generated based on a literature review of maternal health-focused studies using national data sets, as well as by reference to the specific mission of each survey (from survey documentation) that might address outpatient, inpatient, or pregnancy-related care. We searched survey questions within the most recent questionnaire for each survey.

Inclusion and Exclusion Criteria

Figure 1 shows the search and screening process. From each of the quality measure sources and in each of the surveys we searched for the following keywords: pregnancy, labor, delivery, maternal, and maternity. To investigate the potential to study the relationship between postpartum morbidities and medical events, conditions, and health care experiences during the peripartum period, we chose to include peripartum maternal health data in this review. We removed duplicates and then screened the collected measures and survey questions to determine if they were maternal-centric. We excluded measures focused on the infant based on the given numerator and denominator, or the contents of the question. We also categorized the period the measure or survey item addresses and whether it referred to the prenatal (before labor and delivery), peripartum (several days before, during, and after labor and delivery), or postpartum period (period after discharge from the hospital up to 365 days after the birth). We excluded measures and survey questions from the prenatal period and included those in the peripartum and postpartum period that were related to maternal health. We organized quality measures based on the Donabedian framework into process, structure, outcome, and patient experience categories, which is the standard used by quality measure stewards (Donabedian, 1988).

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews.

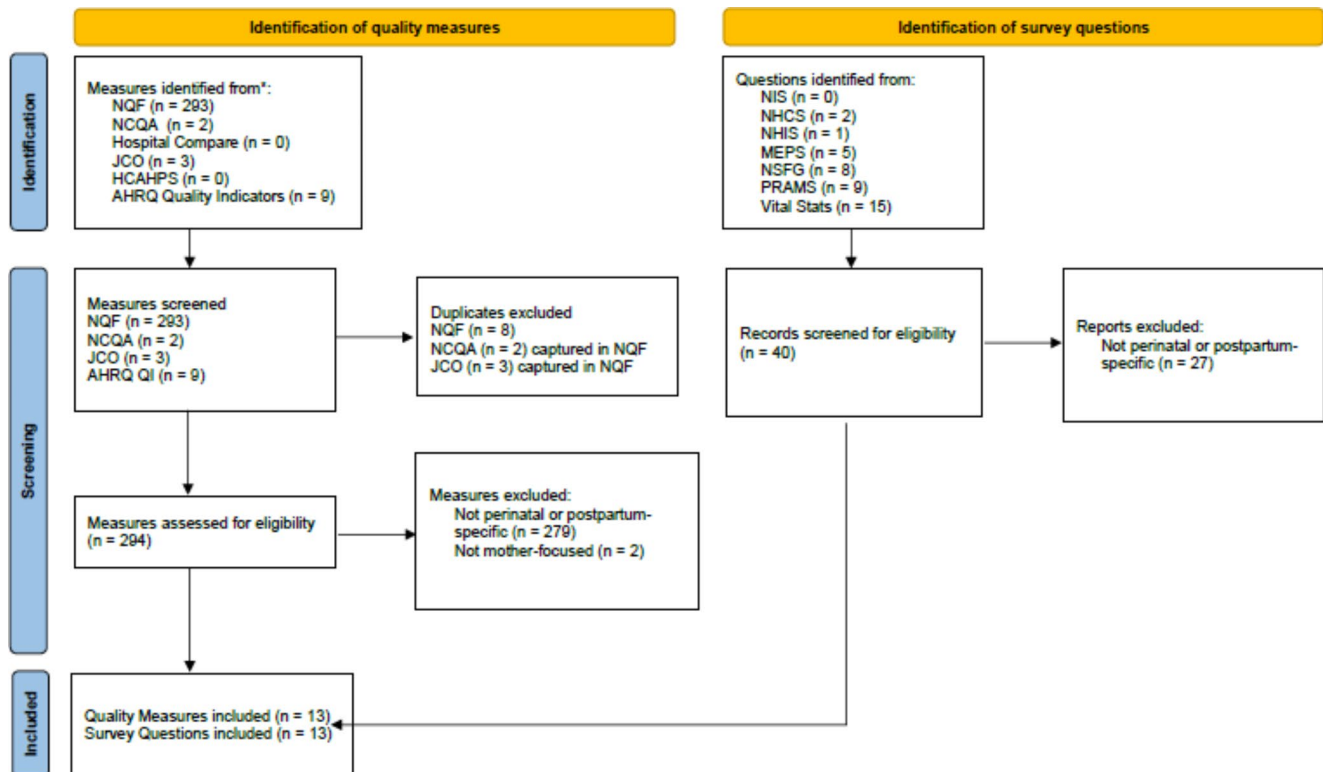


Fig. 1 PRISMA Search Strategy Flow Chart

BMJ 2021;372:n71. <https://doi.org/10.1136/bmj.n71>. For more information, visit: <http://www.prisma-statement.org/>.

In the surveys, in addition to questions specifically focused on pregnancy and the postpartum period, if data elements in the survey data sets could be leveraged to estimate maternal health and care use in the postpartum period, such as billing and procedure codes, we included them as potential sources of data.

Results

We examined a total of thirteen quality measures and thirteen survey questions that met our inclusion criteria. Among the quality measures, we identified eleven measures targeting the peripartum period and two targeting the postpartum period. Within the peripartum measure set, one was an outcome measure as defined by the quality measure steward, the Joint Commission, and five additional we classified as outcome based on our interpretation of each measure (Table 1). The remaining 7 were process measures. No measures of either structure or patient experience were identified. Only two measures addressed the postpartum period: an NQF-endorsed measure of contraceptive care provision postpartum and a measure of the timeliness of postpartum care. The latter was defined as receiving a postpartum

visit between 21 and 56 days postpartum prior to 2019 and revised to including a postpartum visit between 7 and 84 days beginning in 2019.

Among the surveys, ten questions targeted the peripartum period (Table 2). Three questions addressed the postpartum period, all of which came from the Pregnancy Risk Assessment Monitoring System (PRAMS): whether a postpartum checkup occurred from 4 to 6 weeks postpartum, and among those receiving a visit, a question addressing advice given to the woman regarding nutrition, weight, pregnancy timing, contraception, and screening for domestic violence, depression, diabetes, and cigarette use. The third measure was a depression screen administered in the survey (Table 2).

Combined, the postpartum measures and survey questions address the receipt of a postpartum check-up, contraception provision, counseling on pregnancy timing, nutrition, weight, contraception, domestic violence, diabetes, and smoking, and screening for depression. Among those, only postpartum depression is considered a maternal morbidity. Other maternal morbidities are not captured among the postpartum quality measures and survey questions.

In addition to looking for questions explicitly pertaining to the peripartum and postpartum period, we looked for surveys that offered procedure codes that could be analyzed to understand maternal morbidity. Three surveys collect ICD procedure and diagnostic codes: National Hospital Care

Table 1 Quality measures associated with pregnancy—peripartum and postpartum periods

Measure	Measure Steward	Donabedian Classification	Period
Cesarean Delivery Rate, Uncomplicated	AHRQ Quality Indicators	Outcome	Peripartum
Vaginal Birth after Cesarean Section, Uncomplicated	AHRQ Quality Indicators	Outcome	Peripartum
Primary Cesarean, Uncomplicated	AHRQ Quality Indicators	Outcome	Peripartum
Obstetric Trauma- Vaginal Delivery without instruments	AHRQ Quality Indicators	Outcome	Peripartum
Obstetric Trauma- Vaginal Delivery with instruments	AHRQ Quality Indicators	Outcome	Peripartum
PC-01 Elective Delivery±	Joint Commission	Process	Peripartum
PC-02 Cesarean Section±	Joint Commission	Outcome	Peripartum
Incidence of Episiotomy±	Christiana Care Health System	Process	Peripartum
Appropriate Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision- C-Section*	Massachusetts General Hospital/Partners Health Care System	Process	Peripartum
Intrapartum Antibiotic Prophylaxis for Group B Streptococcus (GBS)*	Massachusetts General Hospital	Process	Peripartum
Appropriate DVT Prophylaxis in Women Undergoing Cesarean Delivery*	Hospital Corporation of America	Process	Peripartum
Contraceptive Care Postpartum±	US Office of Population Affairs	Outcome	Postpartum
Timeliness of Postpartum Care (visit between 21–56 days postpartum pre-2019 or 7–84 2019-present)*	HEDIS Measures	Process	Postpartum

*= No longer endorsed by NQF.

±= Endorsed by NQF

Survey, National Inpatient Survey, and Medical Expenditures Panel Survey. The National Hospital Care Survey and National Inpatient Survey are both restricted to ICD codes

Table 2 National survey questions associated with peripartum and postpartum period

Question	Survey	Period
Revenue code- Labor Room	NHCS	Peripartum
Was this First Cesarean	NSFG	Peripartum
Was Birth Planned Cesarean before Labor	NSFG	Peripartum
Medical Reason for Cesarean	NSFG	Peripartum
Preterm Delivery	NSFG	Peripartum
Onset of Labor	Vital Statistics-Birth Data	Peripartum
Characteristics of Labor and Delivery	Vital Statistics-Birth Data	Peripartum
Method of Delivery	Vital Statistics-Birth Data	Peripartum
Maternal morbidities during labor	Vital Statistics-Birth Data	Peripartum
Mother Transferred for Fetal or Maternal Medical Needs	Vital Statistics-Birth Data	Peripartum
Postpartum checkup 4–6 weeks after giving birth	PRAMS	Postpartum
Postpartum visit counseling– pregnancy timing, nutrition and weight, contraception, screen for DV, diabetes, smoking	PRAMS	Postpartum
Postpartum depression screen	PRAMS	Postpartum

associated with specific hospital stays, which limits them largely to the peripartum period, though in the case of hospital readmission they may also capture those codes. The Medical Expenditures Panel Survey, by contrast, offers a two-year window in which a participant’s ICD codes are collected and may provide longitudinal insights into maternal morbidities.

