Severe Maternal Morbidity: Why and How To Review

Sarah J. Kilpatrick MD, PhD
Professor and Helping Hand of Los Angeles Endowed Chair
Chair Department of Obstetrics and Gynecology
Associate Dean for Faculty Development
Cedars-Sinai Medical Center

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Disclosure of Faculty Financial Interests or Relationships

I do not have any disclosures.

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Objectives

This session will provide an overview of:

- The standard definition of severe maternal morbidity
- How to effectively identify cases of severe maternal morbidity
- How to use the Severe Maternal Morbidity Data Abstraction and Assessment Tool

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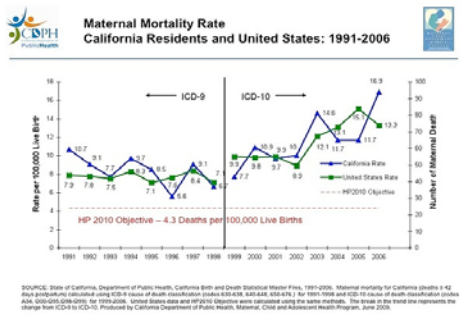
18 YO G2 P0020

- Presents to ER 5 days s/p termination with abd pain
- Afebrile, HR 100
- Many services called to evaluate abd pain, ultrasound done
- 12 hours later gyn called pt taken to or for d+c, antibiotics started
- 2 days later pt dies due to sepsis, mutltisystem organ failure

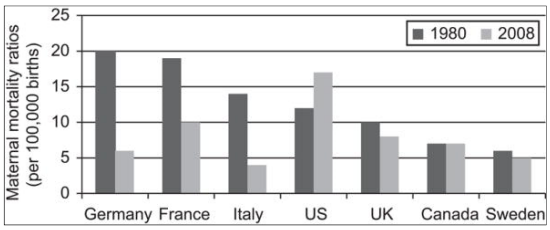
SMM Review: Why Bother?

- Reduce maternal mortality and morbidity
- Look for opportunities to improve care
- Look for patterns
- Develop interventions to improve care
- Not enough deaths to review

California Data: 1991-2006



MMR 1980 vs. 2008



Hogan MC, Lancet 2010;375:1609-23.
Hankins. Levels of Maternity Care. Obstet Gynecol 2012.

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Causes of Death Subtle Change

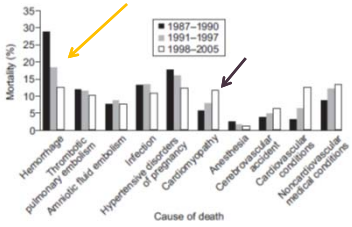

Fig. 1. Cause-specific proportionate pregnancy-related mortality for 1987 to 1990, 1991 to 1997, and 1998 to 2005 in the United States.

Berg OG 2010;116:1

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Preventability

- **37% deaths in Chicago 1992-98 (*Kemp* AJOG 2000:182;S164)**
- **54% deaths in MA 1990-1999 (Nannini, 2002)**
- **40% NC 1995-99 (Berg *OG* 2005;106:1228-34)**
- **Preventable factors**
  - Providers (41% preventable deaths)
  - Patients (15%)
  - Both (15%) (Sachs NEJM, 1987:316:667-72)

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Near Miss Preventable Factors

- 40% deaths preventable factors
- 45% near misses preventable factors
- 17% severe morbidities preventable factors (p = .01)
- Clearly opportunity for slowing progression through the continuum at least from severe morbidity to worse

Geller AJOG 2004;191:939-44

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Morbidity: The Problem

- Maternal morbidity is difficult to define
  - Broad range of complications and conditions
  - Broad range of severity

- Maternal morbidity cannot be captured by a defined set of metrics
- Administrative vs. more local records
  - We need to start somewhere

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What is Below the Iceberg?

- Severe maternal morbidity cases
  - 0.5% deliveries 1991-2003
    - 291,000 cases, 464 hospitals, national hospital discharge survey
  - Based on ICD-9 codes most common: transfusion, eclampsia, hysterectomy (75%)
  - 50X more common than death
- What if we studied these?

