

Supplemental Digital Content for:

Postpartum Psychiatric Outcomes following
Severe Maternal Morbidity at an Urban Safety-Net Hospital

By

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Appendix 1. Indicators of Severe Maternal Morbidity with Corresponding ICD-9-CM and ICD-10-CM Codes.¹

Severe Maternal Morbidity Indicator	DX or PR Code	ICD-9 Code	ICD-10 Code
1. Acute myocardial infarction	DX	410.xx	I21.xx, I22.x
2. Aneurysm*	DX	441.x	I71.xx* I79.0*No I71.7 code exists, so ICD-10 list encompasses all possible I71 codes
3. Acute renal failure	DX	584.5, 584.6, 584.7, 584.8, 584.9, 669.3x	N17.x, O90.4
4. Adult respiratory distress syndrome	DX	518.5x, 518.81 518.82 518.84, 799.1	J80, J95.1, J95.2, J95.3, J95.82x, J96.0x, J96.2x R09.2
5. Amniotic fluid embolism	DX	673.1x	O88.1x
6. Cardiac arrest/ventricular fibrillation*	DX	427.41, 427.42*, 427.5 * Ventricular flutter	I46.x, I49.0x
7. Conversion of cardiac rhythm	PR	99.6x	5A2204Z, 5A12012
8. Disseminated intravascular coagulation	DX	286.6, 286.9, 666.3x	D65, D68.8, D68.9, O72.3
9. Eclampsia	DX	642.6x	O15. X
10. Heart failure/arrest during surgery or procedure	DX	997.1	I97.12x, I97.13x, I97.710, I97.711
11. Puerperal cerebrovascular disorders	DX	430.xx, 431.xx, 432.xx, 433.xx, 434.xx, 436xx, 437.xx, 671.5x, 674.0x, 997.02	I60.xx- I68.xx, O22.51, O22.52, O22.53, I97.81x, I97.82x, O87.3
12. Pulmonary edema / Acute heart failure	DX	518.4, 428.1, 428.0, 428.21, 428.23, 428.31, 428.33, 428.41, 428.43	J81.0, I50.1, I50.20, I50.21, I50.23, I50.30, I50.31, I50.33, I50.40, I50.41, I50.43, I50.9
13. Severe anesthesia complications	DX	668.0x*, 668.1x, 668.2x	O74.0 , O74.1 , O74.2, O74.3, O89.0x, O89.1, O89.2
14. Sepsis	DX	038.xx, 995.91, 995.92, 670.2x (after October 1, 2009)	O85, O86.04, T80.211A, T81.4XXA, T81.44xx, Or R65.20 Or A40.x, A41.x, A32.7

15. Shock	DX	669.1x, 785.5x, 995.0, 995.4, 998.0x	O75.1, R57.x, R65.21, T78.2XXA, T88.2 XXA, T88.6 XXA, T81.10XA , T81.11XA, T81.19XA
16. Sickle cell disease with crisis	DX	282.42, 282.62, 282.64, 282.69	D57.0x, D57.21x, D57.41x, D57.81x
17. Air and thrombotic embolism	DX	415.1x, 673.0x, 673.2x 673.3x, 673.8x	I26.x, O88.0x, O88.2x, O88.3x, O88.8x
18. Blood products transfusion	PR	99.0x	30233 Peripheral vein, percutaneous (7 th digit: x=1: nonautologous) 30240 Central Vein, open (7 th digit: x=1: nonautologous) 30243 Central Vein, percutaneous (7 th digit: x=1: nonautologous x=0: autologous) +Hx, Kx, Lx, Mx, Nx, Px, Rx, Tx, Blood *See Complete list of blood product transfusion codes below
19. Hysterectomy	PR	68.3x-68.9x	0UT90ZZ, 0UT94ZZ, 0UT97ZZ, 0UT98ZZ, 0UT9FZZ
20. Temporary tracheostomy*	PR	31.1	0B110Z, 0B110F, 0B113, 0B114
21. Ventilation	PR	93.90, 96.01, 96.02, 96.03, 96.05	5A1935Z, 5A1945Z, 5A1955Z

