Severe Maternal Morbidity

Dr. Dan Connealy, MD, MBA, FACOG
Erica Meier, MSN, RN, RNC-OB, C-EFM, C-ONQS

1

What is SMM?

- "Unexpected outcomes of labor and delivery that have serious short or long term impacts"
  - Adopted by CDC, ACOG and SMFM
  - But what should be defined as meeting criteria?
    - ICD 9/10 Code – 21 indicators

2

ICD 10 Indicators of SMM

- Acute Myocardial Infarction
- Aneurysm
- Acute Renal Failure
- ARDS
- Amniotic fluid embolism
- Cardiac Arrest – V-Fib
- Cardioversion
- DIC
- Blood transfusion
- Eclampsia
- CHF – Cardiac arrest
- Cerebrovascular disorders
- Pulmonary edema
- Severe anesthesia complications
- Sepsis/Shock
- VTE
- Sickle disease – crisis
- Hysterectomy
- Intubation/ventilation

https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html

3

4

Hospital Defined Criteria

- Admission to the ICU
- Transfusion of ≥ 4 units of blood

- Validated – High sensitivity (79-100%) and specificity (78-96%)

Geller SE, Rosenberg D, Cox S, Brown M, Simonson L, Kilpatrick S. A scoring system identified near-miss maternal morbidity during pregnancy. J Clin Epidemiol. 2004 Jul;57(7):716-20. doi: 10.1016/j.jclinepi.2004.01.003. PMID: 15358399.

5

How big of a problem is Maternal Mortality and SMM?

6

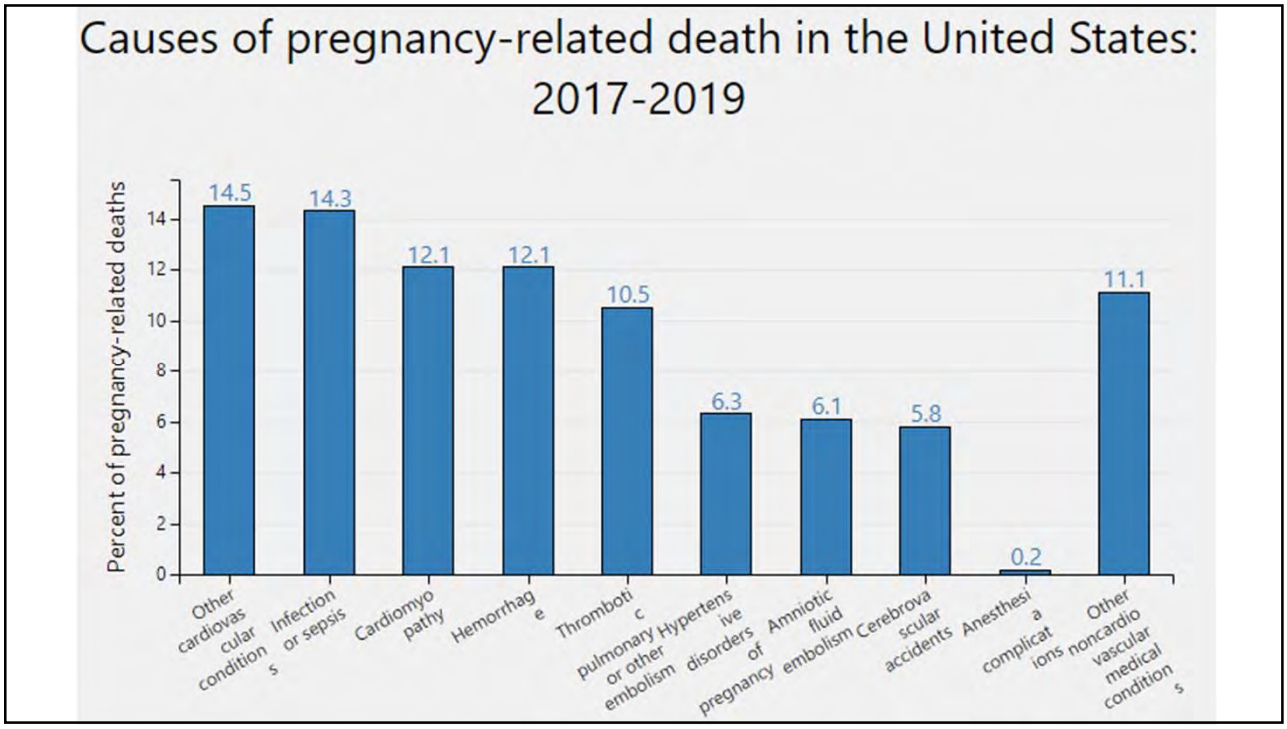
Maternal Mortality – CDC 2021

- 2021 = 32.9/100,000 (1205 deaths)
- 2020 = 23.8/100,000 (861 deaths)
- 2019 = 20.1/100,000 (754 deaths)

- Rates for non-Hispanic black in 2021 = 69.9/100,000
  - ***2.6 x higher than non-Hispanic white***

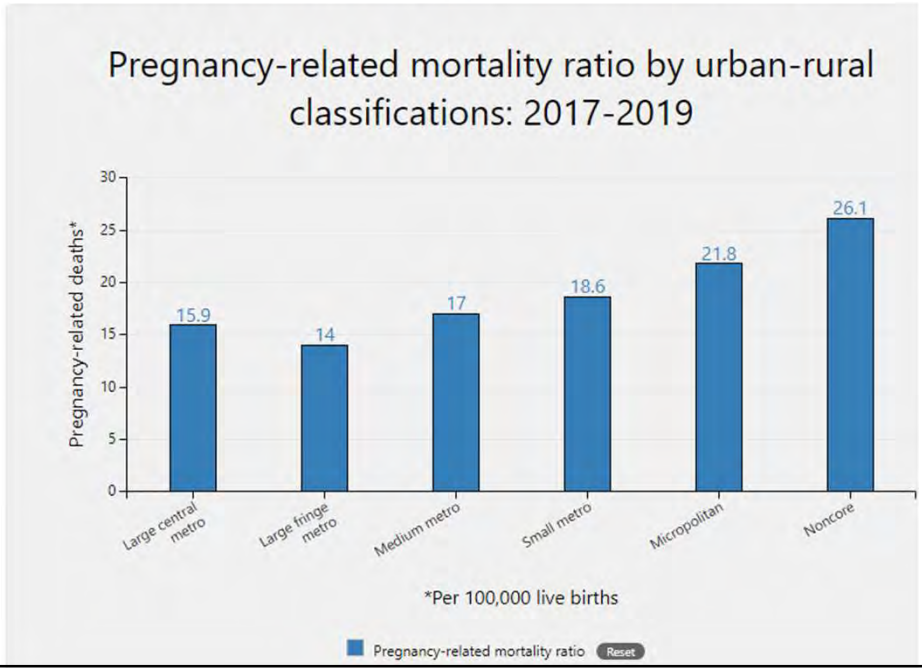
- Rates also higher for all races in women age 40 or above (138.5/100,000)