Callaghan ajog 2008;199:133

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How to Define and Screen for SMM

- **National Surveillance**
- **Facility Identification and Review**

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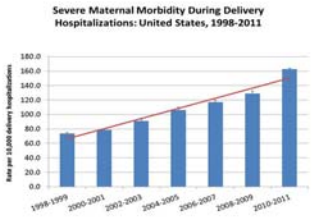
Severe Maternal Morbidity Among Delivery and Postpartum Hospitalizations in the United States

William M. Callaghan, MD, MPH, Andreea A. Creanga, MD, PhD, and Elena V. Kuklina, MD, PhD

Population-based surveillance



Callaghan et al. Obstet Gynecol 2012;120:1029-36

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Maternal morbidity	ICD-9-CM Codes	Diagnosis code	Procedure code
Acute renal failure	584, 669.3	x	
Cardiac arrest/ventricular fibrillation	427.41, 427.42, 427.5	x	
Heart failure during procedure or surgery	669.4x, 997.1	x	
Shock	669.1, 785.5x, 995.0, 995.4, 998.0	x	
Sepsis	038.0-038.9, 995.91, 995.92	x	
Disseminated intravascular coagulation	286.6, 286.9, 666.3	x	
Amniotic fluid embolism	673.1	x	
Thrombotic embolism	415.1x, 673.0, 673.2, 673.3, 673.8	x	
Puerperal cerebrovascular disorders	430, 431, 432.x, 433.x, 434.x, 436, 437.x, 671.5, 674.0, 997.2, 999.2	x	
Severe anesthesia complications	668.0, 668.1, 668.2	x	
Pulmonary edema	428.1, 518.4	x	
Adult respiratory distress syndrome	518.5, 518.81, 518.82, 518.84, 799.1	x	
Acute myocardial infarction	410.xx	x	
Eclampsia	642.6x	x	
Blood transfusion	99.00-99.09		x
Hysterectomy	68.3-68.9		x
Ventilation	93.90, 96.01-96.05, 96.7x		x
Sickle cell anemia with crisis	282.62, 282.64, 282.69	x	
Intracranial injuries	800.xx, 801.xx, 803.xx, 804.xx, 851.xx-854.xx	x	
Internal injuries of thorax, abdomen, and pelvis	860.xx—869.xx	x	
Aneurysm	441.x	x	
Operations on heart and pericardium	35.xx, 36.xx, 37.xx, 39.xx		x
Cardio monitoring	89.6x		x
Temporary tracheostomy	31.1		x
Conversion of cardiac rhythm	99.6x		x

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Severe Maternal Morbidity: Near Miss

- 5 factor scoring system identified women with "near miss" morbidity (Se 100%; Sp 93%)
  - Organ system failure
  - Extended intubation
  - ICU admission
  - Surgical intervention
  - Transfusion ≥4 units

Geller et al., J Clin Epidemiol, 2004

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2 Factor Model

- **2 factors**
  - **ICU admission and transfusion 4 or more units**
  - **100% sensitivity**
  - **78% specificity**
    - **Pick up 36 extra near miss cases**
    - **Were classified as severe morbidity**
- **Can use a model to identify and analyze these patients**

Geller J clin epi 2004;57:716

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Near Miss Identification Repeated

- **Tested Geller model on 815 cases**
  - **Point system**
  - **ICU admit alone: 79% sensitivity, 96% specificity;**
  - **4 or more units alone: 63% sensitivity; 99% specificity**
- **Currently only US 2 papers to test smm identification**

You Am J Perinatol 2013;30:21-4

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Severe Maternal Morbidity: How To Find?

