

**SUPPLEMENTAL DIGITAL CONTENT 2.** Maternal, pregnancy, and neonatal/infant outcomes

Category	Outcome	ICD-10 Code or Source	ICD-10 Description	ICD-9 Code <sup>1</sup>	Timing <sup>2</sup>
Maternal	All-cause maternal mortality, during pregnancy and up to 24 hours after delivery	KPNC EMR	—	—	GA $\geq$ 24 weeks up to 24 hours after delivery
	All-cause maternal mortality, day 2 through day 42	KPNC EMR	—	—	$\geq$ 2 days after delivery up to and including day 42
	Preterm labor	O60.*	Preterm labor	644.00, 644.03, 644.20, 644.21	GA $\geq$ 24 weeks to GA $<$ 37 weeks
	Preterm labor with preterm delivery	O60.*	Preterm labor	644.00, 644.03, 644.20, 644.21	GA $\geq$ 24 weeks to GA $<$ 37 weeks; delivery must occur $<$ 37 weeks
	Maternal sepsis	A40.*	Streptococcal sepsis	038.0, 38.2, 995.91	GA $\geq$ 24 weeks to end of pregnancy
		A41.*	Other sepsis	038.10, 038.11, 038.12, 038.19, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9, 995.91	
	Eclampsia	O15.*	Eclampsia	642.60, 642.61, 642.63, 642.64	GA $\geq$ 24 weeks up through 42 days after end of pregnancy
	Pre-eclampsia	O14.*	Pre-eclampsia	642.4*, 642.5*	GA $\geq$ 24 weeks up through 42 days after end of pregnancy
	Pregnancy-related hypertension	O13.*	Gestational [pregnancy-induced] hypertension without significant proteinuria	642.3*	GA $\geq$ 24 weeks up through 42 days after end of pregnancy
		O16.*	Unspecified maternal hypertension	642.9*	
Neonatal	Preterm premature rupture of membranes	O42.*	Premature rupture of membranes	658.1*, 658.2*	GA $\geq$ 24 weeks to GA $<$ 37 weeks
		P01.1	Newborn affected by premature rupture of membranes	761.1	
	Labor protraction and arrest disorders	O63.*	Long labor	662.01, 662.11, 662.21, 662.31	GA $\geq$ 24 weeks up through 7 days after end of pregnancy
		O64.*	Obstructed labor due to malposition and malpresentation of fetus	652.21, 652.41, 652.81, 652.91, 660.01, 660.31	

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	Gestational diabetes mellitus	O24.4*	Gestational diabetes mellitus	648.81, 648.82, 648.83, 648.84	GA $\geq$ 24 weeks up through 42 days after end of pregnancy
	Intrauterine growth restriction/poor fetal growth	O36.5*	Maternal care for known or suspected poor fetal growth	656.50, 656.51, 656.53	GA $\geq$ 24 weeks up through 7 days after end of pregnancy, or birth through 7 day of life in the corresponding infant record
		P05.*	Disorders of newborn related to slow fetal growth and fetal malnutrition	764.*	
	Vaginal or intrauterine hemorrhage	O46.0*	Antepartum hemorrhage with coagulation defect	641.30, 641.31, 641.33	GA $\geq$ 24 weeks up through 7 days after end of pregnancy
		O46.8*	Other antepartum hemorrhage	641.80, 641.81, 641.83	
		O46.9*	Antepartum hemorrhage, unspecified	641.90, 641.91, 641.93	
		O67.0*	Intrapartum hemorrhage with coagulation defect	641.31	
		O67.8*	Other intrapartum hemorrhage	641.81	
		O67.9*	Intrapartum hemorrhage, unspecified	641.91	
		O20.0*	Threatened abortion	640.03	
		O20.8*	Other hemorrhage in early pregnancy	640.83	
		O20.9*	Hemorrhage in early pregnancy, unspecified	640.93	
	Oligohydramnios	O41.0*	Oligohydramnios	658.0*	GA $\geq$ 24 weeks up through 7 days after end of pregnancy, or birth through 7 day of life in the corresponding infant record
		P01.2	Newborn affected by oligohydramnios	761.2	
	Polyhydramnios	O40.*	Polyhydramnios	657.0*	GA $\geq$ 24 weeks up through 7 days after end of pregnancy, or birth through 7 day of life in the corresponding infant record
		P01.3	Newborn affected by polyhydramnios	761.3	
	Liver and biliary tract disorders in pregnancy, childbirth, and the puerperium	O26.6*	Liver and biliary tract disorders in pregnancy, childbirth and the puerperium	646.70, 646.71, 646.73, 646.84	GA $\geq$ 24 weeks up through 42 days after end of pregnancy
	Obstetric cholestasis	(Internal KPNC codes with “cholestasis” keyword, excluding any descriptions that have	—	—	GA $\geq$ 24 weeks up through 7 days after end of pregnancy