7



8

Pregnancy-Related Deaths by Urban-Rural Classifications



9

Severe Maternal Morbidity

- As with maternal mortality – rates of SMM are on the rise
- 60,000 SMM occurrences annually in the U.S.
  - Account for 0.3-2.4% of all deliveries

Grobman WA et al. Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network. Frequency of and factors associated with severe maternal morbidity. Obstet Gynecol. 2014 Apr;123(4):804-10. doi: 10.1097/AOG.0000000000000173. PMID: 24785608; PMCID: PMC4116103.

10

Why should we target SMM for review?

- SMM may serve as an important predictor of mortality
- Limitations in our ability to affect change with the relative low number of mortality cases
  - Rare outcome spread across a huge number of facilities
- SMM often seen as "near miss" events
  - Almost half of cases are seen as preventable
  - No delivery institution is immune

11

Additional benefits to SMM reviews……

- Identify and study at-risk populations disproportionately impacted by SMM
  - Racial/Ethnic minorities
  - Government insured
  - Rurality
- Optimize resource allocation to affect change
- Reduction in healthcare costs

Ozimek JA, Eddins RM, Greene N, Karagyozyan D, Pak S, Wong M, Zakowski M, Kilpatrick SJ. Opportunities for improvement in care among women with severe maternal morbidity. Am J Obstet Gynecol. 2016 Oct;215(4):509.e1-6. doi: 10.1016/j.ajog.2016.05.022. Epub 2016 May 19. PMID: 27210068.

12

SMM Costs

Directly Measured Costs of Severe Maternal Morbidity Events During Delivery Admission Compared to Uncomplicated Deliveries

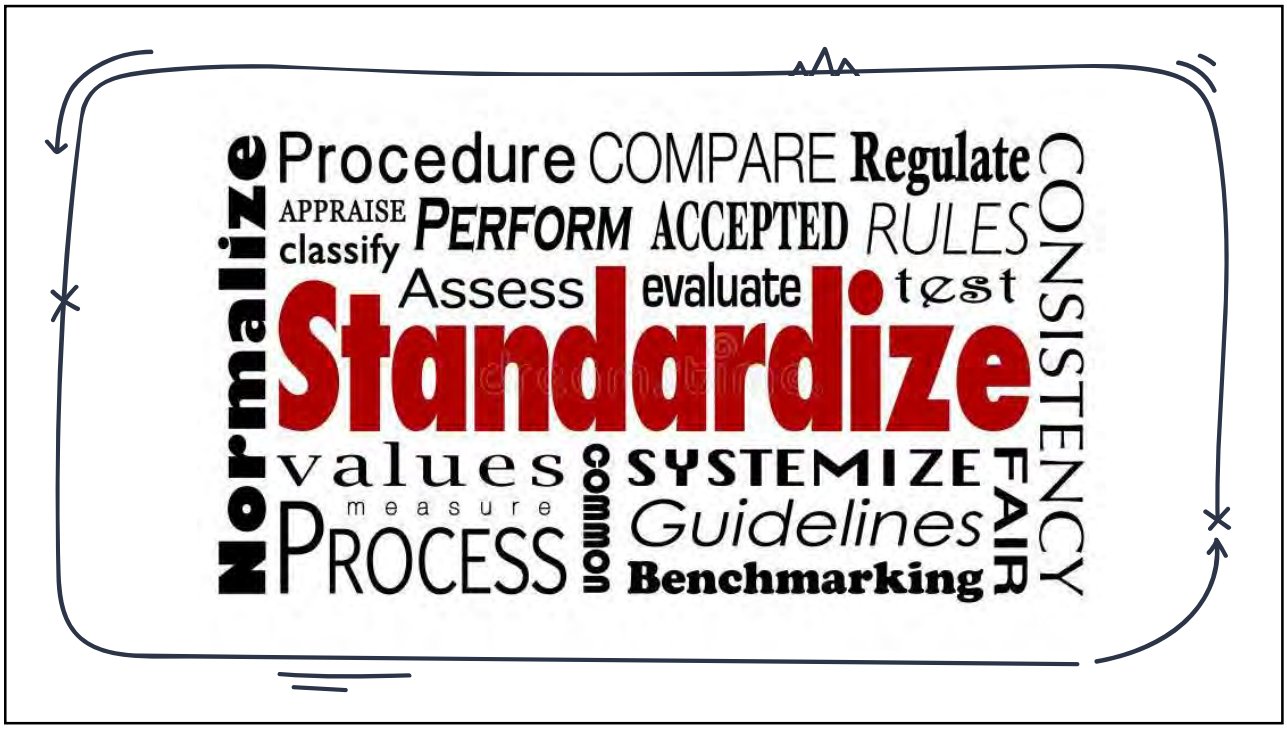
Michelle P. Debbink, MD/PhD[1,2], Torri D. Metz, MD/MS[1,2], Richard E. Nelson, PhD[3,4], Sophie E. Janes, BA[5], Alexandra Kroes, BS[5], Lori J. Begaye, BS[6], Cara C. Heuser, MD[2], Marcela C. Smid, MD/MS[1,2], Robert M. Silver, MD[1], Michael W. Varner, MD[1,2], Brett D. Einerson, MD/MS[1,2]

- SMM events associated with 2.5-fold increase in cost compared to uncomplicated deliveries
- Case example: 2500 delivery institution with 2% rate of SMM
  - Estimates an excess cost of $430,000 per year for SMM

13

Where do we begin?