- Requires multiple sources or a dedicated perinatal database for identification
  - Most scoring system factors not available in administrative databases
  - Cumbersome for state-level and national surveillance
- Organ system failure performs well by itself (Se 95%; Sp 88%)
- Geller: Transfusion ≥4 units and/or ICU admission is nearly as sensitive as the 5-factor system (Se 100%; Sp 78%)

(You et al., Am J Perinatol 2013;30:21-4)

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Current Commentary

Facility-Based Identification of Women With Severe Maternal Morbidity

It Is Time to Start

William M. Callaghan, MD, MPH, William A. Grobman, MD, MBA, Sarah J. Kilpatrick, MD, PhD, Elliott K. Main, MD, and Mary D'Alton, MD

- **Facility surveillance *AND REVIEW:***
  - Transfusion ≥4 units
  - ICU admission
- **Just Do It paper**

Callaghan OG 2014;123:978-81

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SMM Review: How To Paper

- Identify women with 4 or more units of blood, ICU admission
- Develop multidisciplinary committee
  - OB, MFM, RN, CNM, OB anesthesia, others
- Primary data abstracted from record and presented to committee for evaluation
- Determine opportunities for improvement

Kilpatrick, Berg, Bernstein, Bingham, Delgado, Callaghan, Harris, Lanni, Mahoney, Main, Nacht, Schellpfeffer, Westover, Harper Standardize severe maternal morbidity review: rationale and process. *Obstet Gynecol* 2014; 124: 361-366.

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Facility-Based Identification of Women with Severe Maternal Morbidity

- **Terminology: severe maternal morbidity**
- **Identification of cases:**
  - ICU admission or
    3-4/1000 deliveries
  - Transfusion of 4 or more units of blood products
    2/1000 deliveries
- **Review: should be done to lessons can be learned**
  - Facility based
- **Research:**
  - Are we identifying right cases
  - Can we improve outcome

Callaghan OG 2014;123:978-81

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Main et al. AJOG 2016

- **Data from CMQCC**
  - **2012-2013**
  - **> 66,000 deliveries in CA**
- **Rate screen positive for SMM (callaghan criteria); 1.3%**
  - **True positive rate for SMM: 0.7%**
  - **False positive rate: 56%; sensitivity: 0.77**
- **Rate for ICU; 4 or more units: 0.4%**
  - **False positive rate: 12%; sensitivity: 0.52**

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Main et al. AJOG 2016:

- Developed Clinical "Gold Standard"Guidelines for severe morbidity
  - Expert panel
  - Arranged by morbidity type
  - Gives examples of yes vs no SMM
  - Recognizes that not all screen positive cases will be true positives

AJOG 2016;214:643

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Gold Standard Guidelines For Severe Maternal Morbidity Using Example Driven Definitions

Severe Maternal Morbidity	NOT Severe Morbidity
HEMORRHAGE	
OB hemorrhage with ≥4 U of RBCs transfused	OB hemorrhage with 2-3 U of RBCs transfused ALONE
OB hemorrhage with 2 U of RBCs and 2 U FFP transfused (without other procedures or complications) IF not judged to be "over-exuberant" transfusion	OB hemorrhage with 2 U of RBCs and 2 U FFP transfused AND judged to be "over-exuberant"
OB hemorrhage with <4 units of blood products transfused and pulmonary congestion requiring > 1 dose of Lasix	OB hemorrhage with <4 units of blood products transfused and pulmonary edema requiring only 1 dose of Lasix
OB hemorrhage, return to OR for major procedure (excludes D&C)	

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Gold Standard Guidelines For Severe Maternal Morbidity Using Example Driven Definitions. Cont…

Severe Maternal Morbidity	NOT Severe Morbidity
HEMORRHAGE	
Any emergency/unplanned peripartum hysterectomy, regardless of units transfused (includes all placenta accretas)	Planned peripartum hysterectomy for cancer/neoplasia
OB hemorrhage with uterine artery embolization, regardless of units transfused	
OB hemorrhage with uterine balloon or Uterine Compression suture placed and 2- 3 units of blood products transfused	OB hemorrhage with uterine balloon or Uterine compression suture placed and ≤1 units of blood products transfused
OB hemorrhage admitted to ICU for invasive monitoring or treatment	OB hemorrhage admitted to ICU for observation only without further treatment

Main 2015 ajog

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Prevention or Opportunity to Alter Outcome

- **Prevention morbidity: harder concept**
  - Reduce eclampsia, DIC, LOS, renal failure, HELLP, stroke etc.
- **Identifying opportunities to alter outcome**
  - Strong, possible, none

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Examples of Preventable Factors

- Provider
  - ➢Failure to identify high risk
  - ➢Incomplete/inappropriate management
  - ➢No referral to tertiary
- System
  - ➢Communication
  - ➢Policies
  - ➢Equipment
  - ➢Medication
- Patient

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SMM Review: Process

- Identify women with 4 or more units of blood, ICU admission
- Develop multidisciplinary committee
  - ➢OB, MFM, RN, CNM, OB anesthesia, others
- Encourage debriefing after event
  - ➢This is not the same as a review
- Primary data abstracted from record and presented to committee

Kilpatrick Obstet Gynecol 2014;124:361-6.

