A Qualitative Process Evaluation of a Monthly Severe Maternal Morbidity Program for Massachusetts Birthing Hospitals

Betsy Lehman Center for Patient Safety

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BETSY LEHMAN CENTER
for Patient Safety

Background

Despite the critical importance of maternal health, people giving birth in the United States continue to experience higher rates of complications during delivery than in other developed countries.[1,2] A common measure of these complications is severe maternal morbidity (SMM), or unexpected, potentially life-threatening experiences or outcomes during labor or delivery. The Centers for Disease Control and Prevention (CDC) defines and measures SMM using 21 indicators, based on ICD-10 codes in administrative data.

Hospitals are encouraged to examine SMM cases with a strong quality improvement lens to prevent future SMM cases. In Massachusetts, the Betsy Lehman Center and the Perinatal Neonatal Quality Improvement Network of Massachusetts (PNQIN) support quality improvement efforts by sharing reports with birthing hospitals on their SMM rates annually. However, receiving data annually – with up to 16 months of delay – means that clinical teams have difficulty remembering specific SMM cases and implementing changes. Recognizing that the best way to make these data actionable is for hospitals to have access to them in a timely manner, the Betsy Lehman Center implemented a program for birthing hospitals to receive their SMM data monthly.

The program is built on an existing data submission process. Massachusetts birthing hospitals are required to submit administrative inpatient discharge data quarterly to the Center for Health Information and Analysis (CHIA, a sister agency to the Betsy Lehman Center). Hospitals participating in the new program submit discharge data monthly. The Betsy Lehman Center identifies cases of SMM and shares SMM cases with clinical teams from participating birthing hospitals. This prompts clinical teams' review and comments on the clinical relevance of each case. Finally, hospitals receive final SMM reports in a Tableau dashboard via a secure website, which enables them to view SMM trends over time and by patient characteristics (e.g., race and ethnicity, insurance status).

The Betsy Lehman Center conducted a qualitative process evaluation of the first year of the program. Interviews of the first cohort of participating hospitals and data agency staff supporting program implementation delve into the experiences, challenges, and lessons learned. The findings presented in this report can be relevant for stakeholders interested in advancing timely SMM including other states, quality collaboratives, and hospital associations.

SEVERE MATERNAL MORBIDITY INDICATORS

1. Acute myocardial infarction
2. Aneurysm
3. Acute renal failure
4. Acute respiratory distress syndrome
5. Amniotic fluid embolism
6. Cardiac arrest / ventricular fibrillation
7. Conversion of cardiac rhythm
8. Disseminated intravascular coagulation
9. Blood transfusion
10. Eclampsia
11. Heart failure / arrest during surgery or procedure
12. Puerperal cerebrovascular disorders
13. Pulmonary edema / acute heart failure
14. Severe anesthesia complications
15. Sepsis
16. Shock
17. Sickle cell disease with crisis
18. Air and thrombotic embolism
19. Hysterectomy
20. Temporary tracheostomy
21. Ventilation

[1] Gunja M, Gumas E, Masitha R, Zephyrin L. *Insights into the U.S. Maternal Mortality Crisis: An International Comparison.* Commonwealth Fund; 2024. doi:10.26099/cthn-st75

[2] Tikkanen, Gunja M, Fitzgerald M, Zephyrin L. *Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries*. Commonwealth Fund; 2020. doi:10.26099/411v-9255

PROCESS OF DISCHARGE DATA SUBMISSION TO TABLEAU DASHBOARD UPDATE

STEP 1

Hospital data submitters submit discharge data to CHIA

(30 days after the month ends)

STEP 2

Betsy Lehman Center identifies SMM cases and sends to clinical teams for review

(2 weeks after discharge data submission)

STEP 3

Clinical teams send reviewed cases back to Betsy Lehman Center

(4 weeks after discharge data submission)

OPTIONAL

Clinical teams discuss cases internally at various levels

STEP 4

Betsy Lehman Center updates Tableau Dashboard

(6 weeks after discharge data submission)

Methods

Interview participants, discussion guides, and analysis

The monthly SMM program began with three Massachusetts birthing hospitals, eventually enrolling eight hospitals between June 2023 and June 2024.