14



15

Building a committee

- Hospital support
  - Establish a standing committee in hospital bylaws
  - Protections afforded to providers
    - This is not peer review but rather expert review focused on improving systems
  - Resources
    - Data extraction
    - Collation of data
    - Support services

16

Building a committee

- Multidisciplinary reflective of physicians and staff
  - OB/Gyn, FP, MFM, CNM, APP, Anesthesia
  - Nurse leaders, staff nurses
  - Hospital QI and appropriate administrators/directors

Consideration of ad-hoc members as needed for special cases

17

TABLE 1. Steps To Implement Routine SMM Reviews

Create multidisciplinary SMM review committee
Identify potential SMM cases and confirm true SMM
Identify the morbidity
Abstract and summarize data
Present case to review committee for discussion
Determine events leading to morbidity
Determine opportunities to improve outcome
Assess provider, system, and patient factors in cases with opportunities to improve outcome
Make recommendations
Effect change and evaluate improvement

SMM indicates severe maternal morbidity.

A step by step approach to the review process is key to efficient utilization of time and resources

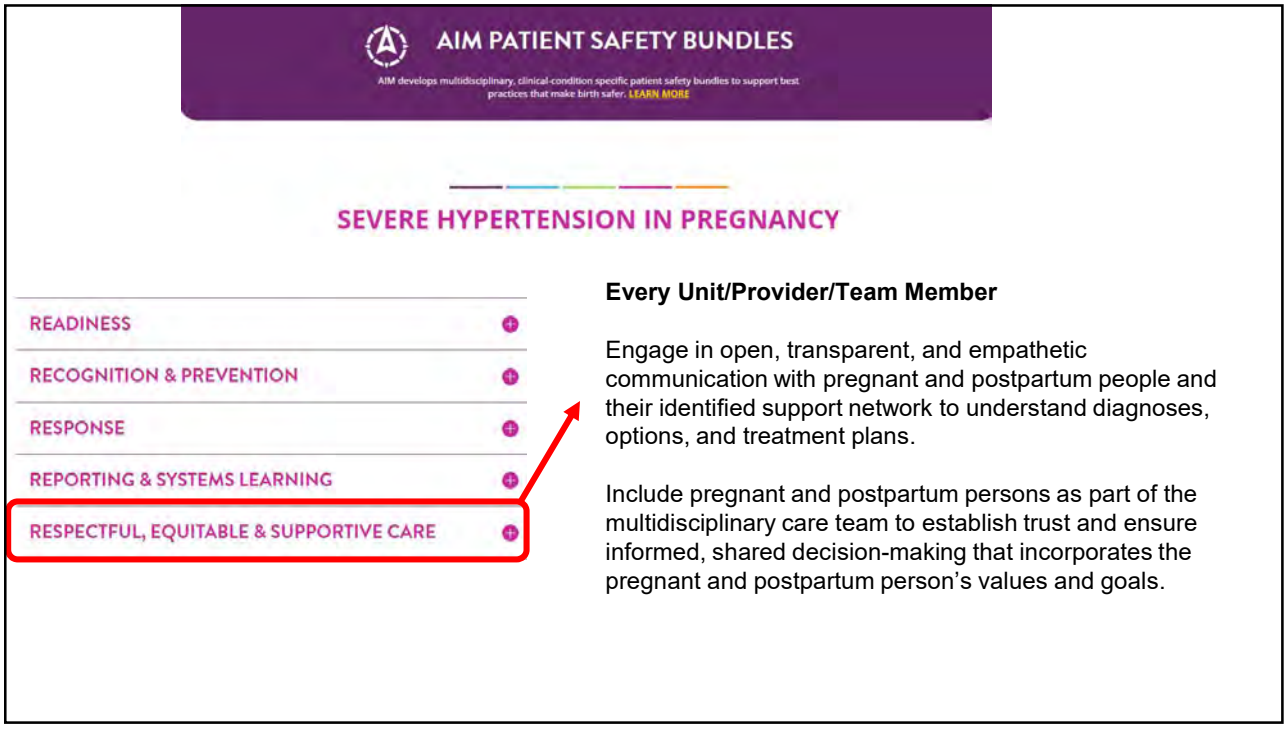
Kilpatrick SJ. Understanding Severe Maternal Morbidity: Hospital-based Review. Clin Obstet Gynecol. 2018 Jun;61(2):340-346. doi: 10.1097/GRF.0000000000000351. PMID: 29334493.

18

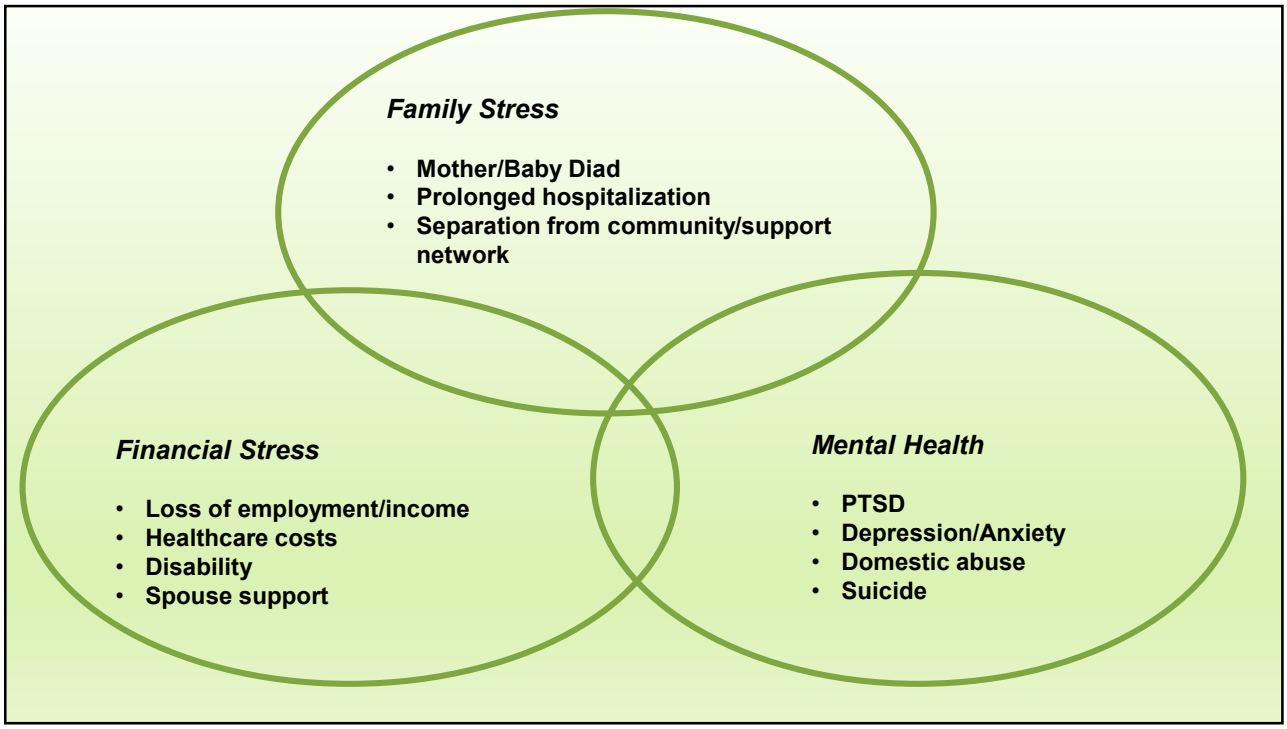
Key Points to Consider

- Screening criteria are not necessarily a quality metric
  - Not all transfusions or ICU admissions are unplanned or considered SMM
- Quality metric may include the following:
  - Rate of preventable cases of SMM
- SMM is not necessarily a sentinel event
  - Key is unexpected vs expected
  - Processes for review are often different