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		“neonatal” in the description )			
Pregnancy	Fetal death/still birth	O02.*	Other abnormal products of conception	631.*	GA $\geq$ 24 weeks to end of pregnancy
		O03.*	Spontaneous abortion	634.*	
		O04.*	Complications following (induced) termination of pregnancy	635.02, 635.12, 635.22, 635.32, 635.42, 635.52, 635.62, 635.72, 635.82	
		O36.4XX0	Maternal care for intrauterine death, not applicable or unspecified	656.41, 656.43	
		O36.4XX1	Maternal care for intrauterine death, fetus 1	656.41, 656.43	
		P95	Stillbirth	779.9	
		Z37.1	Single stillbirth	V27.1	
	Live birth	KPNC EMR	—	—	GA $\geq$ 24 weeks, live birth
	Preterm birth	KPNC EMR	—	—	GA $\geq$ 24 weeks to GA $<$ 37 weeks, live birth
Fetal asphyxia	Fetal asphyxia	O68.*	Labor and delivery complicated by abnormality of fetal acid-base balance	656.31	GA $\geq$ 24 weeks up through 7 days after end of pregnancy, or birth through 7 day of life in the corresponding infant record
		P19.0	Metabolic acidemia in newborn first noted before onset of labor	768.2	
		P19.1	Metabolic acidemia in newborn first noted during labor	768.3	
		P19.2	Metabolic acidemia noted at birth	768.4	
		P19.9	Metabolic acidemia, unspecified	768.4	
		P22.*	Respiratory distress of newborn	770.6, 770.89, 769	
Infant/Neonatal	All-cause neonatal death, birth through day 28	KPNC EMR	—	—	Birth through day 28 of life
	All-cause neonatal death, day 29 through day 90	KPNC EMR	—	—	Day 29 through day 90 of life

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	Neonatal sepsis, early onset, birth through day 7	P36*	Bacterial sepsis of newborn	771.81	Birth through day 7 of life
	Neonatal sepsis, late onset, day 8 through day 28	P36*	Bacterial sepsis of newborn	771.81	Day 8 through day 28 of life
	Congenital anomalies, major	I42.9*	Cardiomyopathy, unspecified	425.4, 425.9	Birth through day 90 of life
		P35.0*	Congenital rubella syndrome	771.0	
		P37.1*	Congenital toxoplasmosis	771.2	
		Q.*, excluding minor congenital anomalies noted below	Congenital malformations, deformations and chromosomal abnormalities		
	Congenital anomalies, minor (per CDC <sup>3</sup> ; non-Q codes were categorized by GSK)	H04.6*	Other changes of lacrimal passages	375.61, 375.69	Birth through day 90 of life
		H05.2*	Exophthalmic conditions	376.3*	
		I51.7*	Cardiomegaly	429.3	
		K40.9*	Unilateral inguinal hernia, without obstruction or gangrene	550.90, 550.91	
		L05.9*	Pilonidal cyst and sinus without abscess	685.1	
		N44.*	Noninflammatory disorders of testis	608.2*	
		N47.*	Disorders of prepuce	607.1	
		P35.1*	Congenital cytomegalovirus infection	771.1	
		P83.5*	Congenital hydrocele	778.6	
		R01.1*	Cardiac murmur, unspecified	785.2	
		R16.0*	Hepatomegaly, not elsewhere classified	789.1	
		R16.1*	Splenomegaly, not elsewhere classified	789.2	
		Q10.1	Congenital ectropion	743.62	
		Q10.2	Congenital entropion	743.62	
		Q10.3	Other congenital malformations of eyelid	743.69	
		Q10.5	Congenital stenosis and stricture of lacrimal duct	743.65	
		Q13.0	Coloboma of iris	743.46	