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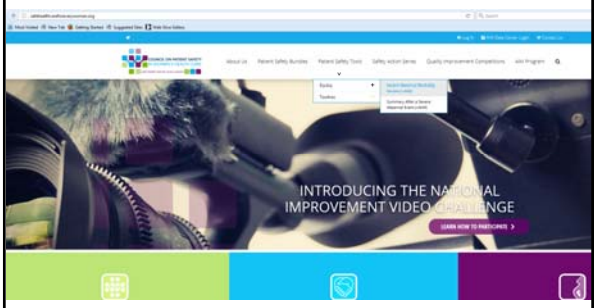
Council on Patient Safety in Women's Health Care Website: safehealthcareforeverywoman.org



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SMM Review Process

- Can use SMM abstraction and assessment form
  - Abstraction:
    - Trained abstractor
    - Capture analyzable and descriptive data from medical record
    - Identify specific morbidity
    - Develop narrative of key aspects of morbidity
    - Focused questions re: care quality
      - Was hypertension recognized appropriately
      - Did woman appropriately receive magnesium
      - Was severe hypertension treated in a timely fashion
      - Was woman delivered in a timely fashion

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Assessment: Done by Committee

- Identify whether opportunities to alter outcome (strong, possible, none)
- If yes enumerate and make specific recommendations
- Identify things that went well
- Conduct of committee
  - Just culture or other nonjudgmental approach

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SMM Review Short Form


SMM Review Form v6-28-2016_short

Abstraction

SMM (recorded cause) _____ SMM Date _____

MR # or PATIENT ID _____ Zip code of patient residence _____

Abstraction Date ___/___/___ Abstractor _____

Birth Facility _____

Hospital Level ☐1 ☐2 ☐3 ☐4 ☐Birth center ☐Other (Specify) _____

Patient Characteristics

Age ___ Weight/Height ___ / ___ Body mass index (BMI) at first prenatal visit ___ Most recent BMI ___

Race (indicate race patient identifies)
Choose an item.

Hispanic or Latina
No ☐ Yes ☐ Unknown ☐

Obstetric History
Gravida ___
Para ___ Term ___ Premature ___ Aborted ___ Living ___
Previous fetal deaths ___
Previous infant deaths ___

Prenatal Care (PNC)

Yes ☐ Week PNC began ___ Week unknown Yes ☐ No ☐ Number of PNC visits ___ Visit # unknown Yes ☐ No ☐
No ☐
Unknown PNC status ☐

Discipline of Primary PNC Provider (choose one)
Choose an item.

Prenatal care source/location
Choose an item.

Planned/intended place of delivery
Choose an item.

Timing of maternal morbidity
Choose an item.

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SMM Short Review Form

Case Narrative

Should include brief synopsis focused on the specific severe maternal morbidity that occurred that allow you to address the disease specific questions. It should be concise and pertinent to the particular SMM and include appropriate time line, evaluation, and be in chronologic format. Try to identify key moments that impacted care

Case Analysis

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SMM Short Review Form

Assessment

MR# or PATIENT ID_____
Date of event: _____
Date of review: _____
Reviewers: _____

1. Morbidity Category ☐ ICU Admission ☐ Transfused 4 or more units ☐ Other____	
2. Sequence of Morbidity Indicate the course of events: *Clinical Cause of Morbidity: 1& 2 reflect what initiated the final cause resulting in the severe morbidity. 3 is the final cause* *For example: 1. Preeclampsia 2. uncontrolled hypertension 3 intracranial bleed,* *So that 1, caused 2, that resulted in 3 – the severe morbidity*	**1.** **2.** **3.**
3. Primary Cause of Morbidity Choose an item. If trauma indicated as primary cause of morbidity: Choose an item. Other cause _____	

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SMM Short Review Form

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 **Provider** **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:	

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SMM Long Review Form

Process for Reviewing a Severe Maternal Morbidity (SMM) Event

What events should be reviewed?