19



20


Family Stress
• Mother/Baby Diad
• Prolonged hospitalization
• Separation from community/support network
Financial Stress
• Loss of employment/income
• Healthcare costs
• Disability
• Spouse support
Mental Health
• PTSD
• Depression/Anxiety
• Domestic abuse
• Suicide

21


Journal of Women's Health > VOL. 32, NO. 5 | Original Articles
Adverse Perinatal Outcomes and Pos
Suicidal Behavior in California, 2013
Association Between Severe Maternal Morbidity and
Illness Within One Year of Hospital Discharge After D
Severe maternal morbidity and postpartum mental health-related outcomes in Sweden: a population-based matched-cohort study
Elizabeth Wall-Wieler, Suzan L. Carmichael, Marcelo L. Urquia, Can Liu, Anders Hjern
Maternal-Fetal Medicine | Published: 18 January 2016
Post-traumatic stress disorder following emergency peripartum hysterectomy
Cara Z. de la Cruz, Martha Coulter, Kathleen O'Rourke, Alfred K. Mbah & Hamisu M. Salihu
International Journal of GYNECOLOGY & OBSTETRICS
CLINICAL ARTICLE
Postpartum psychoactive substa
morbidity
RESEARCH ARTICLE Open Access
The relationship between severe maternal morbidity and psychological health symptoms at 6–8 weeks postpartum: a prospective cohort study in one English maternity unit
Marie Furuta, Jane Sandall, Derek Cooper and Debra Bick

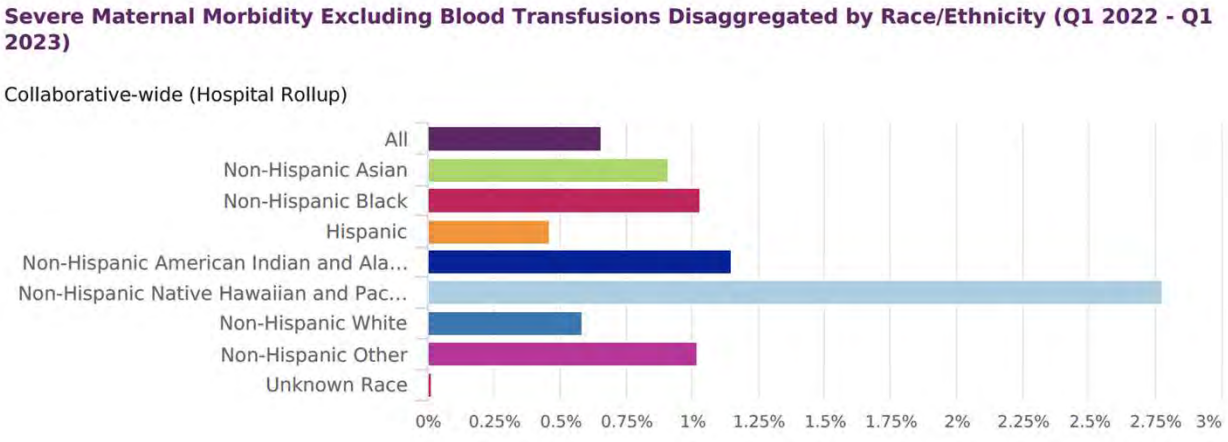
22

Impact of Social Determinants of Health

- SMM disproportionately affects certain groups of patients
- Identifying and understanding the how and why is critical to reducing the impact of SMM in our communities
- Local, Regional and Statewide reviews need to consider the role of SDOH when developing recommendations and strategies to affect change

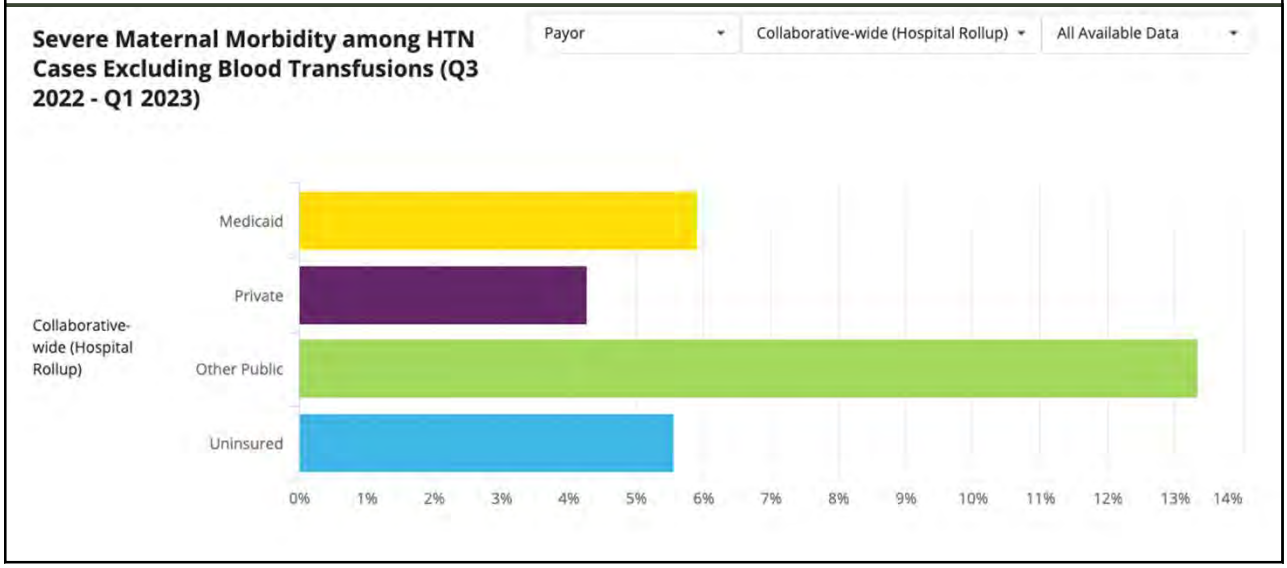
23

Nebraska Data AIM - NPQIC



24

Nebraska Data AIM - NPQIC



25

26

Timeline

- MWH joined the NPQIC SMM Pilot group in May 2022
  - Review and utilize different standardized abstraction tools
  - SMM Committee to review cases and abstraction tools
- MWH first SMM Committee Meeting August 2022
- Small Group created SMM Abstraction tool November 2022

27

How in 3 months did we get a committee up and going??

