

Special Analysis: Severe Maternal Morbidity (SMM)

BACKGROUND

The Center for Disease Control Division of Reproductive Health (DRH) has been collecting data surveillance for pregnancy-related mortality since 1987¹. Severe maternal morbidity (SMM) is a constellation of pregnancy factors that negatively impact a woman's health. While each of these conditions is rare, SMM occurs 100 times more frequently than maternal death². Research continues to highlight that nearly one-half of maternal mortality and morbidity is preventable³ and readiness and recognition of severe events is critical.

In late 2018, The Joint Commission® convened a Perinatal Technical Advisory Panel to identify several of the key areas within perinatal care that could have significant impact in reducing the morbidity and mortality of women within the inpatient environment, as well as assuring a level of preparedness once discharged home. These new **Standards for Maternal Safety**, which include Hemorrhage and Severe Hypertension, went into effect January 2021 and will become a routine component of The Joint Commission® survey methodology.

The Standards for Maternal Safety include 13 new Elements of Performance (EPs) based upon the Alliance for Innovation of Maternal Health (AIM) Maternal Care Bundle recommendations⁴ for Obstetric Hemorrhage and Severe Hypertension. These new requirements, PC.06.01.01 and PC.06.01.03, are designed to improve the quality and safety of care provided to women during all stages of pregnancy and postpartum.

- **Standard PC.06.01.01 Maternal Hemorrhage: Reduce the likelihood of harm related to maternal hemorrhage**
EP 6: Review hemorrhage cases that meet criteria established by the hospital to evaluate the effectiveness of the care,

treatment, and services provided by the hemorrhage response team during the event.

- **Standard PC.06.01.03 Severe Hypertension/ Preeclampsia: Reduce the likelihood of harm related to maternal severe hypertension/preeclampsia**

EP 5: Review severe hypertension/preeclampsia cases that meet criteria established by the hospital to evaluate the effectiveness of the care, treatment, and services provided to the patient during the event.

The National Perinatal Information Center (NPIC) began reporting on Severe Maternal Morbidity (SMM) in 2015, particularly surrounding AIM measures SMM Among Hemorrhage Cases and SMM Among Preeclampsia Cases. NPIC uses the AIM adopted CDC definition of SMM⁵. This Special Analysis is an intentional focus on SMM.

The analysis presents the AIM Severe Maternal Morbidity measures (SMM, SMM Among Hemorrhage Cases, and SMM Among Preeclampsia Cases) in a dashboard format which includes the overall rate and rate excluding blood transfusions for each measure with the following data displays:

- Quarterly and overall rates for the reporting period, with accompanying numerator/denominator counts and percent of SMM indicators present on admission (POA); comparison of overall hospital rates to the subgroup and database averages with determination of significant variance from average
- The 21 CDC Indicators broken down by number of cases falling into each indicator category and the percent of total indicators
- A Trend analysis with determination of significance over time

Recommendations for utilizing this SMM Special Analysis

- 1) Readiness for Joint Commission® surveys
- 2) Compliance with PC.06.01.01 (EP 6) and PC.06.01.03 (EP 5)
 - a. NPIC can provide case lists to assist you with reviewing cases that meet your department’s criteria to evaluate care
 - b. Utilize the Custom Analytic Interactive Reporting Network (CAIRN) to track SMM rates by month/quarter and create custom comparisons by Medicaid, delivery volume, academic affiliation, region, etc.
 - c. Post these SMM reports on communication boards, and share during shift huddles and staff meetings
- 3) Hospital specific data engagement webinars tailored to your facility to further explore SMM data and facilitate a “deep-dive” into other outcomes that may have an impact on your SMM data
- 4) Monitoring team training efforts and building budgetary support for team training

5) Developing a culture of patient safety, using SMM reports as a foundation for reporting near misses and “Good Catch” programs

Currently underway is the development of PC-07, Maternal Complications Measure, a collaboration between Centers for Medicare and Medicaid Services (CMS) and The Joint Commission®.

We recognize that not all NPIC member hospitals are accredited by The Joint Commission®. However, we do hope that this report will offer the same level of critical information that can provide a path forward for the care and treatment of women with maternal hemorrhage or severe hypertension.

If you have any questions about the data displayed or to request case lists, please contact your Senior Client Services Coordinator.

