

**Appendix 1. Maternal and Obstetric Comorbidities, ICD-9 Codes, and Minimum Level of Maternal Care**

<b>Maternal Comorbidity</b>	<b>ICD-9-CM Code</b>	<b>Minimum Level of Care</b>
Preterm	644.x	I
Multiple Gestation	V27.2-V27.8, 651.x	I
Previous Cesarean Delivery	654.2x	I
Prior Uterine Surgery	654.9x	I
Gestational Hypertension	642.3x	I
Preeclampsia without Severe Features	642.4x, 642.7x	I
Chronic Hypertension	401.x, 402.x, 403.x, 404.x, 405.x, 642.0x, 642.1x, 642.2x, 642.7x	I
Gestational Diabetes	648.8x	I
Preterm Multiple Gestation	V27.2-V27.8, 651.x AND 644.x	II
Pre-Existing Diabetes Mellitus	250.x, 648.0x	II
Alcohol Abuse	291.xx, 303.xx, 305.0x	II
Drug Abuse	304.x, 305.2-305.9x, 648.3x	II
Asthma	493.x	II
History of DVT or PE	V12.51, V12.55	II
Hypercoagulable State	289.81, 289.82	II

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Coagulation Disorder	649.3x	II
Abruption	641.x, 656.0	II
Preterm Chronic Hypertension	401.x, 402.x, 403.x, 404.x, 405.x, 642.0x, 642.1x, 642.2x, 642.7x AND 644.x	II
Preterm Gestational Hypertension	642.3x AND 644.x	II
Preterm Preeclampsia without Severe Features	642.4x, 642.7x AND 644.x	II
Preeclampsia with Severe Features	642.5x, 642.6x	II
Placenta Previa	641.0x, 641.1x	II
Previa with Prior Uterine Surgery	641.0x, 641.1x AND 654.9x OR 654.2x	III
Preterm Preeclampsia with Severe Features	642.5x, 642.6x AND 644.x	III
Chronic Renal Disease	581.x-583.x, 585.x, 587.x, 588.x, 646.2x	III
Cystic Fibrosis	277.0x	III
Epilepsy	649.1, 694.4x	III
HIV	042.x, V08.x	III
Systemic Lupus Erythematosus	710.0x	III
Sickle Cell Disease	282.4x, 282.6x	III
Hematologic Cancer	200.x – 209.x	III

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Breast Cancer	174.X	III
Maternal Cancer	14x.x, 15x.x, 160.x-165.x, 170.x, 171.x, 188.x, 189.x	III
Gynecologic Cancer	179.x, 180.x, 181.x, 182.x, 183.x, 184.x	III
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Congenital Heart Disease	745.0x-747.4x, 648.5x	IV
Chronic Ischemic Heart Disease	412.x-414.x	IV
Cardiac Valvular Disease	394.x-397.x, 424.x	IV
Endocarditis	424.9x, 421.x	IV
Aortic Stenosis	395.0, 395.2, 746.3, 746.81, 747.22	IV
Mitral Stenosis	394.0, 394.2, 746.5	IV
Aortic and Mitral Stenosis	396.0, 396.2, 396.8	IV
Mechanical Heart Valve	V43.3	IV
Hypertrophic Cardiomyopathy	425.1x	IV
Chronic Congestive Heart Failure	428.22, 428.23, 428.32, 428.33, 428.42, 428.43	IV
Marfan Syndrome	759.82	IV
Aortic Aneurysm	441.x	IV
Pulmonary Hypertension	416.0x, 416.8x, 416.9x	IV
Hypoplastic Left Heart Syndrome	746.7	IV

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Single Ventricle (Fontan)	745.3	IV
Cirrhosis	571.5, 571.6	IV
Brain Tumor	225.0, 225.1, 225.2, 191.x	IV
Neurofibromatosis	237.70, 237.71, 237.72, 237.70	IV

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**Appendix 2. Hospital Services, SID Procedure Code or AHA Code, and Hospital Level of Care**

<b>Definition</b>	<b>SID or AHA Description</b>	<b>ICD9 Procedure Code</b>	<b>AHA Variable</b>
<b>Level II</b>			
General Surgery	Appendectomy Procedure	47.x	
Services*	Bowel Resection Procedure	45.x	
	Cholecystectomy Procedure	512.x	
Intensive Care Unit	Medical/Surgical ICU		MSICHOS
Ultrasound	US in Hospital		ULTSNHOS
	US Procedure	887.x	
CT Scan	CT in Hospital		CTSCNHOS
	CT Procedure	870.3, 870.4, 877.1, 874.1, 880.1	
MRI	MRI in Hospital		MRIHOS
	MRI Procedure	889.x	
<b>Level III</b>			
Cardiology*	Cardiac Services Available		CICHOS
	Cardiac ICU Beds		CIBD > 1
	Adult Cardiology Available		ACARDHOS

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Neurology	Neurology Services Available	NEROHOS
Nephrology	Hemodialysis Available	HEMOHOS

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**Level IV**

Transplant Services	Heart Transplant	HARTHOS
	Kidney Transplant	KDNYHOS
	Liver Transplant	LIVRHOS
	Lung Transplant	LUNGHOS
Cardiac Surgery	Cardiac Surgery	ASTCHOS
	Valve Procedures	35.x
Neurosurgery	Neurosurgical Procedures	01.x, 02.x

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\*Indicates all codes or services must be present for hospital with given AHA ID to meet definition of available services.

### Appendix 3. Hospital Delivery Level and Receipt of Inappropriate Level of Care

#### According to State of Delivery

State of Hospital	Level I (n=103,987)	Level II (n=285,685)	Level III (n=304,764)	Level IV (n=151,109)	Inappropriately Low Level
Florida	52,369 (24.77)	56,504 (26.72)	68,118 (32.21)	34,459 (16.30)	8,910 (4.21)
Massachusetts	8,788 (12.60)	24,026 (34.46)	13,993 (20.07)	22,917 (32.87)	1,558 (2.23)
New Jersey	6,866 (6.95)	30,274 (30.65)	41,001 (41.50)	20,645 (20.90)	1,515 (1.53)
New York	20,080 (8.74)	54,873 (23.89)	108,259 (47.12)	46,525 (20.25)	4,238 (1.84)
North Carolina	4,573 (4.02)	44,185 (38.87)	48,120 (42.33)	16,794 (14.77)	1,431 (1.26)
Oregon	2,240 (5.26)	25,042 (58.84)	10,404 (24.45)	4,870 (11.44)	766 (1.80)
Washington	9,071 (11.39)	50,781 (63.78)	14,869 (18.67)	4,899 (6.15)	1,978 (2.48)

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