- Pregnant, peripartum or postpartum women receiving 4 or more units of blood
- Pregnant, peripartum or postpartum women who are admitted to an ICU as defined by the birth facility
- Other pregnant, peripartum or postpartum women who have an unexpected and severe medical event – at the discretion of the birth facility

Who should review the event?

Multidisciplinary standing committee at birth facility representing-

- Obstetrical providers (obstetricians, family physicians and/or advanced practice nurses)
- Anesthesia providers
- Obstetric care nurses
- Birth Facility quality improvement team
- Birth Facility administration
- Patient advocate
- Scribe
- If small birth facility, consider partnering with regional perinatal center or outsourcing the review

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SMM Long Review Form

Process for Reviewing a Severe Maternal Morbidity (SMM) Event

When to review?

- As close as possible to the time of the event
- The more severe the event, the closer the timing to review
- If large birthing facility with a number of events, consider scheduling regular meeting to do reviews.

How to review?

- Reviews should be sanctioned by the facility and protected from discovery. Confidentiality statements should be gathered from each committee member
- Gather all pertinent patient medical records and facility records regarding this patient and event
- Engage a trained reviewer/abstractor to complete the Abstraction section of the SMM Review Form, including a pertinent synopsis of the event and objective information found in the records
- Primary review is then presented to the review committee
- Multidisciplinary Reviews follow a standard format (i.e. Assessment section of SMM Review Form)
- Multidisciplinary Review conclude with recommendations

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SMM Long Review Form

Instructions for SMM Abstraction

Recommendation is to review all those transfused 4 or more units or admission to ICU, but any birth facility may choose to review additional cases

- Identify the main event associated with the SMM
- Utilize the appropriate disease specific questions to create a pertinent time line and guide the review and abstraction of medical record information.
- If the answer to any of the following disease specific questions is no, attempt to identify why and record an explanation. These explanations should assess potential system, provider and patient issues.
- Fill out the objective data

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SMM Long Review Form

Disease specific questions to guide SMM Review Process

Hemorrhage

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 (e.g. medications, balloons, sutures, etc.) used?
5. Were modifiable risk factors (e.g., Pitocin, induction, chorioamnionitis, delay in delivery) managed appropriately?
6. Was sufficient assistance (e.g. additional doctors, nurses, or others) requested and received?

Hypertensive disease

1. Was hypertension recognized appropriately?
2. Did the woman appropriately receive magnesium SO4?
3. Was severe hypertension treated in a timely fashion?
4. Was the woman delivered at the appropriate time relative to her hypertensive disease?
5. Were any complications related to hypertensive disease managed appropriately?

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SMM Long Review Form

SMM Outcome Factors Guide

Purpose: To assist in determining opportunities to alter outcomes

SYSTEM & PROVIDER FACTORS	How did these factors contribute to the SMM?			
	Suboptimal Outcome	Delayed Response	N/A	Other, list specifics details here
Point of Entry to Healthcare				
Diagnosis				
Referral to Higher Level Care				
Treatment				
Management Hierarchy: (i.e. RN to MD, Resident to Attending)				
Education				
Team Communication				
Policies/Procedures				
Documentation				
Equipment/Environmental Factors				
Discharge				

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SMM Long Review Form

SMM Outcome Factors Guide

Purpose: To assist in determining opportunities to alter outcomes

Patient Factors				
Pre-pregnancy: Underlying significant medical or physical conditions	Suboptimal Outcome	Delayed Response	N/A	Other, list specifics details here
Previous significant obstetric conditions				
Non-obstetric medical complications that occurred during pregnancy				
Complications due to conditions of pregnancy				
Psychiatric/Behavioral health				Alcohol ☐ Tobacco ☐ Illicit Drugs ☐ Psychiatric Disorder ☐ Other ☐ *[if other, list specific details]*
Significant stressors				Domestic Violence ☐ Lack of food access ☐ Lack of housing ☐ Other ☐ *[if other, list specific details]*
Barriers to seeking healthcare or healthcare access				Refusal ☐ Cultural Beliefs ☐ Lack of health insurance ☐ Lack of transportation ☐ Other ☐