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		Q13.2	Other congenital malformations of iris	743.46	
		Q13.5	Blue sclera	743.47	
		Q15.8	Other specified congenital malformations of eye	743.8	
		Q17.0	Accessory auricle	744.1	
		Q17.1	Macrotia	744.22	
		Q17.3	Other misshapen ear	744.29	
		Q17.4	Misplaced ear	744.29	
		Q17.5	Prominent ear	744.29	
		Q17.8	Other specified congenital malformations of ear	744.21	
		Q18.0	Sinus, fistula and cyst of branchial cleft	744.41, 744.42	
		Q18.1	Preauricular sinus and cyst	744.46, 744.47	
		Q18.3	Webbing of neck	744.5	
		Q18.4	Macrostomia	744.83	
		Q18.5	Microstomia	744.84	
		Q18.6	Macrocheilia	744.81	
		Q18.8	Other specified congenital malformations of face and neck	744.89	
		Q27.0	Congenital absence and hypoplasia of umbilical artery	747.5	
		Q30.2	Fissured, notched and cleft nose	748.1	
		Q30.8	Other congenital malformations of nose	748.1	
		Q35.7	Cleft uvula	749.02	
		Q38.1	Ankyloglossia	750.0	
		Q38.2	Macroglossia	750.15	
		Q38.3	Other congenital malformations of tongue	750.10, 750.11, 750.12, 750.13, 750.16, 750.19	
		Q38.4	Congenital malformations of salivary glands and ducts	750.21, 750.22, 750.23, 750.24	
		Q38.5	Congenital malformations of palate, not elsewhere classified	750.9	
		Q38.6	Other congenital malformations of mouth	750.26	

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		Q43.5	Ectopic anus	751.5	
		Q52.3	Imperforate hymen	752.42	
		Q52.4	Other congenital malformations of vagina	752.41, 752.49	
		Q52.5	Fusion of labia	752.49	
		Q52.6	Congenital malformation of clitoris	752.49	
		Q52.8	Other specified congenital malformations of female genitalia	752.49	
		Q53.1*	Undescended testicle, unilateral	752.51	
		Q53.2*	Undescended testicle, bilateral	752.51	
		Q53.9	Undescended testicle, unspecified	752.51	
		Q54.4	Congenital chordee	752.63	
		Q55.1	Hypoplasia of testis and scrotum	752.89	
		Q55.20	Unspecified congenital malformations of testis and scrotum	752.89	
		Q55.22	Retractile testis	752.52	
		Q55.61	Curvature of penis (lateral)	752.69	
		Q55.64	Hidden penis	752.65	
		Q55.69	Other congenital malformation of penis	752.69	
		Q55.9	Congenital malformation of male genital organ, unspecified	752.9	
		Q66.2*	Congenital metatarsus (primus) varus	754.52	
		Q66.3*	Other congenital varus deformities of feet	754.59	
		Q66.5*	Congenital pes planus	754.61	
		Q66.6*	Other congenital valgus deformities of feet	754.69	
		Q66.7*	Congenital pes cavus	754.71	
		Q66.8*	Other congenital deformities of feet	754.61	
		Q67.0	Congenital facial asymmetry	754.0	

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		Q67.1	Congenital compression facies	754.0	
		Q67.2	Dolichocephaly	754.0	
		Q67.3	Plagiocephaly	754.0	
		Q67.4*	Other congenital deformities of skull, face and jaw	754.0	
		Q67.6	Pectus excavatum	754.81	
		Q67.7	Pectus carinatum	754.82	
		Q67.8	Other congenital deformities of chest	754.89	
		Q68.0	Congenital deformity of sternocleidomastoid muscle	754.1	
		Q68.1	Congenital deformity of finger(s) and hand	754.89	
		Q68.2	Congenital deformity of knee	754.40, 754.41, 755.64	
		Q68.8	Other specified congenital musculoskeletal deformities	755.51, 755.52, 756.9	
		Q69.0	Accessory finger(s)	755.01	
		Q69.2	Accessory toe(s)	755.02	
		Q70.3*	Webbed toes	755.13	
		Q74.1	Congenital malformation of knee	755.64	
		Q75.0	Craniosynostosis	756.0	
		Q75.2	Hypertelorism	756.0	
		Q75.3	Macrocephaly	756.0	
		Q75.8	Other specified congenital malformations of skull and face bones	756.0	
		Q76.0	Spina bifida occulta	756.17	
		Q76.42*	Congenital lordosis	754.2	
		Q79.59	Other congenital malformations of abdominal wall	756.70, 756.79	
		Q82.5	Congenital non-neoplastic nevus	757.32	
		Q82.6	Congenital sacral dimple	757.39	
		Q82.8	Other specified congenital malformations of skin	757.2, 757.33, 757.39	