¹Creanga, A. A., Berg, C. J., Ko, J. Y., Farr, S. L., Tong, V. T., Bruce, F. C., & Callaghan, W. M. (2014). Maternal Mortality and Morbidity in the United States: Where Are We Now? *Journal of Women’s Health, 23*(1), 3–9. <https://doi.org/10.1089/jwh.2013.4617>

²Callaghan, W. M., Creanga, A. A., & Kuklina, E. V. (2012). Severe maternal morbidity among delivery and postpartum hospitalizations in the United States. *Obstetrics and Gynecology, 120*(5), 1029–1036. <https://doi.org/10.1097/aog.0b013e31826d60c5>

³Howell, E. A., & Zeitlin, J. (2017). Improving hospital quality to reduce disparities in severe maternal morbidity and mortality. *Seminars in Perinatology, 41*(5), 266–272. <https://doi.org/10.1053/j.semperi.2017.04.002>

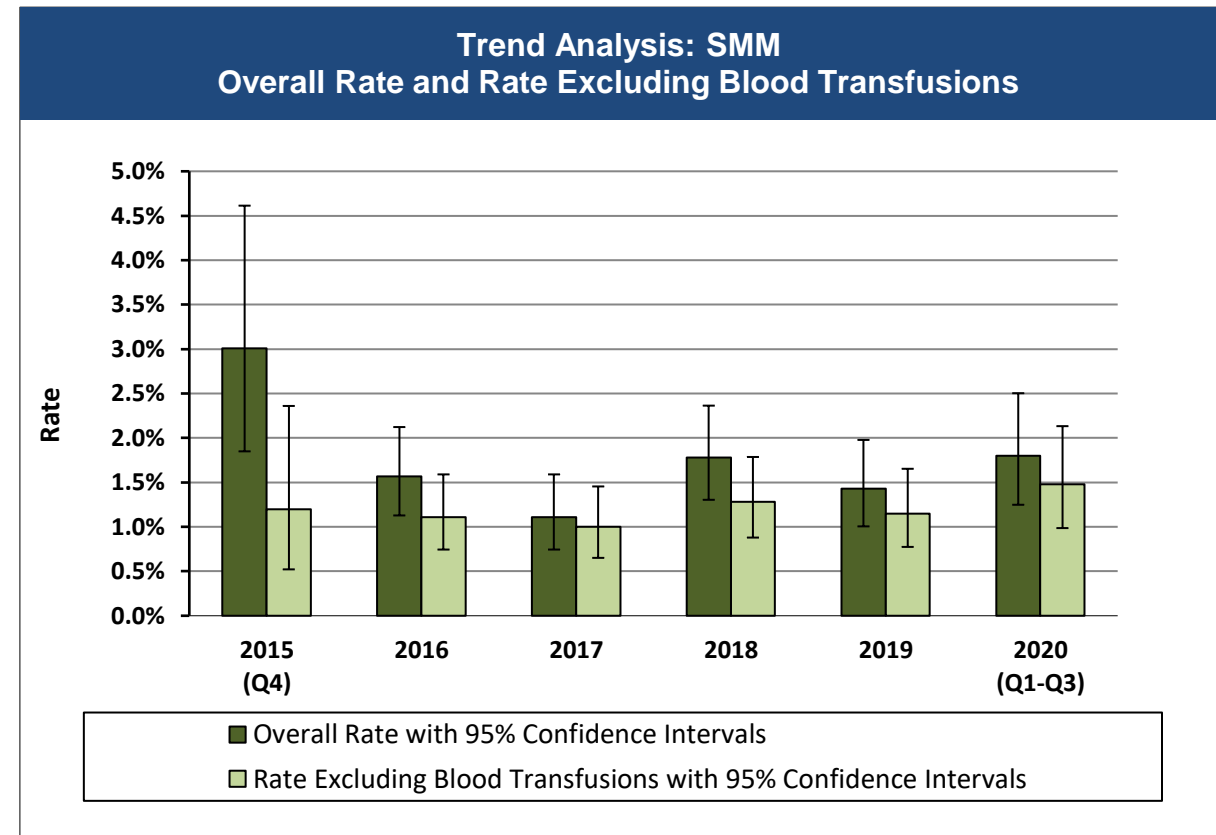
⁴R3 Report Issue 24 PC standards for maternal safety. (n.d.). Retrieved February 28, 2021, from <https://www.jointcommission.org/standards/r3-report/R3-Report-Issue-24-PC-standards-for-maternal-safety>

⁵Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion. Centers for Disease Control and Prevention. Severe Morbidity Indicators and Corresponding ICD-9-CM/ICD-10-CM/PCS Codes during Delivery Hospitalizations (2019) <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm>