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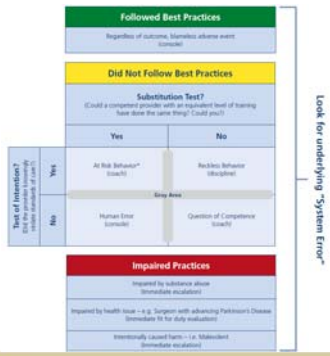
Just Culture



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Example 1

- 43 YO with known previa, presumed accreta
  - Presents at 37 wks with hemorrhage
  - To OR cesarean hysterectomy performed
    - Becomes hypotensive, tachycardic, Develops DIC
    - Difficulty finding extra surgical help
  - EBL 4 liters, transfused 8 PRBCs, 6 FFP
  - To SICU postop intubated
  - Discharge home on POD 4

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SMM Review Form Example 1

ABSTRACTION	
[Screened Positive by] ICDDx Code ☐ ICD Px Code **X** ≥4 Units RBC **X** ICU Admit **X** PPLOS ☐ Other	
PATIENT CHARACTERISTICS **OBSTETRIC HISTORY** **PRENATAL CARE (PNC)**	
[Assisted Reproductive Technology (ART)] Yes/No If **Yes**, what: **IVF**	**Most of these are drop down boxes**
[Planned/intended place of delivery] **Level 3**	
DELIVERY INFORMATION	
[Gestational age at time of morbidity] **37**	
[Birth status] **live born**	
[If C-Section] **classical/hysterectomy**	
Type of C-Section	
[Type of anesthesia] **general**	

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Example 1 SMM Short Review Form

Assessment

MR# or PATIENT ID_____
Date of event: _____
Date of review: _____
Reviewers: _____

1. Morbidity Category x **ICU Admission** x **Transfused 4 or more units** ☐ **Other** ____	
2. Sequence of Morbidity Indicate the course of events: *Clinical Cause of Morbidity: 1& 2 reflect what initiated the final cause resulting in the severe morbidity. 3 is the final cause* *For example: 1. Preeclampsia 2. uncontrolled hypertension 3 intracranial bleed,* *So that 1, caused 2, that resulted in 3 – the severe morbidity*	1. Previa, accreta 2. Placental hemorrhage, hysterectomy 3. DIC
3. Primary Cause of Morbidity Choose an item. Placental hemorrhage If trauma indicated as primary cause of morbidity: Choose an item. Other cause _____	

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Sample Categories Primary Cause Morbidity

- OB hemorrhage
- Placental hemorrhage
- Hypertension
- Infection/sepsis
- Pulmonary
- Cardiac
- Surgical complications
- Anesthesia complications

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COUNCIL ON PATIENT SAFETY IN WOMEN'S HEALTH CARE

Example 1 SMM Short Review Form

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 **Provider** XX **System** XX **Patient**	
List up to 3 things that could be done to alter outcome:	multidisciplinary planning for accreta before del Planned del before 38 wks Have better urgent way to reach gynecologic advanced surgical help
Identify practices that were done well and should be reinforced:	Emergent del handled well by on call team
Recommendations for system, practice, provider improvements:	Implement system for accreta delivery planning Make contact list for 24 hr availability for surgical help

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Example 1 SMM Long Review Form

SMM Outcome Factors Guide
Purpose: To assist in determining opportunities to alter outcomes

SYSTEM & PROVIDER FACTORS	How did these factors contribute to the SMM?			
	Suboptimal Outcome	Delayed Response	N/A	Other, list specifics details here
Point of Entry to Healthcare				
Diagnosis				
Referral to Higher Level Care				
Treatment	yes	yes		Delayed, inadequate prep Del should have been earlier
Management Hierarchy: *(i.e. RN to MD, Resident to Attending)*				
Education	yes			
Team Communication	yes			should have been team alerted
Policies/Procedures	maybe			consider accreta team
Documentation				
Equipment/Environmental Factors				
Discharge				

