Maternal Health Indicator 03 (MHI 03): Refined Severe Maternal Morbidity (20 Indicators) Plus In-Hospital Mortality Rate, Beta
September 2024
Area-Level Indicator
Type of Score: Rate

Prepared by:

Agency for Healthcare Research and Quality

U.S. Department of Health and Human Services

qualityindicators.ahrq.gov

DESCRIPTION

Refined Severe Maternal Morbidity and In-Hospital Mortality per 10,000 deliveries (beta version), based on 20 indicators[1]. The 20 indicators include: Acute Myocardial Infarction, Aneurysm, Acute Renal Failure with Dialysis (refined), Acute Respiratory Distress Syndrome, Amniotic Fluid Embolism, Cardiac Arrest/Ventricular Fibrillation, Conversion of Cardiac Rhythm, Coagulopathy (including Disseminated Intravascular Coagulation refined), Eclampsia, Heart Failure/Arrest During Surgery or Procedure, Puerperal Cerebrovascular Disorders, Pulmonary Edema/Acute Heart Failure, Severe Anesthesia Complications, Sepsis, Shock, Sickle Cell Disease with Crisis, Air and Thrombotic Embolism, Hysterectomy, Temporary Tracheostomy, and Ventilation.[2]

[NOTE: The software provides the rate per 10,000 deliveries, as is common practice among severe maternal morbidity measures.]

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[1]MHI 03 incorporates refinements to the severe maternal morbidity measure used by the Centers for Disease Control and Prevention and the Health Resources and Services Administration and informed by work from the Alliance for Innovation on Maternal Health, a maternal health quality improvement initiative, defined in the following documentation: Identifying Severe Maternal Morbidity (SMM) | Maternal Infant Health | CDC.

Details of the refinements are outlined in the document titled "Scientific Rationale and Empirical Testing: Refinements to the Severe Maternal Morbidity Measure." MHI 03 also aligns with the Centers for Medicare & Medicaid Services Severe Obstetric Complications measure by incorporating an indicator of in-hospital mortality, as defined in the following documentation: Severe Obstetric Complications | eCQI Resource Center (healthit.gov).

[2]Blood transfusion excluded.

NUMERATOR

Discharges, meeting the inclusion and exclusion rules for the denominator, with any listed ICD-10-CM diagnosis codes for
• Acute Myocardial Infarction (*DX_Acute_Myocard_Infarct**)
• Aneurysm (*DX_Aneurysm**)
• Acute Renal Failure (*DX_Acute_Renal_Fail**) with dialysis (*DIALYIP**)
• Acute Respiratory Distress (*DX_Acute_Resp_Distress**)
• Amniotic Fluid Embolism (*DX_Amniotic_Fluid_Emb**)
• Cardiac Arrest/Ventricular Fibrillation (*DX_Card_Arrest_Vent_Fib**)
• Coagulopathy (including disseminated Intravascular Coagulation)
(*DX_Diss_Intravasc_Coagul3_**)
• Eclampsia, (*DX_Eclampsia**)
• Heart Failure/Arrest During Surgery or Procedure (*DX_Heart_Fail_Surgery**)
• Puerperal Cerebrovascular Disorders (*DX_Puerp_Cerebrovascular**)
• Pulmonary Edema/Acute Heart Failure (*DX_Pulmonary Edema**)
• Severe Anesthesia Complications (*DX_Severe_Anesth_Comp**)
• Sepsis (*DX_Sepsis**)
• Shock (*DX_Shock**)
• Sickle Cell Disease with Crisis (*DX_Sickle_Cell_Crisis**)
• Air and Thrombotic Embolism (*DX_Air_Thrombotic_Embolism**)
or with any listed ICD-10-PCS procedure codes for
• Conversion of Cardiac Rhythm (*PR_Conv_Cardiac_Rhythm**)
• Hysterectomy (*PR_Hysterectomy**)
• Temporary Tracheostomy (*PR_Temp_Tracheostomy**)
• Ventilation (*PR_Ventilation**)
or
• in-hospital death (DISP=20)

DENOMINATOR

All deliveries, identified by any listed
• ICD-10-CM diagnosis code for delivery (*DX_Delivery**)
• ICD-10-PCS procedure code for delivery (*PR_Delivery**)

DENOMINATOR EXCLUSIONS

Exclude discharges:

• with missing gender (SEX=missing)

• with missing age (AGE=missing)

• with missing quarter (DQTR=missing)

• with missing year (YEAR=missing)

• with missing principal diagnosis (DX1=missing)

• with age at delivery <12 or >55 years

• with abortions, either spontaneous or elective, based on diagnoses (**_DX_Abortion*_**) or procedures (**_PR_Abortion*_**)

* See below for code list

Acute myocardial infarction diagnosis codes: (DX_Acute_MyoCard_Infarct)

I2101	ST elevation (STEMI) myocardial infarction involving left main coronary artery	I219	Acute myocardial infarction, unspecified
I2102	ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery	I21A1	Myocardial infarction type 2
I2109	ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall	I21A9	Other myocardial infarction type
I2111	ST elevation (STEMI) myocardial infarction involving right coronary artery	I21B	Myocardial infarction with coronary microvascular dysfunction
I2119	ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall	I220	Subsequent ST elevation (STEMI) myocardial infarction of anterior wall
I2121	ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery	I221	Subsequent ST elevation (STEMI) myocardial infarction of inferior wall
I2129	ST elevation (STEMI) myocardial infarction involving other sites	I222	Subsequent Non-ST elevation (NSTEMI) myocardial infarction
I213	ST elevation (STEMI) myocardial infarction of unspecified site	I228	Subsequent ST elevation (STEMI) myocardial infarction of other sites
I214	Non-ST elevation (NSTEMI) myocardial infarction	I229	Subsequent ST elevation (STEMI) myocardial infarction of unspecified site

Aneurysm diagnosis codes: (DX_Aneurysm)

