**Inclusion/Exclusion criteria and pathway for Coarctation patients**

# Identify Coarctation group

## Step 1: Include patients who had evidence of Coarctation diagnosis

### Diagnostic code evidence of primary diagnosis Coarctation-arch hypolasia

#### Patients who have a diagnosis code for

##### Table A Diagnosis codes Coarctation as listed for Top rank

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| **Diagnosis codes for Coarctation as listed for Top rank** |
| 092901. Aortic coarctation |
| 092911. Aortic arch hypoplasia (tubular) |
| 091517. Aortic 'annular' hypoplasia. |
| 092944.Descending thoracic or abdominal aortic coarctation. |

### Procedure evidence of primary diagnosis Coarctation

b)\_ specific procedure number 47:coarctation\_hypoplasia / Isolated coarctation/hypoplasia of aorta repair

## Step 2: Exclude patients who had more complex CHD

### