

Appendices for Trends in Severe Maternal Morbidity Complications by Patient Characteristics, 2016–2021

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Appendix A

The *International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System* (ICD-10-CM/PCS) diagnosis and procedure codes used to identify delivery stays are listed in Table A.1. The list of ICD-10-CM/PCS diagnosis and procedure codes used to identify severe maternal morbidity (SMM) are included in Table A.2. The majority of delivery discharge records with an SMM indicator are identified with one indicator type, but this prevalence decreased during the five-year study period. In 2016, 81 percent of SMM cases were defined by one indicator while in 2021 only 76 percent of SMM cases were based on one indicator. The 20 SMM indicators are grouped into clinically meaningful non-mutually exclusive SMM complication groups listed in Table A.3.

Table A.1 Clinical codes used to identify delivery stays

Code type	Code	Description
Deliveries		
ICD-10-CM	Z37	Outcome of delivery
ICD-10-CM	O80	Encounter for full-term uncomplicated delivery
ICD-10-CM	O82	Encounter for cesarean delivery without indication
ICD-10-CM	O7582	Onset (spontaneous) of labor after 37 completed weeks of gestation but before 39 completed weeks gestation, with delivery by (planned) cesarean section
MS-DRG v33-35	765–766	Cesarean section
MS-DRG v33-35	767–768	Vaginal delivery
MS-DRG v36+	774–775, 768, 796–798, 805–807	Vaginal delivery
MS-DRG v36+	783–788	Cesarean section
ICD-10-PCS	10D00Z0– 10D00Z2, 10D07Z3–10D07Z8	Extraction of products of conception
ICD-10-PCS	10E0XZZ	Delivery of products of conception, external approach
Exclusions		
ICD-10-CM	O0X	Pregnancy with abortive outcome
ICD-10-PCS	10A0	Abortion of products of conception

Abbreviations: ICD-10-CM/PCS: *International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System*; MS-DRG: Medicare Severity Diagnosis Related Groups; v: version.

Table A.2 Clinical codes used to identify severe maternal morbidity (SMM) cases

Code	Description
1. Acute myocardial infarction	
I2101	ST elevation (STEMI) involving left main coronary artery
I2102	STEMI involving left anterior descending coronary artery
I2109	STEMI involving other coronary artery of anterior wall
I2111	STEMI involving right coronary artery
I2119	STEMI involving other coronary artery of inferior wall
I2121	STEMI involving left circumflex coronary artery
I2129	STEMI involving other sites
I213	STEMI myocardial infarction of unspecified site
I214	Non-ST elevation (NSTEMI) myocardial infarction
I219	Acute myocardial infarction, unspecified
I21A1	Myocardial infarction type 2
I21A9	Other myocardial infarction type
I220	Subsequent STEMI of anterior wall
I221	Subsequent STEMI of inferior wall
I222	Subsequent NSTEMI myocardial infarction
I228	Subsequent STEMI of sites
I229	Subsequent STEMI of unspecified site
2. Aneurysm	
I7100	Dissection of unspecified site of aorta
I7101	Dissection of thoracic aorta
I7102	Dissection of abdominal aorta
I7103	Dissection of thoracoabdominal aorta
I711	Thoracic aortic aneurysm, ruptured
I712	Thoracic aortic aneurysm, without rupture
I713	Abdominal aortic aneurysm, ruptured
I714	Abdominal aortic aneurysm, without rupture
I715	Thoracoabdominal aortic aneurysm, ruptured
I716	Thoracoabdominal aortic aneurysm, without rupture
I718	Aortic aneurysm of unspecified site, ruptured
I719	Aortic aneurysm of unspecified site, without rupture
I790	Aneurysm of aorta in diseases classified elsewhere

Code	Description
3. Acute renal failure	
N170	Acute kidney failure with tubular necrosis
N171	Acute kidney failure with acute cortical necrosis
N172	Acute kidney failure with medullary necrosis
N178	Other acute kidney failure
N179	Acute kidney failure, unspecified
O904	Postpartum acute kidney failure
4. Acute respiratory distress syndrome	
J80	Acute respiratory distress syndrome
J951	Acute pulmonary insufficiency following thoracic surgery
J952	Acute pulmonary insufficiency following nonthoracic surgery
J953	Chronic pulmonary insufficiency following surgery
J95821	Acute postprocedural respiratory failure
J95822	Acute and chronic postprocedural respiratory failure
J9600	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia
J9601	Acute respiratory failure with hypoxia
J9602	Acute respiratory failure with hypercapnia
J9620	Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J9621	Acute and chronic respiratory failure with hypoxia
J9622	Acute and chronic respiratory failure with hypercapnia
J9690	Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia
J9691	Respiratory failure, unspecified with hypoxia
J9692	Respiratory failure, unspecified with hypercapnia
R0603	Acute respiratory distress syndrome
R092	Respiratory arrest
5. Amniotic fluid embolism	
O88112	Amniotic fluid embolism in pregnancy, second trimester
O88113	Amniotic fluid embolism in pregnancy, third trimester
O88119	Amniotic fluid embolism in pregnancy, unspecified trimester
O8812	Amniotic fluid embolism in childbirth
O8813	Amniotic fluid embolism in the puerperium
6. Cardiac arrest/ventricular fibrillation	
I462	Cardiac arrest due to underlying cardiac condition
I468	Cardiac arrest due to other underlying condition
I469	Cardiac arrest, cause unspecified

Code	Description
I4901	Ventricular fibrillation
I4902	Ventricular flutter
7. Conversion of cardiac rhythm (procedure)	
5A12012	Extracorporeal assistance and performance, performance, cardiac, single, output, manual
5A2204Z	Restoration of cardiac rhythm, single
8. Disseminated intravascular coagulation	
D65	Disseminated intravascular coagulation
D688	Other specified coagulation defects
D689	Coagulation defect, unspecified
O45002	Premature separation of placenta with coagulation defect, unspecified, second trimester
O45003	Premature separation of placenta with coagulation defect, unspecified, third trimester
O45009	Premature separation of placenta with coagulation defect, unspecified, unspecified trimester
O45012	Premature separation of placenta with afibrinogenemia, second trimester
O45013	Premature separation of placenta with afibrinogenemia, third trimester
O45019	Premature separation of placenta with afibrinogenemia, unspecified trimester
O45022	Premature separation of placenta with disseminated intravascular coagulation, second trimester
O45023	Premature separation of placenta with disseminated intravascular coagulation, third trimester
O45029	Premature separation of placenta with disseminated intravascular coagulation, unspecified trimester
O45092	Premature separation of placenta with other coagulation defect, second trimester
O45093	Premature separation of placenta with other coagulation defect, third trimester
O45099	Premature separation of placenta with other coagulation defect, unspecified trimester
O46002	Antepartum hemorrhage with coagulation defect, unspecified, second trimester
O46003	Antepartum hemorrhage with coagulation defect, unspecified, third trimester
O46009	Antepartum hemorrhage with coagulation defect, unspecified, unspecified trimester
O46012	Antepartum hemorrhage with afibrinogenemia, second trimester
O46013	Antepartum hemorrhage with afibrinogenemia, third trimester
O46019	Antepartum hemorrhage with afibrinogenemia, unspecified trimester
O46022	Antepartum hemorrhage with disseminated intravascular coagulation, second trimester
O46023	Antepartum hemorrhage with disseminated intravascular coagulation, third trimester
O46029	Antepartum hemorrhage with disseminated intravascular coagulation, unspecified trimester
O46092	Antepartum hemorrhage with other coagulation defect, second trimester
O46093	Antepartum hemorrhage with other coagulation defect, third trimester
O46099	Antepartum hemorrhage with other coagulation defect, unspecified trimester
AO670	Intrapartum hemorrhage with coagulation defect
O723	Postpartum coagulation defects

Code	Description
9. Eclampsia	
O1500	Eclampsia complicating pregnancy, unspecified trimester
O1502	Eclampsia complicating pregnancy, second trimester
O1503	Eclampsia complicating pregnancy, third trimester
O151	Eclampsia complicating childbirth
O152	Eclampsia complicating the puerperium
O159	Eclampsia, unspecified as to time period
10. Heart failure	
I97120	Postprocedural cardiac arrest following cardiac surgery
I97121	Postprocedural cardiac arrest following other surgery
I97130	Postprocedural heart failure following cardiac surgery
I97131	Postprocedural heart failure following other surgery
I97710	Intraoperative cardiac arrest during cardiac surgery
I97711	Intraoperative cardiac arrest during other surgery
11. Puerperal cerebrovascular disorder	
A812	Progressive multifocal leukoencephalopathy
G450	Vertebro-basilar artery syndrome
G451	Carotid artery syndrome (hemispheric)
G452	Multiple and bilateral precerebral artery syndromes
G453	Amaurosis fugax
G454	Transient global amnesia (identity with 437.7)
G458	Other transient cerebral ischemic attacks and related syndromes
G459	Transient cerebral ischemic attack, unspecified
G460	Middle cerebral artery syndrome
G461	Anterior cerebral artery syndrome
G462	Posterior cerebral artery syndrome
G463	Brain stem stroke syndrome
G464	Cerebellar stroke syndrome
G465	Pure motor lacunar syndrome
G466	Pure sensory lacunar syndrome
G467	Other lacunar syndromes
G468	Other vascular syndromes of brain in cerebrovascular diseases
G9349	Other encephalopathy
H3400	Transient retinal artery occlusion, unspecified eye
H3401	Transient retinal artery occlusion, right eye

Code	Description
H3402	Transient retinal artery occlusion, left eye
H3403	Transient retinal artery occlusion, bilateral
I6000	Nontraumatic subarachnoid hemorrhage from unspecified carotid siphon and bifurcation
I6001	Nontraumatic subarachnoid hemorrhage from right carotid siphon and bifurcation
I6002	Nontraumatic subarachnoid hemorrhage from left carotid siphon and bifurcation
I6010	Nontraumatic subarachnoid hemorrhage from unspecified middle cerebral artery
I6011	Nontraumatic subarachnoid hemorrhage from right middle cerebral artery
I6012	Nontraumatic subarachnoid hemorrhage from left middle cerebral artery
I602	Nontraumatic subarachnoid hemorrhage from anterior communicating artery
I6020	Nontraumatic subarachnoid hemorrhage from unspecified anterior communicating artery
I6021	Nontraumatic subarachnoid hemorrhage from right anterior communicating artery
I6022	Nontraumatic subarachnoid hemorrhage from left anterior communicating artery
I6030	Nontraumatic subarachnoid hemorrhage from unspecified posterior communicating artery
I6031	Nontraumatic subarachnoid hemorrhage from right posterior communicating artery
I6032	Nontraumatic subarachnoid hemorrhage from left posterior communicating artery
I604	Nontraumatic subarachnoid hemorrhage from basilar artery
I6050	Nontraumatic subarachnoid hemorrhage from unspecified vertebral artery
I6051	Nontraumatic subarachnoid hemorrhage from right vertebral artery
I6052	Nontraumatic subarachnoid hemorrhage from left vertebral artery
I606	Nontraumatic subarachnoid hemorrhage from other intracranial arteries
I607	Nontraumatic subarachnoid hemorrhage from unspecified intracranial artery
I608	Other nontraumatic subarachnoid hemorrhage
I609	Nontraumatic subarachnoid hemorrhage, unspecified
I610	Nontraumatic intracerebral hemorrhage in hemisphere, subcortical
I611	Nontraumatic intracerebral hemorrhage in hemisphere, cortical
I612	Nontraumatic intracerebral hemorrhage in hemisphere, unspecified
I613	Nontraumatic intracerebral hemorrhage in brain stem
I614	Nontraumatic intracerebral hemorrhage in cerebellum
I615	Nontraumatic intracerebral hemorrhage, intraventricular
I616	Nontraumatic intracerebral hemorrhage, multiple localized
I618	Other nontraumatic intracerebral hemorrhage
I619	Nontraumatic intracerebral hemorrhage, unspecified
I6200	Nontraumatic subdural hemorrhage, unspecified
I6201	Nontraumatic acute subdural hemorrhage
I6202	Nontraumatic subacute subdural hemorrhage

Code	Description
I6203	Nontraumatic chronic subdural hemorrhage
I621	Nontraumatic extradural hemorrhage
I629	Nontraumatic intracranial hemorrhage, unspecified
I6300	Cerebral infarction due to thrombosis of unspecified precerebral artery
I63011	Cerebral infarction due to thrombosis of right vertebral artery
I63012	Cerebral infarction due to thrombosis of left vertebral artery
I63013	Cerebral infarction due to thrombosis of bilateral vertebral artery
I63019	Cerebral infarction due to thrombosis of unspecified vertebral artery
I6310	Cerebral infarction due to embolism of unspecified precerebral artery
I63111	Cerebral infarction due to embolism of right vertebral artery
I63112	Cerebral infarction due to embolism of left vertebral artery
I63113	Cerebral infarction due to embolism of bilateral vertebral arteries
I63119	Cerebral infarction due to embolism of unspecified vertebral artery
I6312	Cerebral infarction due to embolism of basilar artery
I63131	Cerebral infarction due to embolism of right carotid artery
I63132	Cerebral infarction due to embolism of left carotid artery
I63133	Cerebral infarction due to embolism of bilateral carotid arteries
I63139	Cerebral infarction due to embolism of unspecified carotid artery
I6319	Cerebral infarction due to embolism of precerebral artery
I6320	Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries
I63211	Cerebral infarction due to unspecified occlusion or stenosis of right vertebral artery
I63212	Cerebral infarction due to unspecified occlusion or stenosis of left vertebral artery
I63213	Cerebral infarction due to unspecified occlusion or stenosis of bilateral vertebral arteries
I63219	Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral artery
I6322	Cerebral infarction due to unspecified occlusion or stenosis of basilar artery
I63231	Cerebral infarction due to unspecified occlusion or stenosis of right carotid artery
I63232	Cerebral infarction due to unspecified occlusion or stenosis of left carotid artery
I63233	Cerebral infarction due to unspecified occlusion or stenosis of bilateral carotid arteries
I63239	Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid artery
I6329	Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries
I6330	Cerebral infarction due to thrombosis of unspecified cerebral artery
I63311	Cerebral infarction due to thrombosis of right middle cerebral artery
I63312	Cerebral infarction due to thrombosis of left middle cerebral artery
I63313	Cerebral infarction due to thrombosis of bilateral middle cerebral arteries
I63319	Cerebral infarction due to thrombosis of unspecified middle cerebral artery

Code	Description
I63321	Cerebral infarction due to thrombosis of right anterior cerebral artery
I63322	Cerebral infarction due to thrombosis of left anterior cerebral artery
I63323	Cerebral infarction due to thrombosis of bi ant cerebral arteries
I63329	Cerebral infarction due to thrombosis unspecified anterior cerebral artery
I63331	Cerebral infarction due to thrombosis of right post cerebral artery
I63332	Cerebral infarction due to thrombosis of left post cerebral artery
I63333	Cerebral infarction to thrombosis of bi posterior cerebral arteries
I63339	Cerebral infarction due to thrombosis unspecified posterior cerebral artery
I63341	Cerebral infarction due to thrombosis of right cerebellar artery
I63342	Cerebral infarction due to thrombosis of left cerebellar artery
I63343	Cerebral infarction to thrombosis of bilateral cerebellar arteries
I63349	Cerebral infarction due to thrombosis unspecified cerebellar artery
I6339	Cerebral infarction due to thrombosis of other cerebral artery
I6340	Cerebral infarction due to embolism of unspecified cerebral artery
I63411	Cerebral infarction due to embolism of right middle cerebral artery
I63412	Cerebral infarction due to embolism of left middle cerebral artery
I63413	Cerebral infarction due to embolism of bi middle cerebral art
I63419	Cerebral infarction due to embolism of unspecified middle cerebral artery
I63421	Cerebral infarction due to embolism of right ant cerebral artery
I63422	Cerebral infarction due to embolism of left ant cerebral artery
I63423	Cerebral infarction due to embolism of bi ant cerebral arteries
I63429	Cerebral infarction due to embolism of unspecified ant cerebral artery
I63431	Cerebral infarction due to embolism of right post cerebral artery
I63432	Cerebral infarction due to embolism of left post cerebral artery
I63433	Cerebral infarction due to embolism of bi post cerebral arteries
I63439	Cerebral infarction due to embolism of unspecified post cerebral artery
I63441	Cerebral infarction due to embolism of right cerebellar artery
I63442	Cerebral infarction due to embolism of left cerebellar artery
I63443	Cerebral infarction due to embolism of bilateral cerebellar arteries
I63449	Cerebral infarction due to embolism of unspecified cerebellar artery
I6349	Cerebral infarction due to embolism of other cerebral artery
I6350	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery
I63511	Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery
I63512	Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery
I63513	Cerebral infarction due to unspecified occlusion or stenosis of bilateral middle cerebral arteries