Six months into the participation of the first cohort of hospitals, clinical teams and data submission teams involved in the program were invited to participate in qualitative, semi-structured interviews with the Betsy Lehman Center research team. This included clinicians closely involved with reviewing cases at their hospitals, data submitters, and staff at CHIA who facilitate collaboration between hospitals and data agencies, and who support inter-agency collaboration.

The Betsy Lehman Center research team conducted 12 interviews: seven with clinicians, one with a team of data submitters, and four with CHIA staff who support hospital data-sharing. Data submitters largely opted out of participating in an interview, citing that they did not have many workload changes or feedback associated with the program.

Interview questions captured information about individuals' workload and process changes since participating in the program, the experience and impact of participating, and feedback for improving the program. The Betsy Lehman Center research team primarily conducted interviews virtually using the Zoom meeting platform and recorded interviews with participant permission. Two researchers independently analyzed transcripts to identify codes and sub-codes, resolving discrepancies iteratively to reach consensus.

Ethics approval was not required due to the quality improvement nature of the research.

Report structure

This report is organized around five findings.

1. Hospital provider teams were highly engaged in clinical review of the data and the program helped focus them on future quality improvement initiatives.
2. CHIA staff relied on clear communication processes between all invested parties for a smooth roll-out to the program.
3. Hospital clinical teams and CHIA staff did not experience significant impact on workflow or workload due to the program.
4. Lack of clinical consensus regarding SMM definitions and operational silos challenged program implementation and quality improvement efforts.
5. Technical barriers and the voluntary nature of the process impacted program maintenance and data submission quality.

Findings

Overall, all clinicians and CHIA staff reported positive satisfaction with the monthly SMM program, reporting that adoption was smooth, straightforward, and not time-consuming. A core contributor to the satisfaction was that the program was built on an existing process and existing relationships. Rather than requiring the uptake of a novel process or program, it primarily relied on a higher frequency of contact with data submitters (for CHIA staff), a higher frequency of SMM case reviews (for clinical teams), and a change in timing of running a program and submitting data (for data submitters). As mentioned previously, data submitters reported that they did not have many workload changes or feedback to elaborate on.

FINDING:

Hospital provider teams were highly engaged in clinical review of the data and the program helped focus them on future quality improvement initiatives

Providers regularly reviewed monthly data and increased collaboration with quality teams

All clinicians reported that, since participating in the program, they utilize a process for reviewing the SMM cases identified by the Betsy Lehman Center. The specific makeup of the SMM case review team has variations across hospitals. All clinicians reported having at least one OB/GYN and one nurse or nurse practitioner reviewing SMM cases. One hospital team reported having a data analyst directly involved with the review.

About half of clinical teams collaborate on case reviews with quality improvement/risk teams. In many hospitals, these teams review patient cases on a consistent frequency (e.g., daily, with larger meetings every two weeks), in addition to the SMM clinical reviewers. Given the quality improvement nature of the project, there is some overlap between the two groups (e.g., they attend monthly quality improvement meetings together).

Two hospitals reported having a patient safety nurse directly involved with reviewing cases, which they found helpful due to the nurse's clinical perspective during case reviews.

Program prompted clinicians to consider future quality improvement efforts

Most hospitals had integrated SMM case reviews with quality improvement practices such as flagging cases for larger grand rounds case review meetings, peer reviews, and interdisciplinary morning huddles. Hospital teams reported that the increased collaboration between obstetrics and quality improvement teams has been positive, leading to reviewing cases for process improvement in clinical practice and for clinical education.

At the time of interviews, most teams had not yet initiated any new internal quality improvement processes or initiatives with the SMM data. Most hospitals also had not yet reported a decrease in SMM rates, although some noted preliminary positive findings, such as a decrease in SMM for Black patients.

However, hospitals were actively thinking about how to initiate new quality improvement processes due to the SMM monthly review process. Some hospitals described intending to use the data for scenario-based clinical education and analyzing clinical behavior and practice.

A couple of hospitals reported taking action to improve their data infrastructure as a result of the monthly SMM program, such as harmonizing all their data sources and integrating SMM data into existing databases. One additional hospital reported their intention to stratify SMM data by variables such as race and ethnicity in the future.