SMM Long Review Form

SMM Outcome Factors Guide
Purpose: To assist in determining opportunities to alter outcomes

Patient Factors				
Pre-pregnancy: Underlying significant medical or physical conditions	Suboptimal Outcome	Delayed Response	N/A	Other, list specifics details here
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Significant stressors				Domestic Violence ☐ Lack of food access ☐ Lack of housing ☐ Other ☐ *[if other, list specific details]*
Barriers to seeking healthcare or healthcare access				Refusal ☐ Cultural Beliefs ☐ Lack of health insurance ☐ Lack of transportation ☐ Other ☐

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Example 2

- 43 YO with known previa, presumed accreta
  - Plan made to deliver her at 36 wks
  - Multidisciplinary team consulted and available
  - Scheduled CS
    - Plan of surgery made: midline skin, immed hyst
    - AM, primary surgeon, gyn onc, ob anesthesia and backup IR available
    - OR cesarean hysterectomy performed
  - EBL 3 liters, transfused 6 PRBCs, 6 FFP
  - To SICU postop intubated
  - Discharge home on POD 4

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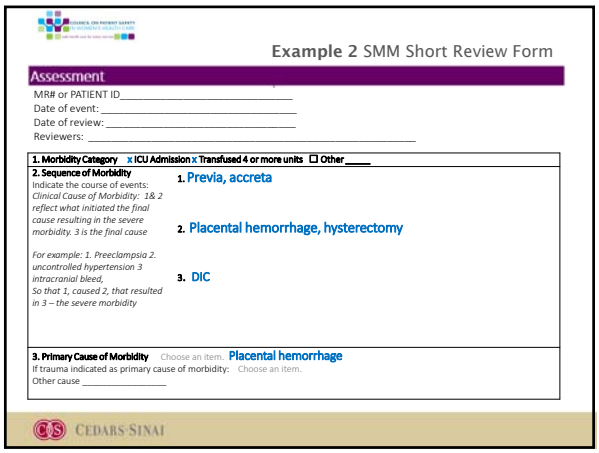

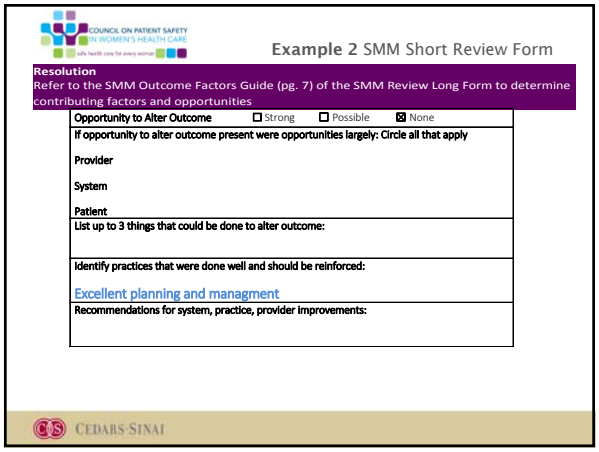

SMM Review Process Continued…

- Have institutional mechanisms to implement change
- Trend data internally potentially regionally, etc.
- Review timing
- Confidentiality
- Focus on systems

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SMM: Opportunities for Improvement

- Retrospective cohort all women admitted for delivery at Cedars-Sinai 1/1/12 – 6/30/14
- EMR screened for SMM using:
  - ICD-9 codes for severe illness as identified by the CDC
  - Prolonged length of stay (≥4 dys vaginal, ≥6 dys cesarean)
  - ICU admission
  - Transfusion of ≥4 units of blood
  - Hospital readmission within 30 days of discharge

Ozimek AJOG 2016

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Methods

- Multidisciplinary team reviewed each screened positive to determine if true SMM occurred
- Each true SMM presented to multidisciplinary committee to determine morbidity, if opportunities for improvement in care existed
- Opportunity for improvement: strong, possible or none
- Incidence of opportunities for improvement determined: system, provider and/or patient
- Morbidity classified: primary cause, organ system, underlying medical condition