Code	Description
I63519	Cerebral infarction due to unspecified occlusion or stenosis of unspecified middle cerebral artery
I63521	Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery
I63522	Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery
I63523	Cerebral infarction due to unspecified occlusion or stenosis of bilateral anterior cerebral arteries
I63529	Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery
I63531	Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery
I63532	Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery
I63533	Cerebral infarction due to unspecified occlusion or stenosis of bilateral posterior cerebral arteries
I63539	Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery
I63541	Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery
I63542	Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery
I63543	Cerebral infarction due to unspecified occlusion or stenosis of bilateral cerebellar arteries
I63549	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery
I6359	Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery
I636	Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
I638	Other cerebral infarction
I6381	Other cerebral infarction due to occlusion or stenosis of small artery
I6389	Other cerebral infarction
I639	Cerebral infarction, unspecified
I6501	Occlusion and stenosis of right vertebral artery
I6502	Occlusion and stenosis of left vertebral artery
I6503	Occlusion and stenosis of bilateral vertebral arteries
I6509	Occlusion and stenosis of unspecified vertebral artery
I651	Occlusion and stenosis of basilar artery
I6521	Occlusion and stenosis of right carotid artery
I6522	Occlusion and stenosis of left carotid artery
I6523	Occlusion and stenosis of bilateral carotid arteries
I6529	Occlusion and stenosis of unspecified carotid artery
I658	Occlusion and stenosis of other precerebral arteries
I659	Occlusion and stenosis of unspecified precerebral artery
I6601	Occlusion and stenosis of right middle cerebral artery
I6602	Occlusion and stenosis of left middle cerebral artery
I6603	Occlusion and stenosis of bilateral middle cerebral arteries
I6609	Occlusion and stenosis of unspecified middle cerebral artery
I6611	Occlusion and stenosis of right anterior cerebral artery

Code	Description
I6612	Occlusion and stenosis of left anterior cerebral artery
I6613	Occlusion and stenosis of bilateral anterior cerebral arteries
I6619	Occlusion and stenosis of unspecified anterior cerebral artery
I6621	Occlusion and stenosis of right posterior cerebral artery
I6622	Occlusion and stenosis of left posterior cerebral artery
I6623	Occlusion and stenosis of bilateral posterior cerebral arteries
I6629	Occlusion and stenosis of unspecified posterior cerebral artery
I663	Occlusion and stenosis of cerebellar arteries
I668	Occlusion and stenosis of other cerebral arteries
I669	Occlusion and stenosis of unspecified cerebral artery
I670	Dissection of cerebral arteries, nonruptured
I671	Cerebral aneurysm, nonruptured
I672	Cerebral atherosclerosis
I673	Progressive vascular leukoencephalopathy
I674	Hypertensive encephalopathy
I675	Moyamoya disease
I676	Nonpyogenic thrombosis of intracranial venous system
I677	Cerebral arteritis, not elsewhere classified
I6781	Acute cerebrovascular insufficiency
I6782	Cerebral ischemia
I6783	Posterior reversible encephalopathy syndrome
I67841	Reversible cerebrovascular vasoconstriction syndrome
I67848	Other cerebrovascular vasospasm and vasoconstriction
I67850	Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy
I67858	Other hereditary cerebrovascular disease
I6789	Other cerebrovascular disease
I679	Cerebrovascular disease, unspecified
I680	Cerebral amyloid angiopathy
I682	Cerebral arteritis in other diseases classified elsewhere
I688	Other cerebrovascular disorders in diseases classified elsewhere
I97810	Intraoperative cerebrovascular infarction during cardiac surgery
I97811	Intraoperative cerebrovascular infarction during other surgery
I97820	Postprocedural cerebrovascular infarction following cardiac surgery
I97821	Postprocedural cerebrovascular infarction following other surgery
O2250	Cerebral venous thrombosis in pregnancy, unspecified trimester