Limitations

Our analysis of the availability of measures among quality measurement stewards and within nationally-representative surveys necessarily leave out important work being done within individual hospitals, in localities and states, and those in development but not yet public. Though these insights would potentially be valuable, this review was limited to existing national surveys and quality measures. Additionally, our key word search in the surveys may have left out questions that are relevant to the estimation of maternal morbidities.

Conclusions for Practice

National estimates of the frequency and distribution of diseases are key to understanding patterns of illness and injury. In diseases such as obesity and diabetes, they are integral for researchers, policy makers, and the public to create

impactful and targeted programs. However, with approximately 4 million pregnancies each year (Curtin et al., 2013), childbirth as the leading reason for hospitalization, and the increasing rates of maternal mortality combined with a widening of racial disparities in several maternal outcomes, the quality of maternal health data at the national level is not commensurate with the magnitude of this public health priority.

The postpartum period is increasingly being recognized as the “fourth trimester” with significant importance to healthy mother-baby bonding, healing from pregnancy (Verbiest et al., 2017), return to work, transitioning to well-woman care, and a lifetime of downstream impacts on women’s and families’ health (Stanton & Brandes, 2012; Verbiest et al., 2017; Wouk et al., 2017). The limited number of postpartum quality measures and limitations of nationally-representative survey questions restrict researchers’ abilities to calculate clear estimates of the incidence, frequency, and distribution of postpartum maternal morbidities and the quality of care implemented to address them. A more comprehensive view of illness and injury in the postpartum period will help to estimate the severity of the issue (e.g., underdiagnosed morbidities which may persist months after delivery), allow for clarification of relationships between predictors and outcomes (e.g., pregnancy or birthing-related injury and postpartum depression), and identify potential points of intervention to improve care quality throughout pregnancy and postpartum.

One such quality improvement mechanism involves payment reforms such as VBP. Designing and testing episodes-of-care, delivery models, and payments which incentivize diagnosis and treatment of morbidities during the entirety of the fourth trimester requires a combination of all four Donabedian quality measures be available. For example, a standard set of maternal-centric postpartum measures would pinpoint if and when care is being accessed after childbirth, if that care is being accessed and received too late; if morbidity outcomes are exacerbated because of delays in follow-up appointments and diagnoses; and if the patient experience during any part of the pregnancy, peripartum, or postpartum is predictive of postpartum care-seeking and the occurrence and severity of postpartum morbidities. VBP purchasing policies include considering patient experience when determining reimbursement rates for services (Zakowski, 2017). Our findings demonstrate that there is little readily available, nationally-representative information on care quality in the postpartum period. However, ICD procedure and diagnosis codes are available through the Medical Expenditure Panel Survey (MEPS) for the postpartum period. Future work can include utilizing these codes to identify predictors of health outcomes in the postpartum period. In time, such work will contribute to a better understanding of women’s

postpartum health experiences and the mechanisms to improve health care quality accessed and received during and after pregnancy.

The absence of quality measures addressing patient experience runs counter to the literature centering the importance of the patient experience (Humenick & Howell, 2003; Jack, 2005; Kozhimannil et al., 2013; Reid & Creanga, 2018; Srivastava et al., 2015). In maternity care patient health is heavily reliant on strong shared-decision making between provider and patient, not just before and after a medical procedure, but in the case of labor and delivery, during the care itself. In this setting, the patient is an active participant in the provision of care. Therefore, patient experience measures could be targeted by data sponsors and quality measure stewards and be designed with maternal-centric elements that capture the uniqueness of this condition and care.

The paucity of maternal health data leaves the public health and health care systems unaware of the maternal experience of women in the postpartum period. While mortality rates absolutely highlight the maternal health crisis in the United States, the limitations of our national maternal health data prevent the full range of health effects experienced after childbirth from being evaluated - many of which may be predictive of mortality. This ignorance in the national narrative may further contribute to medical mistrust and lower rates of patient activation (Sinaiko et al., 2019) between new mothers and the medical system that can lead to missed appointments and diagnoses, interfering with opportunities to promote the health of mothers, babies, and families. As transparency continues to increase with the publication of quality measures in public web-based access points such as Hospital Compare, women can benefit from an enhanced view of maternal-centric quality measures to assist in maternal health care decision-making.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10995-022-03516-0>.

Author Contribution Dr. Holzer developed the idea for the paper and led the primary data collection and analysis. She created the first draft of the paper and was responsible for revisions and the final version. Ms. Fiedler provided research support, including revising the paper, identifying and inputting citations. Dr. Londhe provided direction and ideas for the paper, reviewed the analysis, wrote and revised the paper, and provided final review.

Funding This work was not supported by external funders and was completed in the course of the authors’ job duties.

Data Availability All data in this study are publicly available.

Code Availability Not applicable.

Declarations

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethics Approval: This work did not involve human subjects and is not subject to IRB review.

Consent to Participate: Not applicable.

Consent for Publication Not applicable.

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