SMM Overall

SMM		
NPIC ID: SA1	Overall Rate	Excluding Blood Transfusions
QTR 4 2019	1.8%	1.5%
<i>Numerator/Denominator</i>	11/597	9/597
<i>Present on Admission</i>	27.3%	33.3%
QTR 1 2020	0.8%	0.5%
<i>Numerator/Denominator</i>	5/646	3/646
<i>Present on Admission</i>	20.0%	33.3%
QTR 2 2020	2.6%	2.3%
<i>Numerator/Denominator</i>	15/575	13/575
<i>Present on Admission</i>	33.3%	38.5%
QTR 3 2020	2.1%	1.8%
<i>Numerator/Denominator</i>	14/670	12/670
<i>Present on Admission</i>	35.7%	41.7%
Total	1.8%	1.5%
<i>Numerator/Denominator</i>	45/2488	37/2488
<i>Present on Admission</i>	31.1%	37.8%
Subgroup Average	3.1% ●	1.3% ●
Database Average	2.2%	0.9% ●
<i>Hospital rate vs. comparative rate: ● Significantly Above ● Significantly Below</i>		

SMM Indicators		
Cases may contain more than one indicator	Count	% of Indicators
1. Acute myocardial infarction	0	0.0%
2. Aneurysm	0	0.0%
3. Acute renal failure	9	13.6%
4. Adult respiratory distress syndrome	3	4.5%
5. Amniotic fluid embolism	0	0.0%
6. Cardiac arrest/ventricular fibrillation	1	1.5%
7. Conversion of cardiac rhythm	1	1.5%
8. Disseminated intravascular coagulation	6	9.1%
9. Eclampsia	3	4.5%
10. Heart failure/arrest during surgery or procedure	0	0.0%
11. Puerperal cerebrovascular disorders	2	3.0%
12. Pulmonary edema / Acute heart failure	2	3.0%
13. Severe anesthesia complications	0	0.0%
14. Sepsis	6	9.1%
15. Shock	5	7.6%
16. Sickle cell disease with crisis	1	1.5%
17. Air and thrombotic embolism	2	3.0%
18. Blood products transfusion	14	21.2%
19. Hysterectomy	8	12.1%
20. Temporary tracheostomy	0	0.0%
21. Ventilation	3	4.5%
Total Indicators	66	
Total Cases	45	



Overall Rate: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	3.0%	1.6%	1.1%	1.8%	1.4%	1.8%
N/D	20/664	41/2613	29/2613	46/2588	36/2513	34/1891

Excluding Blood Transfusions: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	1.2%	1.1%	1.0%	1.3%	1.2%	1.5%
N/D	8/664	29/2613	26/2613	33/2588	29/2513	28/1891

Notes:

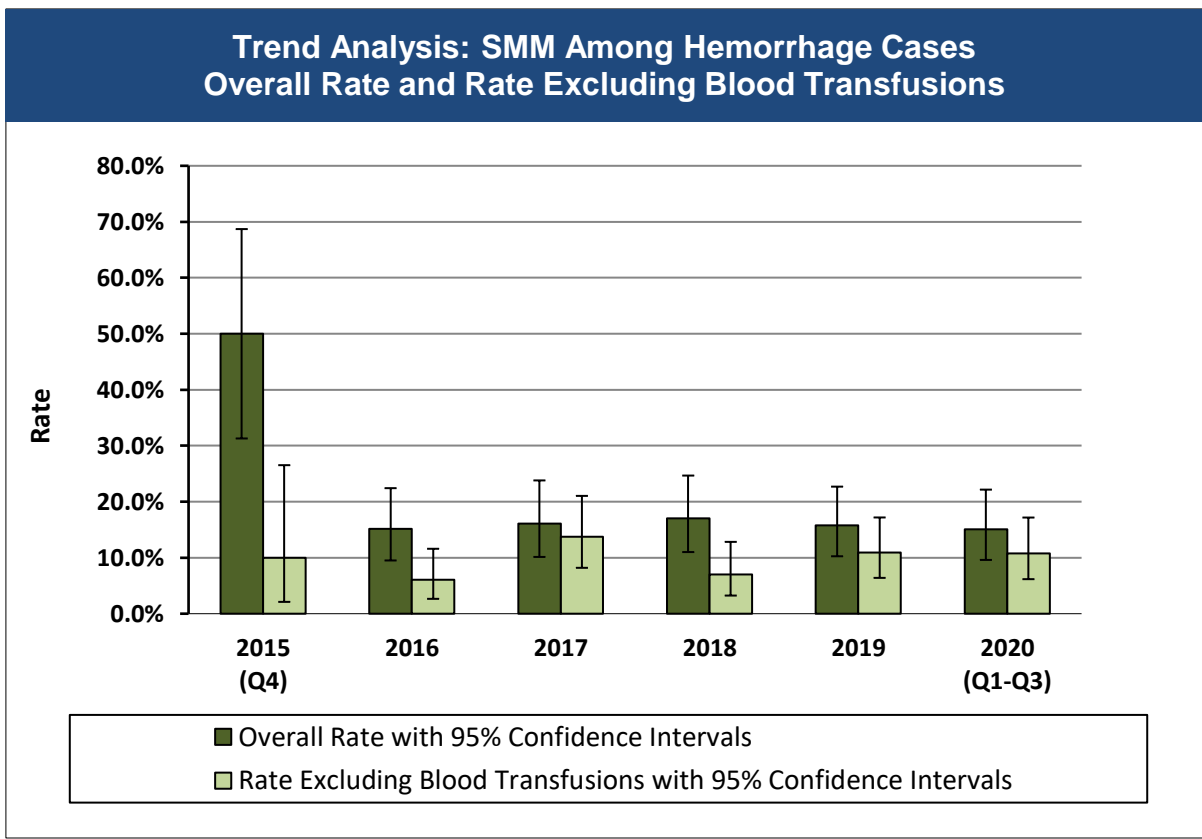
- Cases are identified as having SMM present on admission ("POA") only when all diagnosis codes associated with the patient's SMM indicator(s) are coded as POA.
- Indicator rates are calculated as the percent of total number of unique indicators on the record.
- SMM Overall cases may also belong to either/both of the Hemorrhage & Preeclampsia bundles.
- Trend rates displayed begin with the implementation of ICD-10 coding (Q4 2015).
- Alliance for Innovation on Maternal Health (AIM) measure definitions are available at:

<https://safehealthcareforeverywoman.org/aim/resources/aim-data-resources/>

SMM Among Hemorrhage Cases		
NPIC ID: SA1	Overall Rate	Excluding Blood Transfusions
QTR 4 2019	16.2%	10.8%
<i>Numerator/Denominator</i>	<i>6/37</i>	<i>4/37</i>
<i>Present on Admission</i>	<i>16.7%</i>	<i>25.0%</i>
QTR 1 2020	6.8%	2.3%
<i>Numerator/Denominator</i>	<i>3/44</i>	<i>1/44</i>
<i>Present on Admission</i>	<i>0.0%</i>	<i>0.0%</i>
QTR 2 2020	20.0%	14.3%
<i>Numerator/Denominator</i>	<i>7/35</i>	<i>5/35</i>
<i>Present on Admission</i>	<i>14.3%</i>	<i>20.0%</i>
QTR 3 2020	18.3%	15.0%
<i>Numerator/Denominator</i>	<i>11/60</i>	<i>9/60</i>
<i>Present on Admission</i>	<i>27.3%</i>	<i>33.3%</i>
Total	15.3%	10.8%
<i>Numerator/Denominator</i>	<i>27/176</i>	<i>19/176</i>
<i>Present on Admission</i>	<i>18.5%</i>	<i>26.3%</i>
Subgroup Average	28.1% ●	8.1%
Database Average	24.2% ●	6.7%

Hospital rate vs. comparative rate: ● Significantly Above ● Significantly Below

SMM Indicators Among Hemorrhage Cases		
Cases may contain more than one indicator	Count	% of Indicators
1. Acute myocardial infarction	0	0.0%
2. Aneurysm	0	0.0%
3. Acute renal failure	5	11.1%
4. Adult respiratory distress syndrome	2	4.4%
5. Amniotic fluid embolism	0	0.0%
6. Cardiac arrest/ventricular fibrillation	1	2.2%
7. Conversion of cardiac rhythm	1	2.2%
8. Disseminated intravascular coagulation	6	13.3%
9. Eclampsia	1	2.2%
10. Heart failure/arrest during surgery or procedure	0	0.0%
11. Puerperal cerebrovascular disorders	0	0.0%
12. Pulmonary edema / Acute heart failure	1	2.2%
13. Severe anesthesia complications	0	0.0%
14. Sepsis	1	2.2%
15. Shock	4	8.9%
16. Sickle cell disease with crisis	0	0.0%
17. Air and thrombotic embolism	0	0.0%
18. Blood products transfusion	14	31.1%
19. Hysterectomy	7	15.6%
20. Temporary tracheostomy	0	0.0%
21. Ventilation	2	4.4%
Total Indicators	45	
Total Cases	27	



