eTable1: Description of congenital anomaly (CA) subgroups, associated ICD-10 codes, exclusions, and published identification methods developed for Hospital Episode Statistics (HES)

CA subgroups[c]	ICD-10 codes[d] (EUROCAT Guide 1.4)	EUROCAT exclusions	Published methods for HES data (alternative codelists)
Any CA[a]	Q-chapter, D215, D821, P350, P351, P371	Exclude all minor anomalies as specified in Guide 1.4	
Neural Tube Defects (NTD)	Q00, Q01, Q05		
Congenital hydrocephalus	Q03	Exclude hydranencephaly. Exclude association with NTD subgroups	
Congenital cataract	Q120		
Congenital Heart Defects (CHD)			
All CHD	Q20-Q26	Exclude patent ductus arteriosus (PDA) (Q250) with gestational age (GA) <37 weeks Exclude peripheral pulmonary artery stenosis (Q256) with GA <37 weeks	
Ventricular septal defect without severe CHD	Q210	Exclude if severe CHD present	
Pulmonary valve stenosis without severe CHD	Q221	Exclude if severe CHD present	
Patent ductus arteriosus (PDA) as the only CHD in term livebirths (GA 37+ weeks)	Q250	Exclude if GA<37 weeks. Exclude if another CHD present	
Severe CHD	Q200, Q201, Q203, Q204, Q212, Q213, Q220, Q224, Q225, Q226, Q230, Q232, Q233, Q234, Q251, Q252, Q262		As EUROCAT and additional procedure codes as described in Gimeno et al., 2023[1]
Atrioventricular septal defect[b]	Q212		
Tetralogy of Fallot[b]	Q213		
Hypoplastic left heart[b]	Q234		
Oro-facial clefts	Q35-Q37	Exclude if associated with holoprosencephaly or anencephaly, or Q357	Diagnosis code + procedure code for primary cleft repair (F031 or F291); see Fitzsimons et al., 2018[2]
Cleft lip	Q36	Exclude if associated with holoprosencephaly or anencephaly	As above

Cleft palate	Q35	Exclude if associated with holoprosencephaly or anencephaly, or Q357	As above
Cleft lip with cleft palate	Q37	Exclude if associated with holoprosencephaly or anencephaly, or Q357	As above
Respiratory	Q300, Q32-Q34	Exclude Q336	
Digestive System	Q38-Q45, Q790	Exclude Q381, Q382, Q400, Q401, Q430, Q444	
Anorectal Malformations	Not a EUROCAT subgroup		Diagnosis codes in hospital or death record, and/or repair procedure code. See Ford et al., 2022[3]
Hirschrung's Disease	Q431		
Gastroschisis	Q793		
Unilateral renal agenesis	Q600		
Congenital hydronephrosis	Q620		
Hypospadias	Q54	Q544	Procedure code for primary repair of hypospadias (M731) with or without a diagnostic code, excluding concomitant codes Q560-Q564, E250, E258, E259, E345, Q640, Q641. See Wilkinson et al.,2017[4]
Club foot – talipes equinovarus	Q660		
Polydactyly	Q69		
Syndactyly	Q70		
Craniosynostosis	Q750		
Chromosomal anomalies			
Down syndrome	Q90		
Turner syndrome	Q96		
Klinefelter syndrome	Q980-Q984		
Di George syndrome	D821		
Karyotype XXX (Trisomy X)	Q970		

CHD: congenital heart defect. GA: gestational age. HES: Hospital Episode Statistics. PDA: patent ductus arteriosus.

[a] Cases with more than one anomaly are only counted once

[b] Included in Severe CHD subgroup

[c] For each individual subgroup (excepting Any CA and Chromosomal anomalies), the primary analysis will be on isolated cases only (excluding those with chromosomal, genetic and multiple organ anomalies).

[d] Three-character codes indicate a range of codes where the fourth character can take any value (if defined); i.e. Q05 means Q051, Q052 through to Q059.

References

1. Gimeno L, Brown K, Harron K, Peppa M, Gilbert R, Blackburn R. Trends in survival of children with severe congenital heart defects by gestational age at birth: A population-based study using administrative hospital data for England. *PAEDIATRIC AND PERINATAL EPIDEMIOLOGY*. 2023; 37:390-400.
2. Fitzsimons KJ, Copley LP, Setakis E, Charman SC, Deacon SA, Dearden L, Van Der Meulen JH. Early academic achievement in children with isolated clefts: a population-based study in England. *Archives of Disease in Childhood*. 2018; 103:356-362.
3. Ford K, Peppa M, Zylbersztejn A, Curry JI, Gilbert R. Birth prevalence of anorectal malformations in England and 5-year survival: a national birth cohort study. *Archives of Disease in Childhood*. 2022; 107:758-766.
4. Wilkinson DJ, Green PA, Beglinger S, Myers J, Hudson R, Edgar D, Kenny SE. Hypospadias surgery in England: Higher volume centres have lower complication rates. *Journal of Pediatric Urology*. 2017; 13:481.e481-481.e486.