*Complete list of blood product transfusion codes:
(+ Hx (whole blood), Kx (frozen plasma), Lx (fresh Plasma), Mx (plasma cryoprecipitate), Nx (red blood cells), Px (frozen Red cells), Rx (platelets), Tx (fibrinogen), Blood)
‘30233H1’, ‘30233L1’, ‘30233K1’, ‘30233M1’, ‘30233N1’, ‘30233P1’, ‘30233R1’, ‘30233T1’,
‘30233H0’, ‘30233L0’, ‘30233K0’, ‘30233M0’, ‘30233N0’, ‘30233P0’, ‘30233R0’, ‘30233T0’,
‘30230H1’, ‘30230L1’, ‘30230K1’, ‘30230M1’, ‘30230N1’, ‘30230P1’, ‘30230R1’, ‘30230T1’,
‘30230H0’, ‘30230L0’, ‘30230K0’, ‘30230M0’, ‘30230N0’, ‘30230P0’, ‘30230R0’, ‘30230T0’,
‘30240H1’, ‘30240L1’, ‘30240K1’, ‘30240M1’, ‘30240N1’, ‘30240P1’, ‘30240R1’, ‘30240T1’,
‘30240H0’, ‘30240L0’, ‘30240K0’, ‘30240M0’, ‘30240N0’, ‘30240P0’, ‘30240R0’, ‘30240T0’,
‘30243H1’, ‘30243L1’, ‘30243K1’, ‘30243M1’, ‘30243N1’, ‘30243P1’, ‘30243R1’, ‘30243T1’,
‘30243H0’, ‘30243L0’, ‘30243K0’, ‘30243M0’, ‘30243N0’, ‘30243P0’, ‘30243R0’, ‘30243T0’,
‘30250H1’, ‘30250L1’, ‘30250K1’, ‘30250M1’, ‘30250N1’, ‘30250P1’, ‘30250R1’, ‘30250T1’,
‘30250H0’, ‘30250L0’, ‘30250K0’, ‘30250M0’, ‘30250N0’, ‘30250P0’, ‘30250R0’, ‘30250T0’,
‘30253H1’, ‘30253L1’, ‘30253K1’, ‘30253M1’, ‘30253N1’, ‘30253P1’, ‘30253R1’, ‘30253T1’,
‘30253H0’, ‘30253L0’, ‘30253K0’, ‘30253M0’, ‘30253N0’, ‘30253P0’, ‘30253R0’, ‘30253T0’,
‘30260H1’, ‘30260L1’, ‘30260K1’, ‘30260M1’, ‘30260N1’, ‘30260P1’, ‘30260R1’, ‘30260T1’,
‘30260H0’, ‘30260L0’, ‘30260K0’, ‘30260M0’, ‘30260N0’, ‘30260P0’, ‘30260R0’, ‘30260T0’,

'30263H1','30263L1', '30263K1', '30263M1', '30263N1','30263P1','30263R1','30263T1',
'30263H0','30263L0', '30263K0', '30263M0', '30263N0','30263P0','30263R0','30263T0'
Adapted from the Centers for Disease Control and Prevention.⁶

Appendix 2. Diagnoses included in “Psychiatric Composite” and “Substance Use/Disorder Composite” with Corresponding ICD-9-CM and ICD-10-CM Codes.*			
	Variable	ICD-9 Codes	ICD-10 Codes
Psychiatric Outcomes	“Psychiatric Composite” variable includes all of the below diagnoses	29x, 30x, 31x, 648.3x, 648.4x, 649.0x Excluding: 314x, 315x, 317x, 318x, 319x, 307.23, 307.52, 307.81, 313.81, 315.00	Fx, T14.91, Z91.5, X7x, X8x, O99.30x, O99.31x, O99.32x, O99.33x, O99.34x Excluding: F7x, F80x, F81x, F82x, F90x
	Non-mood psychotic disorders (including schizophrenia, brief psychotic disorder, schizotypal and delusional disorders)	295x, 297x, 298x, 301.22	F2x
	Non-psychotic mood/affective disorders (including manic episode, bipolar disorder, single major depressive episode, major depressive disorder)	296x, 298.0, OR 300.4, 301.1x, 311x	F3x, F53x
	Non-psychotic anxiety disorders (including panic, generalized anxiety, dissociative, stress-related, and somatoform disorders; excluding PTSD, acute stress reaction, and adjustment disorder)	298.2, 300x, 306x, 307.80, 307.89, 310.81, V40.2	F4x Excluding: F43x, F40.00, F40.240
	PTSD, acute stress reaction/disorder, or adjustment disorder	308x, 309x	F43x
	Suicide attempt (excluding suicidal ideation)	E95x	T14.91, X7x, X8x
Substance Use/Disorder (SUD)	Alcohol use and/or dependence	291x, 303x, 305.0x, 357.5, 425.5, 571.0x, 571.1x, 571.2x, 571.3x, 535.3x	F10x, G62.1x, I42.6x, K70x, K29.2x

	Other drug use and/or dependence	292x, 304x, 305x, 357.5x, 535.3x, 571.0x, 571.1x, 571.2x, 571.3x, 965x, 968x, 969x, 970.81x, E860x, E980x Excluding: 305.0x	F1x, I42.7x, T40x Excluding: F10x, T40.3x
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*Codes were not required to be the “primary” diagnosis in the hospital encounter. “Psychiatric history” and “substance use/disorder history” were defined as any inpatient encounter at Grady Memorial Hospital in the two years prior to index delivery with a corresponding diagnosis code.
Adapted from Lewkowitz et. al.²