Interviews also highlighted that opportunities to share challenges and successes, and to problem solve across hospitals, were highly valued. To meet these needs, the Betsy Lehman Center has been facilitating an SMM learning meeting series for hospitals participating in the program to discuss and identify best practices in coding, as well as to reach a clinical consensus on how to identify certain indicators as SMM events.

FINDING:

CHIA staff relied on clear communication processes between all invested parties for a smooth roll-out to the program

The role of most CHIA staff interviewed was primarily to serve as liaisons to hospital data submitters to encourage hospitals' timely submission of inpatient discharge data. Interviewees noted the importance of holding meetings

such as kick-off meetings and regular check-ins between parties involved in the monthly SMM program (e.g., clinical teams, hospital data submitters, CHIA liaisons, hospital IT staff, state agencies) to maintain clear communication lines.

The monthly SMM program also required close communication between the Betsy Lehman Center and CHIA, with one CHIA staff member interviewed serving as the primary interagency liaison. In their role, the interagency liaison kept abreast of the changes within various CHIA departments, considered and reported back on the ways those changes could impact collection of SMM data, and connected departments and agencies to help answers to any project-related questions.

Finally, CHIA staff also noted relying on clear documentation including the use of an existing document outlining hospital data submission deadlines to streamline the data submission process. At the outset of the program, hospitals were confused about the period of data reporting and timeline of data review. Clear communication processes helped resolve this with time as CHIA staff clarified the lookback period with data submitters.

FINDING:

Hospital clinical teams and CHIA staff did not experience significant impact on workflow or workload due to the program

Most clinicians stated that reviewing SMM cases monthly did not greatly affect hospital workflow and required only a small amount of time per month. Some clinicians stated that their facilities already had data reporting processes and systems in place related to SMM, which helped facilitate the review process. As described above, having relationships with quality and safety nurses also helped with the review process.

In addition, clinicians reported on the usefulness of having timely data with enough detail to streamline chart reviews on identified cases. Clinicians also stated that receiving monthly SMM data from an external source acted as a good check on hospitals' medical records.

While clinicians reported that changes to workload and workflow were minimal, a few challenges were noted. One hospital reported that they had to adjust the timeline of their internal case review to match the timeline of receiving SMM data from the Betsy Lehman Center.

Although clinicians reported that the SMM review process was simple, some referenced a lack of time to review cases promptly, given clinicians' heavier workloads due to limited staff capacity and difficulty finding time for all busy clinical reviewers to convene for SMM case reviews.

CHIA liaisons similarly reported that the process has been straightforward and simple. Although monthly data submission slightly increased their time spent communicating with hospitals, the increase to their workload was minimal (approximately 20 to 30 minutes of work per month). Part of this time is spent adapting communication approaches depending on the data submitter they are working with (e.g., timing of contact, number of touchpoints or reminders).

FINDING:

Lack of clinical consensus regarding SMM definitions and operational silos constrained program implementation and quality improvement efforts

Despite overall positive satisfaction, clinicians noted a few key barriers and challenges to implementing the monthly SMM program in their hospitals. They most often reported trouble identifying and diagnosing SMM cases due to coding errors and differences in clinical judgement in the application of the CDC's definition of SMM. For example, there may be differences in clinical judgement of how high or how long creatinine should be elevated to be considered SMM due to acute renal failure.

Even when clinical teams were in agreement regarding clinical review, a lack of collaboration between clinicians and hospital coding teams inhibited efforts to improve the data. Hospital coding teams convert clinical notes and documentation into diagnosis codes for billing teams to use to submit claims and work with insurance. One clinician admitted that they have no sense of who the hospital coding teams are at their hospital. This lack of interaction relates to problems with SMM identification, as many false positive cases could be caused by coding errors. In response, a couple hospitals noted experiences meeting with – or future plans to meet with – their hospital coding teams to address some of these coding concerns and improve the data going forward.