Category	Outcome	ICD-10 Code or Source	ICD-10 Description	ICD-9 Code <sup>1</sup>	Timing <sup>2</sup>	
		Q83.2	Absent nipple	757.6		
		Q83.3	Accessory nipple	757.6		
		Q83.8	Other congenital malformations of breast	757.6		
		Q84.1	Congenital morphological disturbances of hair, not elsewhere classified	757.4		
		Q84.2	Other congenital malformations of hair	757.4		
		Q84.3	Anonychia	757.5		
		Q84.5	Enlarged and hypertrophic nails	757.5		
		Q84.6	Other congenital malformations of nails	757.5		
		Q84.8	Other specified congenital malformations of integument	757.8		
		Perinatal distress	P19.*	Metabolic acidemia in newborn	Birth through day 42 of life	
			P22.0*	Respiratory distress syndrome of newborn		
			P22.1*	Transient tachypnea of newborn		
			P22.8*	Other respiratory distress of newborn		
			P22.9*	Respiratory distress of newborn, unspecified		
			R09.01*	Asphyxia		
			R09.02*	Hypoxemia		
	Extremely low birthweight (<1,000 g)	(Birthweight <1,000 g)	—	Birthweight in birth record		
		Very low birthweight (<1,000 g to <1,500 g)	(Birthweight <1,000 g to <1,500 g)	—	Birthweight in birth record	
		Low birthweight (1,500 g to <2,500 g)	(Birthweight <1,500 g to <2,500 g)	—	Birthweight in birth record	
		Small for gestational age <sup>4</sup>	(Birth percentile on Fenton scale <0.1)	—	Birthweight in birth record	
			P05.0*	Newborn light for gestational age	Birth through day 28	
				764.0*, 764.19		

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	Macrosomia <sup>4</sup>	P05.1*	Newborn small for gestational age	764.00, 764.1*	
		(Birthweight $\geq$ 4,000 g)	—	—	Birthweight in birth record
		P08.0*	Exceptionally large newborn baby	766.0	Birth through day 28
	Large for gestational age <sup>4</sup>	P08.1*	Other heavy for gestational age newborn	766.1	
		(Birth percentile on Fenton scale $>0.9$ )	—	—	Birthweight in birth record
		P08.0*	Exceptionally large newborn baby	766.0	Birth through day 28
		P08.1*	Other heavy for gestational age newborn	766.1	

<sup>1</sup> ICD-9 codes were backwards mapped using the Centers for Medicare & Medicaid Services General Equivalence Mappings (GEMS) ("ICD-9-CM to and from ICD-10-CM and ICD-10-PCS. March 2009") from the finalized set of ICD-10 codes; GEMS is available at: [https://www.cms.gov/medicare/coding/icd10/downloads/icd-10\\_gem\\_fact\\_sheet.pdf](https://www.cms.gov/medicare/coding/icd10/downloads/icd-10_gem_fact_sheet.pdf). Proposed ICD-9 codes will be used in combination where GEMS scenarios specify.

<sup>2</sup> GA: Gestational age; all pregnancies must reach  $\geq$ 24 weeks. Notes column indicates timing of the outcome or other relevant detail pertaining to the outcome.

<sup>3</sup> Centers for Disease Control and Prevention, Birth Defects Surveillance Toolkit, Supplemental Digital Content 2: External minor congenital anomalies. Available at: <https://archive.cdc.gov/#/details?url=https://www.cdc.gov/ncbddd/birthdefects/surveillancemanual/appendices/appendix-b.html>.

<sup>4</sup> Birth record weight will take precedence in determining these outcomes. ICD-9/10 codes will only be used if birthweight is missing.

Asterisk (\*) indicates a “wildcard” which can substitute for any character. For example, Q\* would capture any ICD10 code beginning with Q. P05.0\* captures any ICD10 code beginning with “P05.0”, so would include P05.00, P05.01, P05.02, etc.