28

Erica Meier MSN, RN, RNC-OB, C-ONQS, C-EFM

Clinical Resource Nurse of OB Services

- Chief Reviewer for reported cases
  - Timelines and follow-ups
- Care and Practice review, changes, creation and implementation
- Simulations

29

Director of Nursing

Bedside RN x2

MFM Physician

Risk and Quality

Core/Charge RN x2

OB/GYN Physician

Service Leader of L&D/HROB

30

Case Identification

Severe Maternal Morbidity Criteria

≥ 4 units of blood products

Standard ≥ 4 PRBCs

ICU transfer

31

Electronic Medical Record Report

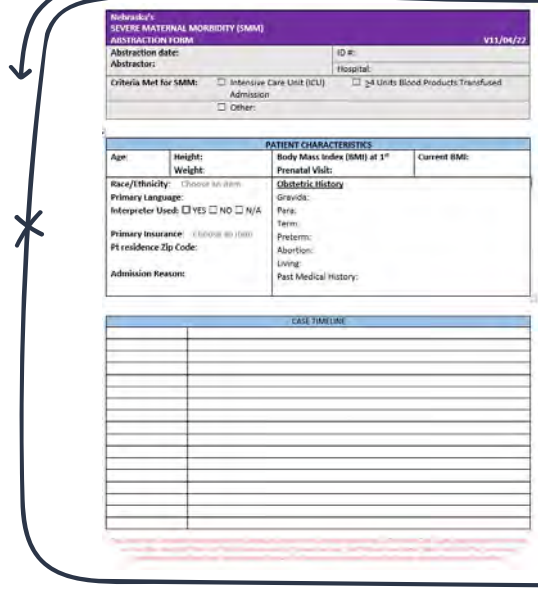
- Patient Name, MRN, open pregnancy encounter or has been pregnant in the last year
- 4 units of blood products
- Consult Intensivist or Transfer to Critical Care order
  - Add Consult Cardiology

32

Ongoing SMM Committee

- August 2022 1st SMM Committee Meeting
  - March 2022 – July 2022
    - 8 SMM cases
      - Average 2-3 cases reviewed
- Cadence – every other month
- Added another MFM and OB/GYN Physician
- Refer cases as needed to System Physician or Nursing Care Review Committees
- Refer systematic concerns to appropriate committees

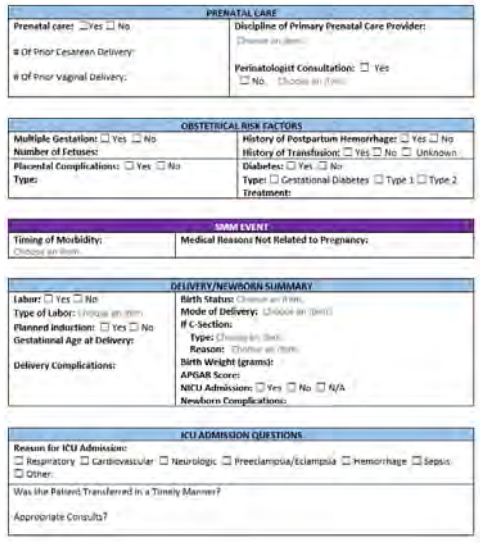
33


Nebraska's
SEVERE MATERNAL MORBIDITY (SMM)
ABSTRACTION FORM
V11/04/22

Abstraction date:
Abstractor:
ID #:
Hospital:
Criteria Met for SMM: ☐ Intensive Care Unit (ICU) Admission ☐ ≥4 Units Blood Products Transfused ☐ Other:

PATIENT CHARACTERISTICS
Age:
Height:
Weight:
Body Mass Index (BMI) at 1st Prenatal Visit:
Current BMI:
Race/Ethnicity:
Primary Language:
Interpreter Used: ☐ YES ☐ NO ☐ N/A
Primary Insurance:
Pt residence Zip Code:
Admission Reason:
Obstetric History
Gravida:
Para:
Term:
Preterm:
Abortion:
Living:
Past Medical History:

CASE TIMELINE


PRENATAL CARE
Prenatal care: ☐ Yes ☐ No
Of Prior Cesarean Delivery:
Of Prior Vaginal Delivery:
Discipline of Primary Prenatal Care Provider:
Perinatologist Consultation: ☐ Yes ☐ No

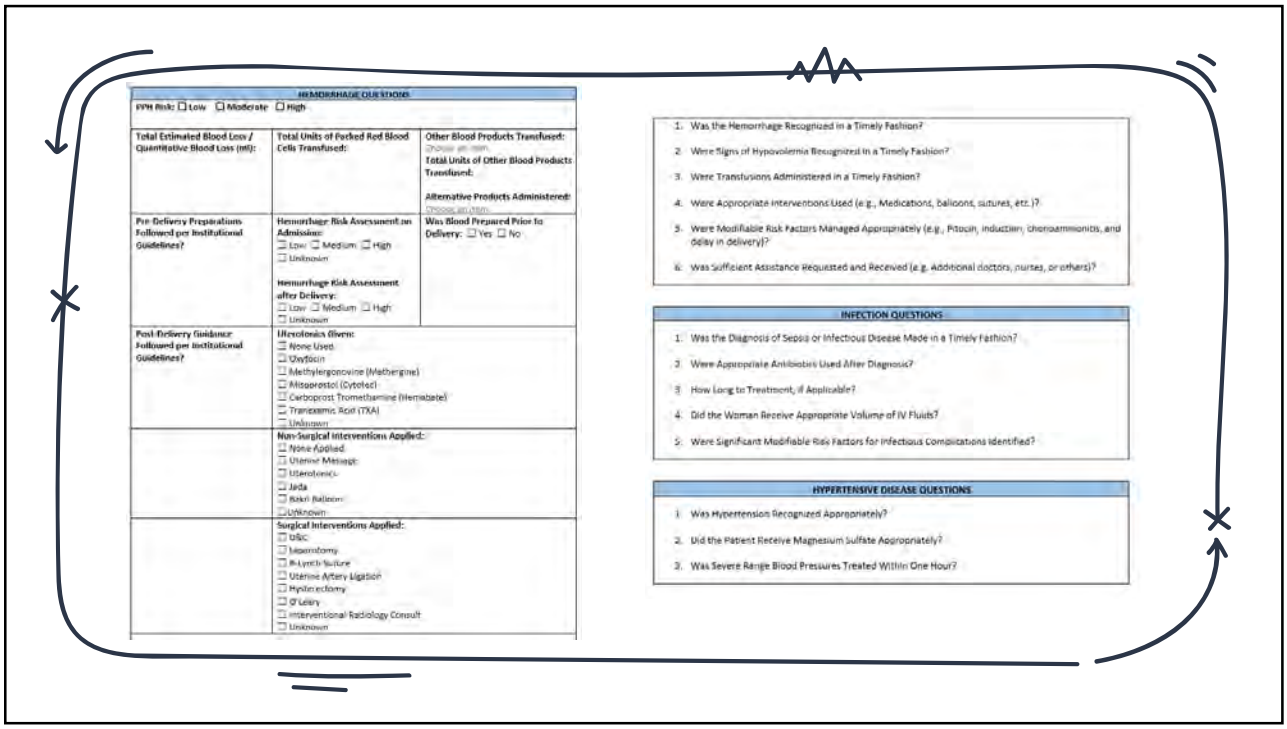
OBSTETRICAL RISK FACTORS
Multiple Gestation: ☐ Yes ☐ No
Number of Fetuses:
Placental Complications: ☐ Yes ☐ No
Type:
History of Postpartum Hemorrhage: ☐ Yes ☐ No
History of Transfusion: ☐ Yes ☐ No ☐ Unknown
Diabetes: ☐ Yes ☐ No
Type: ☐ Gestational Diabetes ☐ Type 1 ☐ Type 2
Treatment:

SMM EVENT
Timing of Morbidity:
Medical Reasons Not Related to Pregnancy:

DELIVERY/NEWBORN SUMMARY
Labor: ☐ Yes ☐ No
Type of Labor:
Planned induction: ☐ Yes ☐ No
Gestational Age at Delivery:
Delivery Complications:
Birth Status:
Mode of Delivery:
If C-Section:
Type:
Reason:
Birth Weight (grams):
APGAR Scores:
NICU Admission: ☐ Yes ☐ No ☐ N/A
Newborn Complications:

ICU ADMISSION QUESTIONS
Reason for ICU Admission:
☐ Respiratory ☐ Cardiovascular ☐ Neurologic ☐ Preeclampsia/Eclampsia ☐ Hemorrhage ☐ Sepsis ☐ Other:
Was the Patient Transferred in a Timely Manner?
Appropriate Consults?

34



HEMORRHAGE QUESTIONS

PPH Risk: ☐ Low ☐ Moderate ☐ High

Total Estimated Blood Loss / Quantitative Blood Loss (ml):	**Total Units of Packed Red Blood Cells Transfused:**	**Other Blood Products Transfused:** Choose an item. **Total Units of Other Blood Products Transfused:** **Alternative Products Administered:** Choose an item.
Pre-Delivery Preparations Followed per Institutional Guidelines?	**Hemorrhage Risk Assessment on Admission:** ☐ Low ☐ Medium ☐ High ☐ Unknown **Hemorrhage Risk Assessment after Delivery:** ☐ Low ☐ Medium ☐ High ☐ Unknown	**Was Blood Prepared Prior to Delivery:** ☐ Yes ☐ No
Post-Delivery Guidance Followed per Institutional Guidelines?	**Uterotonics Given:** ☐ None Used ☐ Oxytocin ☐ Methylergonovine (Methergine) ☐ Misoprostol (Cytotec) ☐ Carboprost Tromethamine (Hemabate) ☐ Tranexamic Acid (TXA) ☐ Unknown	
	Non-Surgical Interventions Applied: ☐ None Applied ☐ Uterine Massage ☐ Uterotonics ☐ Jada ☐ Bakri Balloon ☐ Unknown	
	Surgical Interventions Applied: ☐ D&C ☐ Hysterectomy ☐ B-Lynch Suture ☐ Uterine Artery Ligation ☐ Hysterectomy ☐ O'Leary ☐ Interventional Radiology Consult ☐ Unknown	

1. Was the Hemorrhage Recognized in a Timely Fashion?
2. Were Signs of Hypovolemia Recognized in a Timely Fashion?
3. Were Transfusions Administered in a Timely Fashion?
4. Were Appropriate Interventions Used (e.g., Medications, Balloons, Sutures, etc.)?
5. Were Modifiable Risk Factors Managed Appropriately (e.g., Pitocin, Induction, Chorioamnionitis, and delay in delivery)?
6. Was Sufficient Assistance Requested and Received (e.g. Additional doctors, nurses, or others)?