Appendix 3. Maternal Comorbidities at Delivery Admission with Corresponding ICD-9-CM and ICD-10-CM Codes.*

	Variable	ICD-9 Codes Included	ICD-10 Codes Included
Maternal Comorbidities	Asthma	493.x	J45.x
	Cardiac valvular disease	394.x-397.x, 424.x, 746.9x	I05.x-I09.x, I34.x-I39.x, Q24.8x
	Chronic hypertension	401.x-405.x, 642.0x-642.2x	O16.x, I10.x, I11.9x, I12.9x
	Chronic kidney disease	585.x, 646.2x	N18.x
	Congenital heart disease	745.0x-747.4x, 648.5x	Q20.x-Q25.x
	Congestive heart failure	428.22-428.23, 428.32-428.33, 428.42-428.43	I50.x, I11.0x
	Human immunodeficiency virus	042.x, V08.x	B20.x, Z21.x
	Ischemic heart disease	412.x-414.x	I20.x-I25.x
	Obesity	278.0x, 649.1x	E66.x, O99.2x
	Preexisting diabetes mellitus	250.x, 648.0x	E10.x-E11.x, O24.0x-O24.3x, O24.8x-O24.9x
	Pulmonary hypertension	416.0x, 416.8x, 416.9x	I27.x
	Sickle cell disease	282.4x, 282.6x	D571.x, D572.x
	Systemic lupus erythematosus	710.0x	M32.x, M34.x
Cystic fibrosis*	277.0x	E84.x	

*No cases of cystic fibrosis were identified in the analytic dataset. Maternal comorbidities were identified using all inpatient encounters at Grady Memorial Hospital in the 12 months prior to index delivery.

Adapted from Bateman et. al.³

Appendix 4. Additional Covariates with Corresponding Data Sources and ICD-9-CM and ICD-10-CM Codes.

	Variable	ICD-9 Codes	ICD-10 Codes
Maternal obstetric history	History of cesarean section (*Additional Source: Surgical History)	654.2x	O34.21x
	Primiparous (*Additional Sources: Obstetric History, History & Physical Note)	659.5x, V22.0, V23.81, V23.83	O09.51x, O09.61x, Z34.0x
	History of preterm birth	644.x	O60.1x, Z3A.08-Z3A.36
Characteristics of index delivery	Preterm (<37 weeks) (*Additional Source: Delivery Summary)	644.x	O60.1x, Z3A.08-Z3A.36
	Multiple gestation	651.x, V27.2-V27.7	O30.x, Z37.2-Z37.7
	Mode of delivery: Vaginal (ICD Procedure Codes)	72, 72.29, 72.39, 72.79, 72.8, 73.22, 73.51, 73.59	10D07Z3, 10D07Z4, 10D07Z5, 10D07Z6, 10D07Z7, 10D07Z8, 10E0XZZ
	Mode of delivery: Cesarean (ICD Procedure Codes)	74, 74.1, 74.2, 74.4, 74.99	10D00Z0, 10D00Z1, 10D00Z2
	Placenta previa	641.0x, 641.1x	O44.x
	Gestational hypertension	642.3x	O13.x
	Mild or unspecified preeclampsia	642.4x, 642.7x	O14.0x, O14.9x
	Severe preeclampsia/eclampsia	642.5x, 642.6x	O14.1x, O14.2x, O15.x
	Gestational diabetes mellitus (without pre-existing diabetes)	648.8x	O24.4x
Index Delivery Exclusion Criteria	Stillbirth	656.40, 656.41, V271	Z37.1, Z37.3, Z37.4, P95

*Additional Source refers to data automatically extracted from clinical notes in electronic health record.

References for Supplemental Digital Content

1. Appendix 2. Severe Morbidity Indicators and Corresponding ICD-9-CM/ICD-10-CM/PCS Codes during Delivery Hospitalizations. In: Division of Reproductive Health NCfCDPaHP, ed: Centers for Disease Control and Prevention; 2019.
2. Lewkowitz AK, Rosenbloom JI, Keller M, et al. Association Between Severe Maternal Morbidity and Psychiatric Illness Within 1 Year of Hospital Discharge After Delivery. *Obstet Gynecol.* 2019;134(4):695-707.
3. Bateman BT, Mhyre JM, Hernandez-Diaz S, et al. Development of a comorbidity index for use in obstetric patients. *Obstet Gynecol.* 2013;122(5):957-965.