I7100	Dissection of unspecified site of aorta	I7131	Pararenal abdominal aortic aneurysm, ruptured
I7101	Dissection of thoracic aorta	I7132	Juxtarenal abdominal aortic aneurysm, ruptured
I71010	Dissection of ascending aorta	I7133	Infrarenal abdominal aortic aneurysm, ruptured
I71011	Dissection of aortic arch	I714	Abdominal aortic aneurysm, without rupture
I71012	Dissection of descending thoracic aorta	I7140	Abdominal aortic aneurysm, without rupture, unspecified
I71019	Dissection of thoracic aorta, unspecified	I7141	Pararenal abdominal aortic aneurysm, without rupture
I7102	Dissection of abdominal aorta	I7142	Juxtarenal abdominal aortic aneurysm, without rupture
I7103	Dissection of thoracoabdominal aorta	I7143	Infrarenal abdominal aortic aneurysm, without rupture
I711	Thoracic aortic aneurysm, ruptured	I715	Thoracoabdominal aortic aneurysm, ruptured
I7110	Thoracic aortic aneurysm, ruptured, unspecified	I7150	Thoracoabdominal aortic aneurysm, ruptured, unspecified
I7111	Aneurysm of the ascending aorta, ruptured	I7151	Supraceliac aneurysm of the thoracoabdominal aorta, ruptured
I7112	Aneurysm of the aortic arch, ruptured	I7152	Paravisceral aneurysm of the thoracoabdominal aorta, ruptured
I7113	Aneurysm of the descending thoracic aorta, ruptured	I716	Thoracoabdominal aortic aneurysm, without rupture
I712	Thoracic aortic aneurysm, without rupture	I7160	Thoracoabdominal aortic aneurysm, without rupture, unspecified
I7120	Thoracic aortic aneurysm, without rupture, unspecified	I7161	Supraceliac aneurysm of the thoracoabdominal aorta, without rupture
I7121	Aneurysm of the ascending aorta, without rupture	I7162	Paravisceral aneurysm of the thoracoabdominal aorta, without rupture
I7122	Aneurysm of the aortic arch, without rupture	I718	Aortic aneurysm of unspecified site, ruptured
I7123	Aneurysm of the descending thoracic aorta, without rupture	I719	Aortic aneurysm of unspecified site, without rupture
I713	Abdominal aortic aneurysm, ruptured	I790	Aneurysm of aorta in diseases classified elsewhere
I7130	Abdominal aortic aneurysm, ruptured, unspecified		

Acute renal failure diagnosis codes: (DX_Acute_Renal_Fail)

N170	Acute kidney failure with tubular necrosis	N179	Acute kidney failure, unspecified
N171	Acute kidney failure with acute cortical necrosis	O904	Postpartum acute kidney failure
N172	Acute kidney failure with medullary necrosis	O9041	Hepatorenal syndrome following labor and delivery
N178	Other acute kidney failure	O9049	Other postpartum acute kidney failure

Dialysis procedure codes: (DIALYIP)

3E1M39Z	Irrigation of peritoneal cavity using dialysate, percutaneous approach	5A1D70Z	Performance of urinary filtration, intermittent, less than 6 hours per day
5A1D00Z	Performance of urinary filtration, single	5A1D80Z	Performance of urinary filtration, prolonged intermittent, 6-18 hours per day
5A1D60Z	Performance of urinary filtration, multiple	5A1D90Z	Performance of urinary filtration, continuous, greater than 18 hours per day

Adult respiratory distress syndrome diagnosis codes: (DX_Acute_Resp_Distress)

J80	Acute respiratory distress syndrome	J9620	Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J951	Acute pulmonary insufficiency following thoracic surgery	J9621	Acute and chronic respiratory failure with hypoxia
J952	Acute pulmonary insufficiency following nonthoracic surgery	J9622	Acute and chronic respiratory failure with hypercapnia
J953	Chronic pulmonary insufficiency following surgery	J9690	Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia
J95821	Acute postprocedural respiratory failure	J9691	Respiratory failure, unspecified with hypoxia
J95822	Acute and chronic postprocedural respiratory failure	J9692	Respiratory failure, unspecified with hypercapnia
J9600	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia	R0603	Acute respiratory distress
J9601	Acute respiratory failure with hypoxia	R092	Respiratory arrest
J9602	Acute respiratory failure with hypercapnia		

Amniotic fluid embolism diagnosis codes: (DX_Amniotic_Fluid_Emb)

O88112	Amniotic fluid embolism in pregnancy, second trimester	O8812	Amniotic fluid embolism in childbirth
O88113	Amniotic fluid embolism in pregnancy, third trimester	O8813	Amniotic fluid embolism in the puerperium
O88119	Amniotic fluid embolism in pregnancy, unspecified trimester		

Cardiac arrest/ventricular fibrillation diagnosis codes: (DX_Card_Arrest_Vent_Fib)

I462	Cardiac arrest due to underlying cardiac condition	I4901	Ventricular fibrillation
I468	Cardiac arrest due to other underlying condition	I4902	Ventricular flutter
I469	Cardiac arrest, cause unspecified		

Disseminated intravascular coagulation diagnosis codes: (DX_Diss_Intravasc_Coagul3_)

D65	Disseminated intravascular coagulation [defibrination syndrome]	O46002	Antepartum hemorrhage with coagulation defect, unspecified, second trimester
O45002	Premature separation of placenta with coagulation defect, unspecified, second trimester	O46003	Antepartum hemorrhage with coagulation defect, unspecified, third trimester
O45003	Premature separation of placenta with coagulation defect, unspecified, third trimester	O46009	Antepartum hemorrhage with coagulation defect, unspecified, unspecified trimester
O45009	Premature separation of placenta with coagulation defect, unspecified, unspecified trimester	O46012	Antepartum hemorrhage with afibrinogenemia, second trimester
O45012	Premature separation of placenta with afibrinogenemia, second trimester	O46013	Antepartum hemorrhage with afibrinogenemia, third trimester
O45013	Premature separation of placenta with afibrinogenemia, third trimester	O46019	Antepartum hemorrhage with afibrinogenemia, unspecified trimester
O45019	Premature separation of placenta with afibrinogenemia, unspecified trimester	O46022	Antepartum hemorrhage with disseminated intravascular coagulation, second trimester
O45022	Premature separation of placenta with disseminated intravascular coagulation, second trimester	O46023	Antepartum hemorrhage with disseminated intravascular coagulation, third trimester
O45023	Premature separation of placenta with disseminated intravascular coagulation, third trimester	O46029	Antepartum hemorrhage with disseminated intravascular coagulation, unspecified trimester
O45029	Premature separation of placenta with disseminated intravascular coagulation, unspecified trimester	O46092	Antepartum hemorrhage with other coagulation defect, second trimester
O45092	Premature separation of placenta with other coagulation defect, second trimester	O46093	Antepartum hemorrhage with other coagulation defect, third trimester
O45093	Premature separation of placenta with other coagulation defect, third trimester	O46099	Antepartum hemorrhage with other coagulation defect, unspecified trimester
O45099	Premature separation of placenta with other coagulation defect, unspecified trimester	O670	Intrapartum hemorrhage with coagulation defect

Eclampsia diagnosis codes: (DX_Eclampsia)

O1500	Eclampsia complicating pregnancy, unspecified trimester	O151	Eclampsia complicating labor
O1502	Eclampsia complicating pregnancy, second trimester	O152	Eclampsia complicating the puerperium
O1503	Eclampsia complicating pregnancy, third trimester	O159	Eclampsia, unspecified as to time period

Heart failure/arrest during surgery or procedure diagnosis codes: (DX_Heart_Fail_Surgery)

I97120	Postprocedural cardiac arrest following cardiac surgery	I97131	Postprocedural heart failure following other surgery
I97121	Postprocedural cardiac arrest following other surgery	I97710	Intraoperative cardiac arrest during cardiac surgery
I97130	Postprocedural heart failure following cardiac surgery	I97711	Intraoperative cardiac arrest during other surgery

Puerperal Cerebrovascular Disorders diagnosis codes: (DX_Puerp_Cerebrovascular)

A812	Progressive multifocal leukoencephalopathy	I63333	Cerebral infarction due to thrombosis of bilateral posterior cerebral arteries
G450	Vertebro-Basilar artery syndrome	I63339	Cerebral infarction due to thrombosis of unspecified posterior cerebral artery
G451	Carotid artery syndrome (hemispheric)	I63341	Cerebral infarction due to thrombosis of right cerebellar artery
G452	Multiple and bilateral precerebral artery syndromes	I63342	Cerebral infarction due to thrombosis of left cerebellar artery
G453	Amaurosis fugax	I63343	Cerebral infarction due to thrombosis of bilateral cerebellar arteries
G454	Transient global amnesia	I63349	Cerebral infarction due to thrombosis of unspecified cerebellar artery
G458	Other transient cerebral ischemic attacks and related syndromes	I6339	Cerebral infarction due to thrombosis of other cerebral artery
G459	Transient cerebral ischemic attack, unspecified	I6340	Cerebral infarction due to embolism of unspecified cerebral artery
G460	Middle cerebral artery syndrome	I63411	Cerebral infarction due to embolism of right middle cerebral artery
G461	Anterior cerebral artery syndrome	I63412	Cerebral infarction due to embolism of left middle cerebral artery
G462	Posterior cerebral artery syndrome	I63413	Cerebral infarction due to embolism of bilateral middle cerebral arteries
G463	Brain stem stroke syndrome	I63419	Cerebral infarction due to embolism of unspecified middle cerebral artery
G464	Cerebellar stroke syndrome	I63421	Cerebral infarction due to embolism of right anterior cerebral artery
G465	Pure motor lacunar syndrome	I63422	Cerebral infarction due to embolism of left anterior cerebral artery
G466	Pure sensory lacunar syndrome	I63423	Cerebral infarction due to embolism of bilateral anterior cerebral arteries
G467	Other lacunar syndromes	I63429	Cerebral infarction due to embolism of unspecified anterior cerebral artery
G468	Other vascular syndromes of brain in cerebrovascular diseases	I63431	Cerebral infarction due to embolism of right posterior cerebral artery
G9349	Other encephalopathy	I63432	Cerebral infarction due to embolism of left posterior cerebral artery
H3400	Transient retinal artery occlusion, unspecified eye	I63433	Cerebral infarction due to embolism of bilateral posterior cerebral arteries
H3401	Transient retinal artery occlusion, right eye	I63439	Cerebral infarction due to embolism of unspecified posterior cerebral artery
H3402	Transient retinal artery occlusion, left eye	I63441	Cerebral infarction due to embolism of right cerebellar artery
H3403	Transient retinal artery occlusion, bilateral	I63442	Cerebral infarction due to embolism of left cerebellar artery
I6000	Nontraumatic subarachnoid hemorrhage from unspecified carotid siphon and bifurcation	I63443	Cerebral infarction due to embolism of bilateral cerebellar arteries

Puerperal Cerebrovascular Disorders diagnosis codes: (DX_Puerp_Cerebrovascular)

I6001	Nontraumatic subarachnoid hemorrhage from right carotid siphon and bifurcation	I63449	Cerebral infarction due to embolism of unspecified cerebellar artery
I6002	Nontraumatic subarachnoid hemorrhage from left carotid siphon and bifurcation	I6349	Cerebral infarction due to embolism of other cerebral artery
I6010	Nontraumatic subarachnoid hemorrhage from unspecified middle cerebral artery	I6350	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery
I6011	Nontraumatic subarachnoid hemorrhage from right middle cerebral artery	I63511	Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery
I6012	Nontraumatic subarachnoid hemorrhage from left middle cerebral artery	I63512	Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery
I602	Nontraumatic subarachnoid hemorrhage from anterior communicating artery	I63513	Cerebral infarction due to unspecified occlusion or stenosis of bilateral middle cerebral arteries
I6020	Nontraumatic subarachnoid hemorrhage from unspecified anterior communicating artery	I63519	Cerebral infarction due to unspecified occlusion or stenosis of unspecified middle cerebral artery
I6021	Nontraumatic subarachnoid hemorrhage from right anterior communicating artery	I63521	Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery
I6022	Nontraumatic subarachnoid hemorrhage from left anterior communicating artery	I63522	Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery
I6030	Nontraumatic subarachnoid hemorrhage from unspecified posterior communicating artery	I63523	Cerebral infarction due to unspecified occlusion or stenosis of bilateral anterior cerebral arteries
I6031	Nontraumatic subarachnoid hemorrhage from right posterior communicating artery	I63529	Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery
I6032	Nontraumatic subarachnoid hemorrhage from left posterior communicating artery	I63531	Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery
I604	Nontraumatic subarachnoid hemorrhage from basilar artery	I63532	Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery
I6050	Nontraumatic subarachnoid hemorrhage from unspecified vertebral artery	I63533	Cerebral infarction due to unspecified occlusion or stenosis of bilateral posterior cerebral arteries
I6051	Nontraumatic subarachnoid hemorrhage from right vertebral artery	I63539	Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery
I6052	Nontraumatic subarachnoid hemorrhage from left vertebral artery	I63541	Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery

Puerperal Cerebrovascular Disorders diagnosis codes: (DX_Puerp_Cerebrovascular)

I606	Nontraumatic subarachnoid hemorrhage from other intracranial arteries	I63542	Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery
I607	Nontraumatic subarachnoid hemorrhage from unspecified intracranial artery	I63543	Cerebral infarction due to unspecified occlusion or stenosis of bilateral cerebellar arteries
I608	Other nontraumatic subarachnoid hemorrhage	I63549	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery
I609	Nontraumatic subarachnoid hemorrhage, unspecified	I6359	Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery
I610	Nontraumatic intracerebral hemorrhage in hemisphere, subcortical	I636	Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
I611	Nontraumatic intracerebral hemorrhage in hemisphere, cortical	I638	Other cerebral infarction
I612	Nontraumatic intracerebral hemorrhage in hemisphere, unspecified	I6381	Other cerebral infarction due to occlusion or stenosis of small artery
I613	Nontraumatic intracerebral hemorrhage in brain stem	I6389	Other cerebral infarction
I614	Nontraumatic intracerebral hemorrhage in cerebellum	I639	Cerebral infarction, unspecified
I615	Nontraumatic intracerebral hemorrhage, intraventricular	I6501	Occlusion and stenosis of right vertebral artery
I616	Nontraumatic intracerebral hemorrhage, multiple localized	I6502	Occlusion and stenosis of left vertebral artery
I618	Other nontraumatic intracerebral hemorrhage	I6503	Occlusion and stenosis of bilateral vertebral arteries
I619	Nontraumatic intracerebral hemorrhage, unspecified	I6509	Occlusion and stenosis of unspecified vertebral artery
I6200	Nontraumatic subdural hemorrhage, unspecified	I651	Occlusion and stenosis of basilar artery
I6201	Nontraumatic acute subdural hemorrhage	I6521	Occlusion and stenosis of right carotid artery
I6202	Nontraumatic subacute subdural hemorrhage	I6522	Occlusion and stenosis of left carotid artery
I6203	Nontraumatic chronic subdural hemorrhage	I6523	Occlusion and stenosis of bilateral carotid arteries
I621	Nontraumatic extradural hemorrhage	I6529	Occlusion and stenosis of unspecified carotid artery
I629	Nontraumatic intracranial hemorrhage, unspecified	I658	Occlusion and stenosis of other precerebral arteries
I6300	Cerebral infarction due to thrombosis of unspecified precerebral artery	I659	Occlusion and stenosis of unspecified precerebral artery
I63011	Cerebral infarction due to thrombosis of right vertebral artery	I6601	Occlusion and stenosis of right middle cerebral artery
I63012	Cerebral infarction due to thrombosis of left vertebral artery	I6602	Occlusion and stenosis of left middle cerebral artery

Puerperal Cerebrovascular Disorders diagnosis codes: (DX_Puerp_Cerebrovascular)

I63013	Cerebral infarction due to thrombosis of bilateral vertebral arteries	I6603	Occlusion and stenosis of bilateral middle cerebral arteries
I63019	Cerebral infarction due to thrombosis of unspecified vertebral artery	I6609	Occlusion and stenosis of unspecified middle cerebral artery
I6302	Cerebral infarction due to thrombosis of basilar artery	I6611	Occlusion and stenosis of right anterior cerebral artery
I63031	Cerebral infarction due to thrombosis of right carotid artery	I6612	Occlusion and stenosis of left anterior cerebral artery
I63032	Cerebral infarction due to thrombosis of left carotid artery	I6613	Occlusion and stenosis of bilateral anterior cerebral arteries
I63033	Cerebral infarction due to thrombosis of bilateral carotid arteries	I6619	Occlusion and stenosis of unspecified anterior cerebral artery
I63039	Cerebral infarction due to thrombosis of unspecified carotid artery	I6621	Occlusion and stenosis of right posterior cerebral artery
I6309	Cerebral infarction due to thrombosis of other precerebral artery	I6622	Occlusion and stenosis of left posterior cerebral artery
I6310	Cerebral infarction due to embolism of unspecified precerebral artery	I6623	Occlusion and stenosis of bilateral posterior cerebral arteries
I63111	Cerebral infarction due to embolism of right vertebral artery	I6629	Occlusion and stenosis of unspecified posterior cerebral artery
I63112	Cerebral infarction due to embolism of left vertebral artery	I663	Occlusion and stenosis of cerebellar arteries
I63113	Cerebral infarction due to embolism of bilateral vertebral arteries	I668	Occlusion and stenosis of other cerebral arteries
I63119	Cerebral infarction due to embolism of unspecified vertebral artery	I669	Occlusion and stenosis of unspecified cerebral artery
I6312	Cerebral infarction due to embolism of basilar artery	I670	Dissection of cerebral arteries, nonruptured
I63131	Cerebral infarction due to embolism of right carotid artery	I671	Cerebral aneurysm, nonruptured
I63132	Cerebral infarction due to embolism of left carotid artery	I672	Cerebral atherosclerosis
I63133	Cerebral infarction due to embolism of bilateral carotid arteries	I673	Progressive vascular leukoencephalopathy
I63139	Cerebral infarction due to embolism of unspecified carotid artery	I674	Hypertensive encephalopathy
I6319	Cerebral infarction due to embolism of other precerebral artery	I675	Moyamoya disease
I6320	Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries	I676	Nonpyogenic thrombosis of intracranial venous system
I63211	Cerebral infarction due to unspecified occlusion or stenosis of right vertebral artery	I677	Cerebral arteritis, not elsewhere classified
I63212	Cerebral infarction due to unspecified occlusion or stenosis of left vertebral artery	I6781	Acute cerebrovascular insufficiency

Puerperal Cerebrovascular Disorders diagnosis codes: (DX_Puerp_Cerebrovascular)

I63213	Cerebral infarction due to unspecified occlusion or stenosis of bilateral vertebral arteries	I6782	Cerebral ischemia
I63219	Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral artery	I6783	Posterior reversible encephalopathy syndrome
I6322	Cerebral infarction due to unspecified occlusion or stenosis of basilar artery	I67841	Reversible cerebrovascular vasoconstriction syndrome
I63231	Cerebral infarction due to unspecified occlusion or stenosis of right carotid arteries	I67848	Other cerebrovascular vasospasm and vasoconstriction
I63232	Cerebral infarction due to unspecified occlusion or stenosis of left carotid arteries	I67850	Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy
I63233	Cerebral infarction due to unspecified occlusion or stenosis of bilateral carotid arteries	I67858	Other hereditary cerebrovascular disease
I63239	Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid artery	I6789	Other cerebrovascular disease
I6329	Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries	I679	Cerebrovascular disease, unspecified
I6330	Cerebral infarction due to thrombosis of unspecified cerebral artery	I680	Cerebral amyloid angiopathy
I63311	Cerebral infarction due to thrombosis of right middle cerebral artery	I682	Cerebral arteritis in other diseases classified elsewhere
I63312	Cerebral infarction due to thrombosis of left middle cerebral artery	I688	Other cerebrovascular disorders in diseases classified elsewhere
I63313	Cerebral infarction due to thrombosis of bilateral middle cerebral arteries	I97810	Intraoperative cerebrovascular infarction during cardiac surgery
I63319	Cerebral infarction due to thrombosis of unspecified middle cerebral artery	I97811	Intraoperative cerebrovascular infarction during other surgery
I63321	Cerebral infarction due to thrombosis of right anterior cerebral artery	I97820	Postprocedural cerebrovascular infarction following cardiac surgery
I63322	Cerebral infarction due to thrombosis of left anterior cerebral artery	I97821	Postprocedural cerebrovascular infarction following other surgery
I63323	Cerebral infarction due to thrombosis of bilateral anterior cerebral arteries	O2250	Cerebral venous thrombosis in pregnancy, unspecified trimester
I63329	Cerebral infarction due to thrombosis of unspecified anterior cerebral artery	O2252	Cerebral venous thrombosis in pregnancy, second trimester
I63331	Cerebral infarction due to thrombosis of right posterior cerebral artery	O2253	Cerebral venous thrombosis in pregnancy, third trimester
I63332	Cerebral infarction due to thrombosis of left posterior cerebral artery	O873	Cerebral venous thrombosis in the puerperium

Pulmonary edema / Acute heart failure diagnosis codes: (DX_Pulmonary_Edema)

I501	Left ventricular failure, unspecified	I50810	Right heart failure, unspecified
I5020	Unspecified systolic (congestive) heart failure	I50811	Acute right heart failure
I5021	Acute systolic (congestive) heart failure	I50813	Acute on chronic right heart failure
I5023	Acute on chronic systolic (congestive) heart failure	I50814	Right heart failure due to left heart failure
I5030	Unspecified diastolic (congestive) heart failure	I5082	Biventricular heart failure
I5031	Acute diastolic (congestive) heart failure	I5083	High output heart failure
I5033	Acute on chronic diastolic (congestive) heart failure	I5084	End stage heart failure
I5040	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	I5089	Other heart failure
I5041	Acute combined systolic (congestive) and diastolic (congestive) heart failure	I509	Heart failure, unspecified
I5043	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	J810	Acute pulmonary edema

Severe anesthesia complications diagnosis codes: (DX_Severe_Anesth_Comp)

O29112	Cardiac arrest due to anesthesia during pregnancy, second trimester	O29293	Other central nervous system complications of anesthesia during pregnancy, third trimester
O29113	Cardiac arrest due to anesthesia during pregnancy, third trimester	O29299	Other central nervous system complications of anesthesia during pregnancy, unspecified trimester
O29119	Cardiac arrest due to anesthesia during pregnancy, unspecified trimester	O740	Aspiration pneumonitis due to anesthesia during labor and delivery
O29122	Cardiac failure due to anesthesia during pregnancy, second trimester	O741	Other pulmonary complications of anesthesia during labor and delivery
O29123	Cardiac failure due to anesthesia during pregnancy, third trimester	O742	Cardiac complications of anesthesia during labor and delivery
O29129	Cardiac failure due to anesthesia during pregnancy, unspecified trimester	O743	Central nervous system complications of anesthesia during labor and delivery
O29192	Other cardiac complications of anesthesia during pregnancy, second trimester	O8901	Aspiration pneumonitis due to anesthesia during the puerperium
O29193	Other cardiac complications of anesthesia during pregnancy, third trimester	O8909	Other pulmonary complications of anesthesia during the puerperium
O29199	Other cardiac complications of anesthesia during pregnancy, unspecified trimester	O891	Cardiac complications of anesthesia during the puerperium
O29212	Cerebral anoxia due to anesthesia during pregnancy, second trimester	O892	Central nervous system complications of anesthesia during the puerperium
O29213	Cerebral anoxia due to anesthesia during pregnancy, third trimester	T882XXA	Shock due to anesthesia, initial encounter
O29219	Cerebral anoxia due to anesthesia during pregnancy, unspecified trimester	T883XXA	Malignant hyperthermia due to anesthesia, initial encounter
O29292	Other central nervous system complications of anesthesia during pregnancy, second trimester		

Sepsis diagnosis codes: (DX_Sepsis)

A327	Listerial Sepsis	A4152	Sepsis due to pseudomonas
A400	Sepsis due to streptococcus, group A	A4153	Sepsis due to serratia
A401	Sepsis due to streptococcus, group B	A4154	Sepsis due to acinetobacter baumannii
A403	Sepsis due to streptococcus pneumoniae	A4159	Other gram-negative Sepsis
A408	Other streptococcal Sepsis	A4181	Sepsis due to enterococcus
A409	Streptococcal Sepsis, unspecified	A4189	Other specified Sepsis
A4101	Sepsis due to methicillin susceptible staphylococcus aureus	A419	Sepsis, unspecified organism
A4102	Sepsis due to methicillin resistant staphylococcus aureus	I76	Septic arterial embolism
A411	Sepsis due to other specified staphylococcus	O85	Puerperal Sepsis
A412	Sepsis due to unspecified staphylococcus	O8604	Sepsis following an obstetrical procedure
A413	Sepsis due to hemophilus influenzae	R6520	Severe Sepsis without septic shock
A414	Sepsis due to anaerobes	R6521	Severe Sepsis with septic shock
A4150	Gram-Negative Sepsis, unspecified	T8112XA	Postprocedural septic shock, initial encounter
A4151	Sepsis due to escherichia coli [E. coli]	T8144XA	Sepsis following a procedure, initial encounter

Shock diagnosis codes: (DX_Shock)

O751	Shock during or following labor and delivery	T782XXA	Anaphylactic shock, unspecified, initial encounter
R570	Cardiogenic shock	T8110XA	Postprocedural shock unspecified, initial encounter
R571	Hypovolemic shock	T8111XA	Postprocedural cardiogenic shock, initial encounter
R578	Other shock	T8119XA	Other postprocedural shock, initial encounter
R579	Shock, unspecified	T886XXA	Anaphylactic reaction due to adverse effect of correct drug or medicament properly administered, initial encounter

Sickle cell disease with crisis diagnosis codes: (DX_Sickle_Cell_Crisis)

D5700	Hb-SS disease with crisis, unspecified	D57431	Sickle-Cell thalassemia beta zero with acute chest syndrome
D5701	Hb-SS disease with acute chest syndrome	D57432	Sickle-Cell thalassemia beta zero with splenic sequestration
D5702	Hb-SS disease with splenic sequestration	D57433	Sickle-Cell thalassemia beta zero with cerebral vascular involvement
D5703	Hb-SS disease with cerebral vascular involvement	D57434	Sickle-Cell thalassemia beta zero with dactylitis
D5704	Hb-SS disease with dactylitis	D57438	Sickle-Cell thalassemia beta zero with crisis with other specified complication
D5709	Hb-SS disease with crisis with other specified complication	D57439	Sickle-Cell thalassemia beta zero with crisis, unspecified
D57211	Sickle-Cell/Hb-C disease with acute chest syndrome	D57451	Sickle-Cell thalassemia beta plus with acute chest syndrome
D57212	Sickle-Cell/Hb-C disease with splenic sequestration	D57452	Sickle-Cell thalassemia beta plus with splenic sequestration
D57213	Sickle-Cell/Hb-C disease with cerebral vascular involvement	D57453	Sickle-Cell thalassemia beta plus with cerebral vascular involvement
D57214	Sickle-Cell/Hb-C disease with dactylitis	D57454	Sickle-Cell thalassemia beta plus with dactylitis
D57218	Sickle-Cell/Hb-C disease with crisis with other specified complication	D57458	Sickle-Cell thalassemia beta plus with crisis with other specified complication
D57219	Sickle-Cell/Hb-C disease with crisis, unspecified	D57459	Sickle-Cell thalassemia beta plus with crisis, unspecified
D57411	Sickle-Cell thalassemia, unspecified, with acute chest syndrome	D57811	Other sickle-cell disorders with acute chest syndrome
D57412	Sickle-Cell thalassemia, unspecified, with splenic sequestration	D57812	Other sickle-cell disorders with splenic sequestration
D57413	Sickle-Cell thalassemia, unspecified, with cerebral vascular involvement	D57813	Other sickle-cell disorders with cerebral vascular involvement
D57414	Sickle-Cell thalassemia, unspecified, with dactylitis	D57814	Other sickle-cell disorders with dactylitis
D57418	Sickle-Cell thalassemia, unspecified, with crisis with other specified complication	D57818	Other sickle-cell disorders with crisis with other specified complication
D57419	Sickle-Cell thalassemia, unspecified, with crisis	D57819	Other sickle-cell disorders with crisis, unspecified

Air and thrombotic embolism diagnosis codes: (DX_Air_Thrombotic_Embolism)

I2601	Septic pulmonary embolism with acute cor pulmonale	O88219	Thromboembolism in pregnancy, unspecified trimester
I2602	Saddle embolus of pulmonary artery with acute cor pulmonale	O8822	Thromboembolism in childbirth
I2609	Other pulmonary embolism with acute cor pulmonale	O8823	Thromboembolism in the puerperium
I2690	Septic pulmonary embolism without acute cor pulmonale	O88312	Pyemic and septic embolism in pregnancy, second trimester
I2692	Saddle embolus of pulmonary artery without acute cor pulmonale	O88313	Pyemic and septic embolism in pregnancy, third trimester
I2693	Single subsegmental pulmonary embolism without acute cor pulmonale	O88319	Pyemic and septic embolism in pregnancy, unspecified trimester
I2694	Multiple subsegmental pulmonary emboli without acute cor pulmonale	O8832	Pyemic and septic embolism in childbirth
I2699	Other pulmonary embolism without acute cor pulmonale	O8833	Pyemic and septic embolism in the puerperium
O88012	Air embolism in pregnancy, second trimester	O88812	Other embolism in pregnancy, second trimester
O88013	Air embolism in pregnancy, third trimester	O88813	Other embolism in pregnancy, third trimester
O88019	Air embolism in pregnancy, unspecified trimester	O88819	Other embolism in pregnancy, unspecified trimester
O8802	Air embolism in childbirth	O8882	Other embolism in childbirth
O8803	Air embolism in the puerperium	O8883	Other embolism in the puerperium
O88212	Thromboembolism in pregnancy, second trimester	T800XXA	Air embolism following infusion, transfusion and therapeutic injection, initial encounter
O88213	Thromboembolism in pregnancy, third trimester		

Conversion of cardiac rhythm procedure codes: (PR_Conv_Cardiac_Rhythm)

5A12012	Performance of cardiac output, single, manual	5A2204Z	Restoration of cardiac rhythm, single

Conversion of cardiac rhythm procedure codes: (PR_Hysterectomy)

| 0UT90ZL | Resection of uterus, supracervical, open approach | 0UT97ZL | Resection of uterus, supracervical, via natural or artificial opening |
| 0UT90ZZ | Resection of uterus, open approach | 0UT97ZZ | Resection of uterus, via natural or artificial opening |

Temporary tracheostomy procedure codes: (PR_Temp_Tracheostomy)

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

Ventilation procedure codes: (PR_Ventilation)

5A1935Z	Respiratory ventilation, less than 24 consecutive hours	5A1955Z	Respiratory ventilation, greater than 96 consecutive hours
5A1945Z	Respiratory ventilation, 24-96 consecutive hours		

Delivery diagnosis codes: (DX_Delivery)

O7582	Onset (spontaneous) of labor after 37 completed weeks of gestation but before 39 completed weeks gestation, with delivery by (planned) cesarean section	Z3753	Quintuplets, all liveborn
O80	Encounter for full-term uncomplicated delivery	Z3754	Sextuplets, all liveborn
O82	Encounter for cesarean delivery without indication	Z3759	Other multiple births, all liveborn
Z370	Single live birth	Z3760	Multiple births, unspecified, some liveborn
Z371	Single stillbirth	Z3761	Triplets, some liveborn
Z372	Twins, both liveborn	Z3762	Quadruplets, some liveborn
Z373	Twins, one liveborn and one stillborn	Z3763	Quintuplets, some liveborn
Z374	Twins, both stillborn	Z3764	Sextuplets, some liveborn
Z3750	Multiple births, unspecified, all liveborn	Z3769	Other multiple births, some liveborn
Z3751	Triplets, all liveborn	Z377	Other multiple births, all stillborn
Z3752	Quadruplets, all liveborn	Z379	Outcome of delivery, unspecified

Delivery procedure codes: (PR_Delivery)

10D00Z0	Extraction of products of conception, high, open approach	10D07Z5	Extraction of products of conception, high forceps, via natural or artificial opening
10D00Z1	Extraction of products of conception, low, open approach	10D07Z6	Extraction of products of conception, vacuum, via natural or artificial opening
10D00Z2	Extraction of products of conception, extraperitoneal, open approach	10D07Z7	Extraction of products of conception, internal version, via natural or artificial opening
10D07Z3	Extraction of products of conception, low forceps, via natural or artificial opening	10D07Z8	Extraction of products of conception, other, via natural or artificial opening
10D07Z4	Extraction of products of conception, mid forceps, via natural or artificial opening	10E0XZZ	Delivery of products of conception, external approach

Abortion diagnosis codes: (DX_Abortion)

O000	Abdominal pregnancy	O0380	Unspecified complication following complete or unspecified spontaneous abortion
O0000	Abdominal pregnancy without intrauterine pregnancy	O0381	Shock following complete or unspecified spontaneous abortion
O0001	Abdominal pregnancy with intrauterine pregnancy	O0382	Renal failure following complete or unspecified spontaneous abortion
O001	Tubal pregnancy	O0383	Metabolic disorder following complete or unspecified spontaneous abortion
O0010	Tubal pregnancy without intrauterine pregnancy	O0384	Damage to pelvic organs following complete or unspecified spontaneous abortion
O00101	Right tubal pregnancy without intrauterine pregnancy	O0385	Other venous complications following complete or unspecified spontaneous abortion
O00102	Left tubal pregnancy without intrauterine pregnancy	O0386	Cardiac arrest following complete or unspecified spontaneous abortion
O00109	Unspecified tubal pregnancy without intrauterine pregnancy	O0387	Sepsis following complete or unspecified spontaneous abortion
O0011	Tubal pregnancy with intrauterine pregnancy	O0388	Urinary tract infection following complete or unspecified spontaneous abortion
O00111	Right tubal pregnancy with intrauterine pregnancy	O0389	Complete or unspecified spontaneous abortion with other complications
O00112	Left tubal pregnancy with intrauterine pregnancy	O039	Complete or unspecified spontaneous abortion without complication
O00119	Unspecified tubal pregnancy with intrauterine pregnancy	O045	Genital tract and pelvic infection following (induced) termination of pregnancy
O002	Ovarian pregnancy	O046	Delayed or excessive hemorrhage following (induced) termination of pregnancy
O0020	Ovarian pregnancy without intrauterine pregnancy	O047	Embolism following (induced) termination of pregnancy
O00201	Right ovarian pregnancy without intrauterine pregnancy	O0480	(Induced) termination of pregnancy with unspecified complications
O00202	Left ovarian pregnancy without intrauterine pregnancy	O0481	Shock following (induced) termination of pregnancy
O00209	Unspecified ovarian pregnancy without intrauterine pregnancy	O0482	Renal failure following (induced) termination of pregnancy
O0021	Ovarian pregnancy with intrauterine pregnancy	O0483	Metabolic disorder following (induced) termination of pregnancy
O00211	Right ovarian pregnancy with intrauterine pregnancy	O0484	Damage to pelvic organs following (induced) termination of pregnancy
O00212	Left ovarian pregnancy with intrauterine pregnancy	O0485	Other venous complications following (induced) termination of pregnancy

Abortion diagnosis codes: (DX_Abortion)

O00219	Unspecified ovarian pregnancy with intrauterine pregnancy	O0486	Cardiac arrest following (induced) termination of pregnancy
O008	Other ectopic pregnancy	O0487	Sepsis following (induced) termination of pregnancy
O0080	Other ectopic pregnancy without intrauterine pregnancy	O0488	Urinary tract infection following (induced) termination of pregnancy
O0081	Other ectopic pregnancy with intrauterine pregnancy	O0489	(Induced) termination of pregnancy with other complications
O009	Ectopic pregnancy, unspecified	O070	Genital tract and pelvic infection following failed attempted termination of pregnancy
O0090	Unspecified ectopic pregnancy without intrauterine pregnancy	O071	Delayed or excessive hemorrhage following failed attempted termination of pregnancy
O0091	Unspecified ectopic pregnancy with intrauterine pregnancy	O072	Embolism following failed attempted termination of pregnancy
O010	Classical hydatidiform mole	O0730	Failed attempted termination of pregnancy with unspecified complications
O011	Incomplete and partial hydatidiform mole	O0731	Shock following failed attempted termination of pregnancy
O019	Hydatidiform mole, unspecified	O0732	Renal failure following failed attempted termination of pregnancy
O020	Blighted ovum and nonhydatidiform mole	O0733	Metabolic disorder following failed attempted termination of pregnancy
O021	Missed abortion	O0734	Damage to pelvic organs following failed attempted termination of pregnancy
O0281	Inappropriate change in quantitative human chorionic gonadotropin (hcg) in early pregnancy	O0735	Other venous complications following failed attempted termination of pregnancy
O0289	Other abnormal products of conception	O0736	Cardiac arrest following failed attempted termination of pregnancy
O029	Abnormal product of conception, unspecified	O0737	Sepsis following failed attempted termination of pregnancy
O030	Genital tract and pelvic infection following incomplete spontaneous abortion	O0738	Urinary tract infection following failed attempted termination of pregnancy
O031	Delayed or excessive hemorrhage following incomplete spontaneous abortion	O0739	Failed attempted termination of pregnancy with other complications
O032	Embolism following incomplete spontaneous abortion	O074	Failed attempted termination of pregnancy without complication
O0330	Unspecified complication following incomplete spontaneous abortion	O080	Genital tract and pelvic infection following ectopic and molar pregnancy
O0331	Shock following incomplete spontaneous abortion	O081	Delayed or excessive hemorrhage following ectopic and molar pregnancy

Abortion diagnosis codes: (DX_Abortion)

Code	Description	Code	Description
O0332	Renal failure following incomplete spontaneous abortion	O082	Embolism following ectopic and molar pregnancy
O0333	Metabolic disorder following incomplete spontaneous abortion	O083	Shock following ectopic and molar pregnancy
O0334	Damage to pelvic organs following incomplete spontaneous abortion	O084	Renal failure following ectopic and molar pregnancy
O0335	Other venous complications following incomplete spontaneous abortion	O085	Metabolic disorders following an ectopic and molar pregnancy
O0336	Cardiac arrest following incomplete spontaneous abortion	O086	Damage to pelvic organs and tissues following an ectopic and molar pregnancy
O0337	Sepsis following incomplete spontaneous abortion	O087	Other venous complications following an ectopic and molar pregnancy
O0338	Urinary tract infection following incomplete spontaneous abortion	O0881	Cardiac arrest following an ectopic and molar pregnancy
O0339	Incomplete spontaneous abortion with other complications	O0882	Sepsis following ectopic and molar pregnancy
O034	Incomplete spontaneous abortion without complication	O0883	Urinary tract infection following an ectopic and molar pregnancy
O035	Genital tract and pelvic infection following complete or unspecified spontaneous abortion	O0889	Other complications following an ectopic and molar pregnancy
O036	Delayed or excessive hemorrhage following complete or unspecified spontaneous abortion	O089	Unspecified complication following an ectopic and molar pregnancy
O037	Embolism following complete or unspecified spontaneous abortion		

Abortion procedure codes: (PR_Abortion)

10A00ZZ	Abortion of products of conception, open approach	10A07ZW	Abortion of products of conception, laminaria, via natural or artificial opening
10A03ZZ	Abortion of products of conception, percutaneous approach	10A07ZX	Abortion of products of conception, abortifacient, via natural or artificial opening
10A04ZZ	Abortion of products of conception, percutaneous endoscopic approach	10A07ZZ	Abortion of products of conception, via natural or artificial opening
10A07Z6	Abortion of products of conception, vacuum, via natural or artificial opening	10A08ZZ	Abortion of products of conception, via natural or artificial opening endoscopic