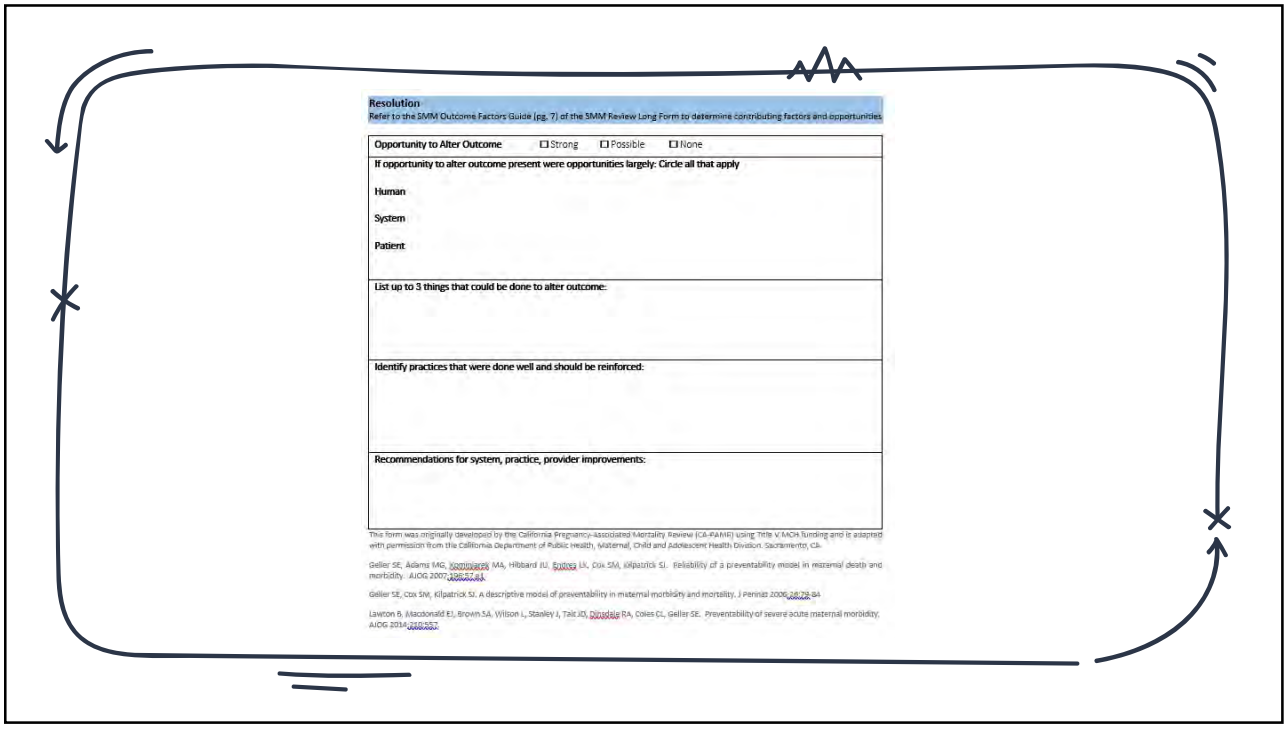
INFECTION QUESTIONS

1. Was the Diagnosis of Sepsis or Infectious Disease Made in a Timely Fashion?
2. Were Appropriate Antibiotics Used After Diagnosis?
3. How Long to Treatment, if Applicable?
4. Did the Woman Receive Appropriate Volume of IV Fluids?
5. Were Significant Modifiable Risk Factors for Infectious Complications Identified?

HYPERTENSIVE DISEASE QUESTIONS

1. Was Hypertension Recognized Appropriately?
2. Did the Patient Receive Magnesium Sulfate Appropriately?
3. Was Severe Range Blood Pressures Treated Within One Hour?

35



Resolution

Refer to the SMM Outcome Factors Guide (pg. 7) of the SMM Review Long Form to determine contributing factors and opportunities

Opportunity to Alter Outcome ☐ Strong ☐ Possible ☐ None	
If opportunity to alter outcome present were opportunities largely: Circle all that apply **Human** **System** **Patient**	
List up to 3 things that could be done to alter outcome:	
Identify practices that were done well and should be reinforced:	
Recommendations for system, practice, provider improvements:	

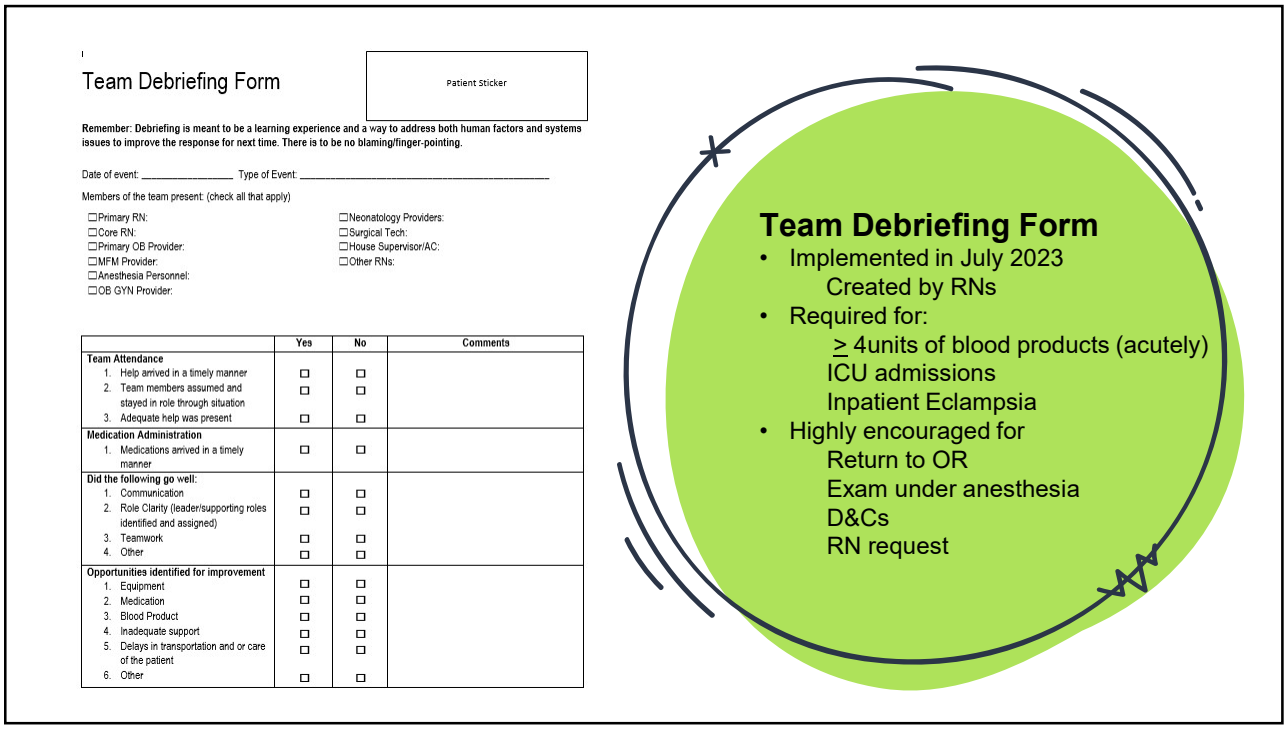
This form was originally developed by the California Pregnancy-Associated Mortality Review (CA-PAMR) using Title V MCH funding and is adapted with permission from the California Department of Public Health, Maternal, Child and Adolescent Health Division, Sacramento, CA.

Geller SE, Adams MG, Kominiarek MA, Hibbard JU, Endres LK, Cox SM, Kilpatrick SJ. Reliability of a preventability model in maternal death and morbidity. AJOG 2007;196:57.e1.