Code	Description
O2252	Cerebral venous thrombosis in pregnancy, second trimester
O2253	Cerebral venous thrombosis in pregnancy, third trimester
O873	Cerebral venous thrombosis in the puerperium
12. Acute heart failure/pulmonary edema	
I501	Left ventricular failure, unspecified
I5020	Unspecified systolic (congestive) heart failure
I5021	Acute systolic (congestive) heart failure
I5023	Acute on chronic systolic (congestive) heart failure
I5030	Unspecified diastolic (congestive) heart failure
I5031	Acute diastolic (congestive) heart failure
I5033	Acute on chronic diastolic (congestive) heart failure
I5040	Unspecified combined systolic and diastolic (congestive) heart failure
I5041	Acute combined systolic and diastolic (congestive) heart failure
I5043	Acute on chronic combined systolic and diastolic heart failure
I50810	Right heart failure, unspecified
I50811	Acute right heart failure
I50813	Acute on chronic right heart failure
I50814	Right heart failure due to left heart failure
I5082	Biventricular heart failure
I5083	High output heart failure
I5084	End stage heart failure
I5089	Other heart failure
I509	Heart failure, unspecified
J810	Acute pulmonary edema
13. Severe anesthesia conditions	
O29112	Cardiac arrest due to anesthesia during pregnancy, second trimester
O29113	Cardiac arrest due to anesthesia during pregnancy, third trimester
O29119	Cardiac arrest due to anesthesia during pregnancy, unspecified trimester
O29122	Cardiac failure due to anesthesia during pregnancy, second trimester
O29123	Cardiac failure due to anesthesia during pregnancy, third trimester
O29129	Cardiac failure due to anesthesia during pregnancy, unspecified trimester
O29192	Other cardiac complications of anesthesia during pregnancy, second trimester
O29193	Other cardiac complications of anesthesia during pregnancy, third trimester
O29199	Other cardiac complications of anesthesia during pregnancy, unspecified trimester
O29212	Cerebral anoxia due to anesthesia during pregnancy, second trimester

Code	Description
O29213	Cerebral anoxia due to anesthesia during pregnancy, third trimester
O29219	Cerebral anoxia due to anesthesia during pregnancy, unspecified trimester
O29292	Other central nervous system complications of anesthesia during pregnancy, second trimester
O29293	Other central nervous system complications of anesthesia during pregnancy, third trimester
O29299	Other central nervous system complications of anesthesia during pregnancy, unspecified trimester
O740	Aspiration pneumonitis due to anesthesia during labor and delivery
O741	Other pulmonary complications of anesthesia during labor and delivery
O742	Cardiac complications of anesthesia during labor and delivery
O743	Central nervous system complications of anesthesia during labor and delivery
O8901	Aspiration pneumonitis due to anesthesia during the puerperium
O8909	Other pulmonary complications of anesthesia during the puerperium
O891	Cardiac complications of anesthesia during the puerperium
O892	Central nervous system complications of anesthesia during the puerperium
T882XXA	Shock due to anesthesia, initial encounter
T883XXA	Malignant hyperthermia due to anesthesia, initial encounter
14. Sepsis*	
A327	Listerial sepsis
A400	Sepsis due to streptococcus, group A
A401	Sepsis due to streptococcus, group B
A403	Sepsis due to Streptococcus pneumoniae
A408	Other streptococcal sepsis
A409	Streptococcal sepsis, unspecified
A4101	Sepsis due to Methicillin susceptible Staphylococcus aureus
A4102	Sepsis due to Methicillin resistant Staphylococcus aureus
A411	Sepsis due to other specified staphylococcus
A412	Sepsis due to unspecified staphylococcus
A413	Sepsis due to Hemophilus influenzae
A414	Sepsis due to anaerobes
A4150	Gram-negative sepsis, unspecified
A4151	Sepsis due to Escherichia coli [E. coli]
A4152	Sepsis due to Pseudomonas
A4153	Sepsis due to Serratia
A4159	Other Gram-negative sepsis
A4181	Sepsis due to Enterococcus
A4189	Other specified sepsis