FINDING:

Technical barriers and the voluntary nature of the process impacted program maintenance and data submission quality

Another barrier to implementation was challenges with technology. Specifically, clinicians reported having trouble with the secure file transfer process to receive SMM cases. Since data with personal health information were being exchanged, the secure file process was required by the state agencies, but the different security requirements for hospital IT departments added extra hurdles for clinicians completing reviews.

Implementation challenges reported by CHIA staff centered around delays, data completeness, and data accuracy on the part of hospital data submitters.

The voluntary nature of the program relates to these challenges. Participating hospitals elected to – but were not required to – submit data on a monthly basis. CHIA staff supported the voluntary process by consistently encouraging hospitals' timely participation and accurate submissions but could not enforce data submission or accuracy. Despite the voluntary process and submission hurdles, all hospitals submitted usable data approximately 96% of the time in the first year.

CONCLUSION:

Diverse implementation experiences offer best practices for efforts to implement monthly SMM programs

This qualitative process evaluation yields insights into core best practices that can facilitate implementation of monthly SMM programs. Being among the first to engage in the monthly SMM program, the experiences of clinicians and CHIA staff interviewed offer various suggestions for improving it, and it is now undergoing expansion with additional hospitals' implementation.

These best practices summarize the experiences and findings shared above.

Data agency best practices

1. **Build in opportunities for inter-role collaboration.** Collecting, submitting, and reviewing SMM cases monthly requires delicate coordination between various groups, including clinicians, data submitters, CHIA liaisons to hospital teams, and data agencies (i.e., Betsy Lehman Center and CHIA). However, these groups are not always in contact with each other, which creates challenges when closer collaboration or clarification are needed. More opportunities for these groups to communicate and to align on goals and priorities will be a benefit. In particular, individuals interviewed appreciated the Betsy Lehman Center's hosting of a kick-off meeting at the outset of the program for each hospital, but requested that the kickoff meeting include all involved groups from a given hospital, and that a feedback loop is established so all groups know the outcome of their contribution.
2. **Appoint liaisons between data agencies and hospitals.** This existing structure – with frequent communication between CHIA liaisons and hospital teams – facilitated the implementation of a monthly SMM program. These existing relationships enabled open communication and supported problem-solving throughout the program.
3. **Disseminate standardized user-friendly materials to facilitate clinicians' SMM case reviews.** Some clinicians reported a desire for simplified, more user-friendly files or spreadsheets that they can use alongside colleagues to review SMM cases. These materials are under development.

Hospital best practices

1. **Work towards hospital-wide alignment on the definition of SMM.** Despite the general use of the CDC's definition of SMM, some clinicians reported on the differences between how different hospital teams – and even clinicians within a given hospital team – define SMM. One challenge with this is that the CDC definition may be overly inclusive, encompassing codes that are not clinically relevant. Standardization of the definition of SMM within each individual hospital may be a helpful starting place.
2. **Collaborate actively with other hospitals involved in the monthly SMM program.** Clinicians described the value they would find in data-sharing among hospitals as well as informal, collaborative meetings with other hospital teams involved in the program. Opportunities to share challenges, successes, and problem solve together would be highly valued. The Betsy Lehman Center has been facilitating an SMM learning series for hospitals participating in

the program to discuss and identify best practices in coding, as well as to reach a clinical consensus on how to identify select indicators as SMM events. A statewide conference for participating hospitals is also under consideration.

3. **Establish internal operations and processes for data submission and case reviews.** This includes allocating sufficient time and personnel for SMM reviews, ensuring role clarity among all involved in the SMM data submission and review process, collaborating with billing teams and data submitters, deciding on case review meeting frequency (ideally with standing meetings), and maintaining deadlines for completion of each monthly case review. Maintaining such structures will decrease the burden of monthly clinical review and increase the ability to act on SMM data in real time.
4. **Include quality and safety nurses on the SMM clinical review team.** In addition to the quality improvement that stems from engagement in a monthly SMM program, including nurse or nurse practitioner case reviewers who have an explicit focus on quality and safety can further demonstrate investment in health care quality.
5. **Invest in quality improvement by using SMM data.** Clinician interviews underscored the importance of hospital investment in quality improvement. Stratifying data by race and ethnicity and sharing SMM results at department meetings can result in positive shifts in maternal health experiences and outcomes.

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