Geller SE, Cox SW, Kilpatrick SJ. A descriptive model of preventability in maternal morbidity and mortality. J Perinat 2006;26:79-84

Lawton B, Macdonald EJ, Brown SA, Wilson L, Stanley J, Tait JD, Dingdale RA, Coles CL, Geller SE. Preventability of severe acute maternal morbidity. AJOG 2014;210:557.

36



Team Debriefing Form

Patient Sticker

Remember: Debriefing is meant to be a learning experience and a way to address both human factors and systems issues to improve the response for next time. There is to be no blaming/finger-pointing.

Date of event: _____ Type of Event: _____

Members of the team present: (check all that apply)

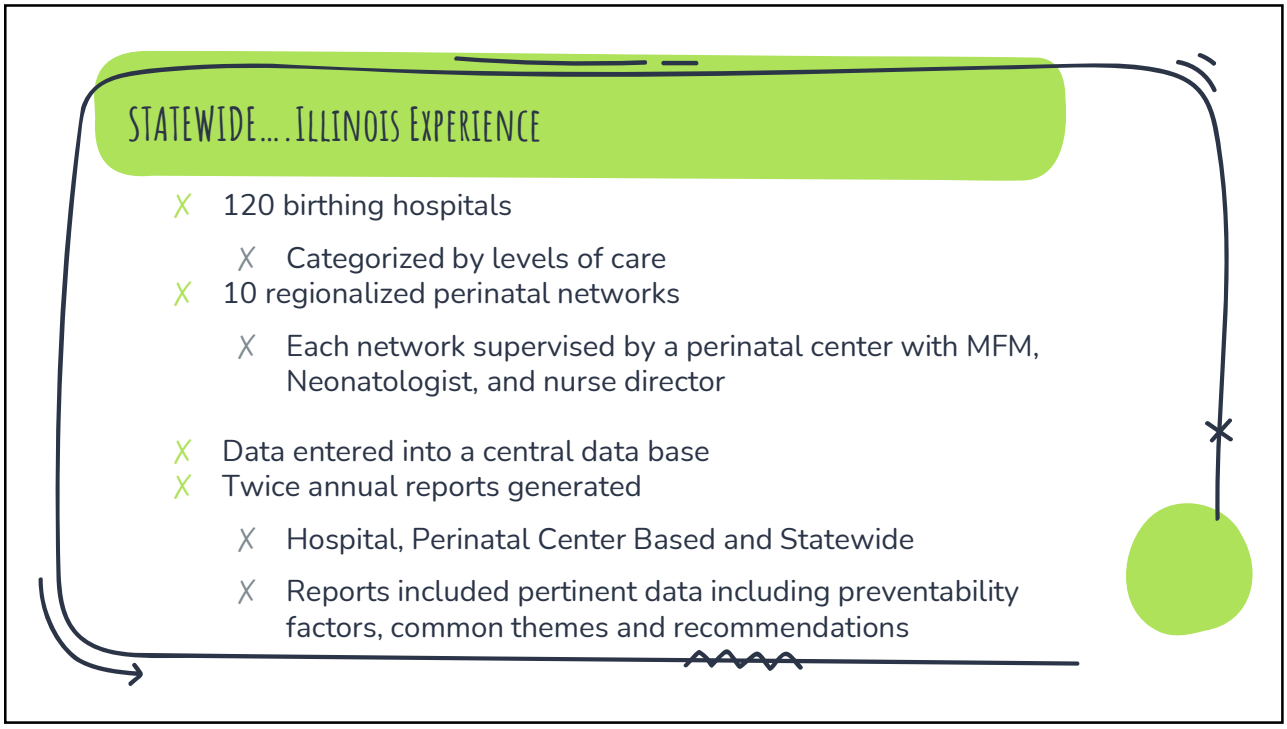
- ☐Primary RN:
- ☐Core RN:
- ☐Primary OB Provider:
- ☐MFM Provider:
- ☐Anesthesia Personnel:
- ☐OB GYN Provider:
- ☐Neonatology Providers:
- ☐Surgical Tech:
- ☐House Supervisor/AC:
- ☐Other RNs:

	Yes	No	Comments
Team Attendance			
1. Help arrived in a timely manner	☐	☐	
2. Team members assumed and stayed in role through situation	☐	☐	
3. Adequate help was present	☐	☐	
Medication Administration			
1. Medications arrived in a timely manner	☐	☐	
Did the following go well:			
1. Communication	☐	☐	
2. Role Clarity (leader/supporting roles identified and assigned)	☐	☐	
3. Teamwork	☐	☐	
4. Other	☐	☐	
Opportunities identified for improvement			
1. Equipment	☐	☐	
2. Medication	☐	☐	
3. Blood Product	☐	☐	
4. Inadequate support	☐	☐	
5. Delays in transportation and or care of the patient	☐	☐	
6. Other	☐	☐	

Team Debriefing Form

- Implemented in July 2023
  - Created by RNs
- Required for:
  - ≥ 4units of blood products (acutely)
  - ICU admissions
  - Inpatient Eclampsia
- Highly encouraged for
  - Return to OR
  - Exam under anesthesia
  - D&Cs
  - RN request

37



STATEWIDE….ILLINOIS EXPERIENCE

- 120 birthing hospitals
  - Categorized by levels of care
- 10 regionalized perinatal networks
  - Each network supervised by a perinatal center with MFM, Neonatologist, and nurse director
- Data entered into a central data base
- Twice annual reports generated
  - Hospital, Perinatal Center Based and Statewide
  - Reports included pertinent data including preventability factors, common themes and recommendations

38

Illinois Experience

- Keys to success
  - Pilot testing
  - Ample time for implementation
  - Support for low-resource facilities
  - Investment from state and local leadership
- Challenges
  - Translation from review to recommendation to changes being implemented

39

Where are we at in Nebraska

- NPQIC
  - Currently piloting institutional level SMM reviews
    - Occurring at Perinatal Center Level Hospitals
      - Nebraska Medicine, CHI, Bryan Health, Methodist Women's
    - Committee formation
    - Abstraction tools
    - Process implementation

40

Challenges in Nebraska

- Lack of well established levels of care
- Lack of well organized "Perinatal Networks"
  - Currently they are system or referral based
- Consolidation of Perinatal/Neonatology resources in Eastern NE
- Lack of Funding/Resources
  - Critical Access and Rural facilities
  - Requires significant investment (financial and manpower) by individual hospitals

41

Thank you for the opportunity to share with you today!

Questions or Comments?

42