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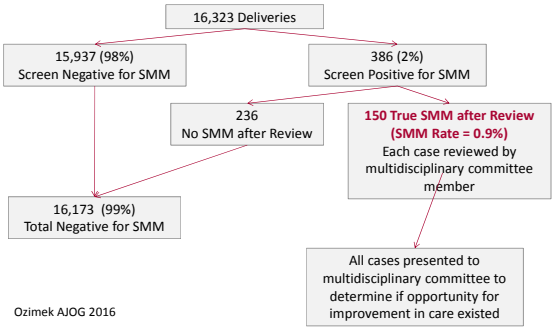
Determination of Opportunity for Improvement in Care in Women with SMM



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Results: Ozimek, 2016

Table 1: Type of Severe Maternal Morbidity and Opportunity for Improvement in Care

Type of SMM	n (%)	Overall Opportunity for Improvement n (%)[a,b]	Contributing Factors: System n (%)	Provider n (%)	Patient n (%)
Hemorrhage	107 (71.3%)	41 (38.3%)	5 (12.2%)	37 (90.2%)	7 (17.1%)
Preeclampsia/Eclampsia	16 (10.7%)	8 (50.0%)	2 (25.0%)	2 (25%)	4 (50.0%)
Cardiovascular	6 (4.0%)	2 (33.3%)	0	2 (100%)	1 (50.0%)
Sepsis/Infection	6 (4.0%)	4 (66.7%)	0	2 (50.0%)	3 (75.0%)
Pulmonary Edema	5 (3.3%)	4 (80.0%)	0	4 (100%)	1 (25.0%)
Other[c]	10 (6.7%)	7 (70.0%)	2 (28.6%)	5 (71.4%)	3 (42.9%)
Total	150 (100%)	66 (44.0%)	9 (13.6%)	52 (78.8%)	19 (28.8%)

[a] Includes "possible" or "strong" opportunity for improvement

[b] Sum of System+Provider+Patient factors will not necessarily equal Overall Opportunity number as some patients had >1 type of opportunity

[c] Other severe maternal morbidities included one each of the following: iatrogenic intra-abdominal hemorrhage secondary to heparin use, postpartum exploratory laparotomy for suspected uterine rupture, uterine rupture that did not meet criteria for hemorrhage, rectal bleeding requiring blood transfusion, respiratory distress requiring ICU care, trauma, cerebrovascular accident, amniotic fluid embolism, cardiomyopathy and maternal death secondary to cardiopulmonary arrest in the setting of severe tumor lysis syndrome.

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What We Have Learned at Cedars-Sinai

- Engagement of multidisciplinary group
- Systemize how to identify patients
- Problems with documentation surprising
- Choose 1-3 issues to address
  - Laps were not being weighed in OR
  - Not clear who was responsible for ordering antibiotics in OR
  - Need for an accreta team
- Need someone to keep/organize data
- Could shorten by collecting less data

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Final Thoughts

- Review forms are just a suggestion
- Important to capture analyzable data locally, regionally, etc.
- ICU admission, transfusion of 4 or more units are not meant to be quality measures
- Debriefs are not the same as reviews
- Open to input regarding ease of use of forms
- Can we show that doing SMM reviews works?

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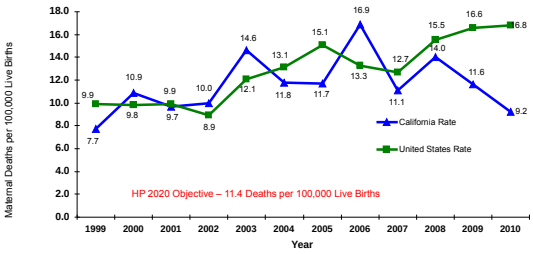
Maternal Mortality Rate, California and United States; 1999-2010



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2010. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95,O98-O99) for 1999-2010. United States data and HP2020 Objective were calculated using the same methods. U.S. maternal mortality data is published by the National Center for Health Statistics (NCHS) through 2007 only. U.S. rates from 2008-2010 were calculated using NCHS Final Death Data (denominator) and CDC Wonder Online Database for maternal deaths (numerator). Accessed at http://wonder.cdc.gov on April 17, 2013. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, April, 2013.

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