Code	Description
A419	Sepsis, unspecified organism
I76	Septic arterial embolism
O85	Puerperal sepsis
O8604	Sepsis following an obstetrical procedure
R6520	Severe sepsis without septic shock
R6521	Severe sepsis with septic shock
T8112XA	Postprocedural septic shock, initial encounter
T8144XA	Sepsis following a procedure, initial encounter
15. Shock	
O751	Shock during or following labor and delivery
R570	Cardiogenic shock
R571	Hypovolemic shock
R578	Other shock
R579	Shock, unspecified
T782XXA	Anaphylactic shock, unspecified, initial encounter
T8110XA	Postprocedural shock unspecified, initial encounter
T8111XA	Postprocedural cardiogenic shock, initial encounter
T8119XA	Other postprocedural shock, initial encounter
T886XXA	Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered, initial encounter
16. Sickle cell with crisis	
D5700	Hb-SS disease with crisis, unspecified
D5701	Hb-SS disease with acute chest syndrome
D5702	Hb-SS disease with splenic sequestration
D57211	Sickle-cell/Hb-C disease with acute chest syndrome
D57212	Sickle-cell/Hb-C disease with splenic sequestration
D57219	Sickle-cell/Hb-C disease with crisis, unspecified
D57411	Sickle-cell thalassemia with acute chest syndrome
D57412	Sickle-cell thalassemia with splenic sequestration
D57419	Sickle-cell thalassemia with crisis, unspecified
D57811	Other sickle-cell disorders with acute chest syndrome
D57812	Other sickle-cell disorders with splenic sequestration
D57819	Other sickle-cell disorders with crisis, unspecified

Code	Description
17. Air & thrombotic embolism	
I2601	Septic pulmonary embolism with acute cor pulmonale
I2602	Saddle embolus of pulmonary artery with acute cor pulmonale
I2609	Other pulmonary embolism with acute cor pulmonale
I2690	Septic pulmonary embolism without acute cor pulmonale
I2692	Saddle embolus of pulmonary artery w/o acute cor pulmonale
I2693	Single subsegmental pulmonary embolism without acute cor pulmonale
I2694	Multiple subsegmental pulmonary emboli without acute cor pulmonale
I2699	Other pulmonary embolism without acute cor pulmonale
O88012	Air embolism in pregnancy, second trimester
O88013	Air embolism in pregnancy, third trimester
O88019	Air embolism in pregnancy, unspecified trimester
O8802	Air embolism in childbirth
O8803	Air embolism in the puerperium
O88212	Thromboembolism in pregnancy, second trimester
O88213	Thromboembolism in pregnancy, third trimester
O88219	Thromboembolism in pregnancy, unspecified trimester
O8822	Thromboembolism in childbirth
O8823	Thromboembolism in the puerperium
O88312	Pyemic and septic embolism in pregnancy, second trimester
O88313	Pyemic and septic embolism in pregnancy, third trimester
O88319	Pyemic and septic embolism in pregnancy, unspecified trimester
O8832	Pyemic and septic embolism in childbirth
O8833	Pyemic and septic embolism in the puerperium
O88812	Other embolism in pregnancy, second trimester
O88813	Other embolism in pregnancy, third trimester
O88819	Other embolism in pregnancy, unspecified trimester
O8882	Other embolism in childbirth
O8883	Other embolism in the puerperium
T800XXA	Air embolism following infusion, transfusion and therapeutic injection, initial encounter
19. Hysterectomy (procedure)	
0UT90ZZ	Resection of Uterus, Open Approach
0UT97ZL	Resection of Uterus, Supracervical, Via Natural or Artificial Opening
0UT97ZZ	Resection of Uterus, Via Natural or Artificial Opening
0UT90ZL	Resection of Uterus, Supracervical, Open Approach

Code	Description
20. Temporary Tracheostomy (procedure)	
0B110F4	Bypass trachea to cutaneous with tracheostomy device, open approach
0B113F4	Bypass trachea to cutaneous with tracheostomy device, percutaneous approach
0B114F4	Bypass trachea to cutaneous with tracheostomy device, percutaneous endoscopic approach
21. Ventilation (procedure)	
5A1935Z	Respiratory Ventilation, Less than 24 Consecutive Hours
5A1945Z	Respiratory Ventilation, 24-96 Consecutive Hours
5A1955Z	Respiratory Ventilation, Greater than 96 Consecutive Hours

*The definition for sepsis-related SMM differs from the definition used in several recent HCUP Statistical Briefs (SB308, SB309, SB310) where sepsis is defined by any diagnosis indicating a sepsis infection and for adult and maternal stays, an indication of organ dysfunction.