Overall Rate: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	50.0%	15.2%	16.1%	17.1%	15.8%	15.1%
N/D	15/30	20/132	20/124	22/129	23/146	21/139

Excluding Blood Transfusions: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	10.0%	6.1%	13.7%	7.0%	11.0%	10.8%
N/D	3/30	8/132	17/124	9/129	16/146	15/139

Notes:

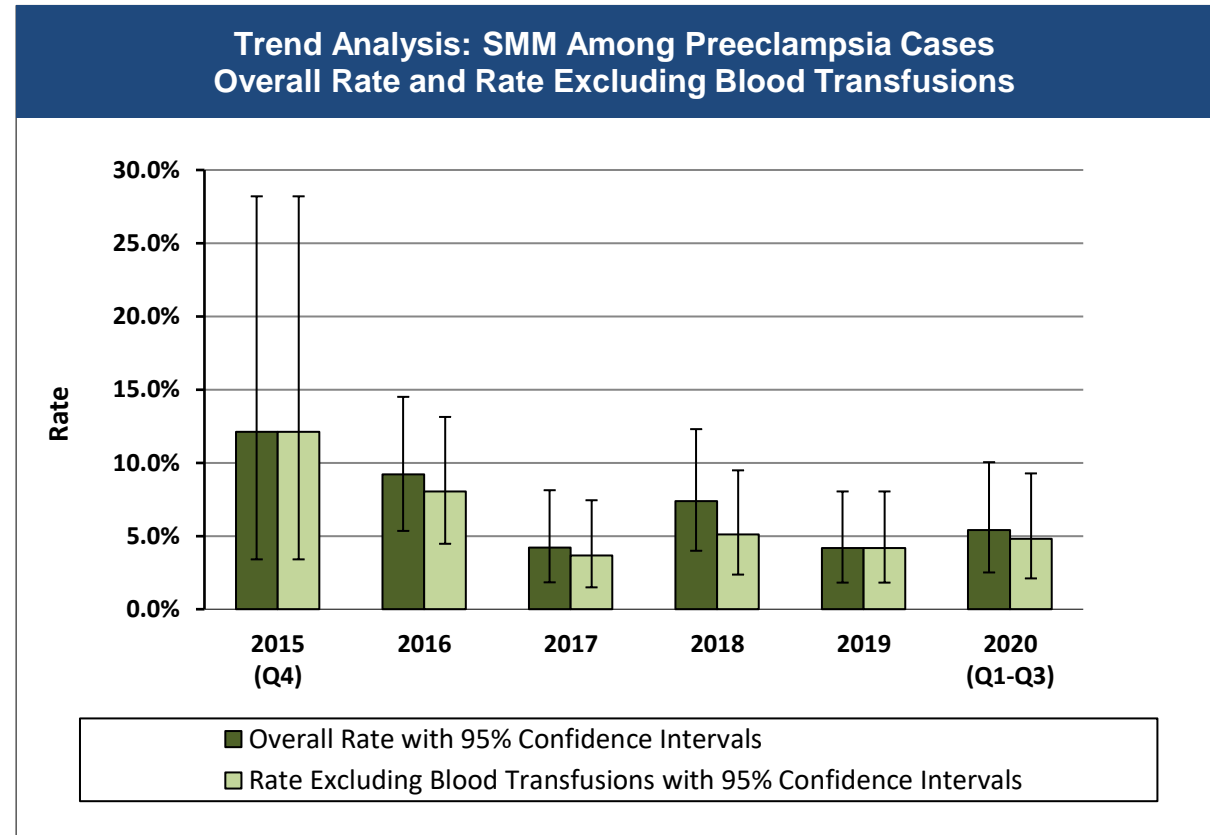
- Cases are identified as having SMM present on admission ("POA") only when all diagnosis codes associated with the patient's SMM indicator(s) are coded as POA.
- Indicator rates are calculated as the percent of total number of unique indicators on the record.
- SMM Overall cases may also belong to either/both of the Hemorrhage & Preeclampsia bundles.
- Trend rates displayed begin with the implementation of ICD-10 coding (Q4 2015).
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SMM Among Preeclampsia Cases		
NPIC ID: SA1	Overall Rate	Excluding Blood Transfusions
QTR 4 2019	2.0%	2.0%
<i>Numerator/Denominator</i>	<i>1/51</i>	<i>1/51</i>
<i>Present on Admission</i>	<i>100.0%</i>	<i>100.0%</i>
QTR 1 2020	5.2%	5.2%
<i>Numerator/Denominator</i>	<i>3/58</i>	<i>3/58</i>
<i>Present on Admission</i>	<i>33.3%</i>	<i>33.3%</i>
QTR 2 2020	4.3%	2.1%
<i>Numerator/Denominator</i>	<i>2/47</i>	<i>1/47</i>
<i>Present on Admission</i>	<i>0.0%</i>	<i>0.0%</i>
QTR 3 2020	6.6%	6.6%
<i>Numerator/Denominator</i>	<i>4/61</i>	<i>4/61</i>
<i>Present on Admission</i>	<i>50.0%</i>	<i>50.0%</i>
Total	4.6%	4.2%
<i>Numerator/Denominator</i>	<i>10/217</i>	<i>9/217</i>
<i>Present on Admission</i>	<i>40.0%</i>	<i>44.4%</i>
Subgroup Average	11.7% ●	7.6%
Database Average	8.9% ●	5.5%