Table A.3 Mapping of severe maternal morbidity (SMM) indicators to SMM complication groups

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

Appendix B

Table B.1 Rate of severe maternal morbidity (SMM) per 10,000 delivery stays overall and by SMM complication groups, 2016–2021

SMM Complication Group	2016	2017	2018	2019	2020	2021	Percent change (2016 to 2021)
Severe Maternal Morbidity	72.0	71.5	76.7	79.7	88.2 (83.3)	101.1 (87.2)	40.4
Hemorrhage	31.8	32.2	34.6	34.7	36.1 (35.4)	40.1 (37.4)	26.1
Respiratory	10.0	10.3	11.3	11.2	15.3 (11.2)	23.7 (11.7)	137.0
Cardiac	7.8	7.9	8.6	9.3	9.7 (9.4)	10.9 (9.8)	39.7
Renal	10.3	11.5	13.0	15.3	19.1 (18.6)	22.6 (20.9)	119.4
Sepsis	9.0	9.4	10.6	11.1	12.9 (11.5)	13.9 (10.5)	54.4
Other	18.6	15.9	15.9	15.6	16.1 (15.9)	17.6 (16.4)	-5.2

Note: SMM rates without COVID-19 are provided in parenthesis for 2020 and 2021.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016–2021.

Table B.2 Rate^a of severe maternal morbidity (SMM) without COVID-19 by SMM complication group and patient characteristics, 2021

Characteristic	Hemorrhage	Respiratory	Cardiac	Renal	Sepsis	Other
Patient age group, years						
12–19	20.8	8.8	7.7	17.3	17.3	26.8
20–24	22.8	8.5	7.5	16.3	11.6	18.3
25–34	34.8	10.5	8.3	18.8	9.4	14.6
35–55	61.6	18.9	16.4	31.9	11.1	17.9
Patient race and ethnicity						
API NH	57.3	12.2	6.5	20.0	22.7	13.3
Black NH	47.8	20.5	18.8	41.8	14.2	30.1
Hispanic	36.7	10.4	7.2	17.3	14.6	14.8
White NH	32.4	10.0	8.5	16.7	6.2	13.9
Other NH	44.4	11.0	10.4	21.4	14.1	16.2
Primary expected payer						
Medicaid	39.0	14.8	12.0	22.2	13.2	20.0
Private insurance	36.1	9.1	7.7	19.5	8.3	13.0
Self-pay/no charge	40.0	16.8	9.3	16.8	9.3	15.7
Other*	37.8	12.8	16.3	29.9	12.3	28.1

Characteristic	Hemorrhage	Respiratory	Cardiac	Renal	Sepsis	Other
Patient community-level income						
Quartile 1 (lowest)	38.1	15.0	12.3	23.8	12.2	21.0
Quartiles 2 and 3	36.0	11.4	9.9	19.8	9.4	15.8
Quartile 4 (highest)	39.6	8.3	6.5	19.5	10.6	12.1
Patient location						
Large metro	40.6	11.7	9.7	23.5	11.9	16.1
Medium/small metro	33.9	11.9	10.0	18.1	8.6	16.1
Nonmetro	31.7	11.4	9.4	15.8	8.0	18.0

Abbreviations: API: Asian/Pacific Islander; metro: metropolitan; NH: non-Hispanic.

Notes: Race and ethnicity were missing for 3.5% of delivery stays.

[†]Rate per 10,000 delivery stays; *Other includes Medicare and other Federal and local government programs (e.g., TRICARE, CHAMPVA, Indian Health Service, Black Lung, Title V) and Workers' Compensation.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2021.