Hospital rate vs. comparative rate: ● Significantly Above ● Significantly Below

SMM Indicators Among Preeclampsia Cases		
Cases may contain more than one indicator	Count	% of Indicators
1. Acute myocardial infarction	0	0.0%
2. Aneurysm	0	0.0%
3. Acute renal failure	3	18.8%
4. Adult respiratory distress syndrome	0	0.0%
5. Amniotic fluid embolism	0	0.0%
6. Cardiac arrest/ventricular fibrillation	1	6.3%
7. Conversion of cardiac rhythm	1	6.3%
8. Disseminated intravascular coagulation	1	6.3%
9. Eclampsia	3	18.8%
10. Heart failure/arrest during surgery or procedure	0	0.0%
11. Puerperal cerebrovascular disorders	1	6.3%
12. Pulmonary edema / Acute heart failure	1	6.3%
13. Severe anesthesia complications	0	0.0%
14. Sepsis	0	0.0%
15. Shock	1	6.3%
16. Sickle cell disease with crisis	0	0.0%
17. Air and thrombotic embolism	0	0.0%
18. Blood products transfusion	4	25.0%
19. Hysterectomy	0	0.0%
20. Temporary tracheostomy	0	0.0%
21. Ventilation	0	0.0%
Total Indicators	16	
Total Cases	10	



Overall Rate: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	12.1%	9.2%	4.2%	7.4%	4.2%	5.4%
N/D	4/33	16/174	8/190	13/176	8/192	9/166

Excluding Blood Transfusions: Stable Over Time

	2015 (Q4)	2016	2017	2018	2019	2020 (Q1-Q3)
SA1	12.1%	8.1%	3.7%	5.1%	4.2%	4.8%
N/D	4/33	14/174	7/190	9/176	8/192	8/166

Notes:

- Cases are identified as having SMM present on admission ("POA") only when all diagnosis codes associated with the patient's SMM indicator(s) are coded as POA.
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APPENDIX

AIM Severe Maternal Morbidity (SMM)

Percent of deliveries with one or more of the 21 CDC identified severe maternal morbidity indicators

AIM Severe Maternal Morbidity Excluding Blood Transfusions

Percent of deliveries with one or more of the 21 CDC identified severe maternal morbidity indicators excluding cases with blood transfusion coded as the only severe morbidity

AIM Severe Maternal Morbidity among Preeclampsia Cases

Percent of delivered preeclampsia patients with one or more of the 21 CDC identified maternal morbidity indicators

AIM Severe Maternal Morbidity among Preeclampsia Cases Excluding Blood Transfusions

Percent of delivered preeclampsia patients with one or more of the 21 CDC identified maternal morbidity indicators excluding cases with blood transfusion coded as the only severe morbidity

AIM Severe Maternal Morbidity among Hemorrhage Cases

Percent of delivered hemorrhage patients with one or more of the 21 CDC identified maternal morbidity indicators

AIM Severe Maternal Morbidity among Hemorrhage Cases Excluding Blood Transfusions

Percent of delivered hemorrhage patients with one or more of the 21 CDC identified maternal morbidity indicators excluding cases with blood transfusion coded as the only severe morbidity

Alliance for Innovation on Maternal Health (AIM) measure definitions are available at:

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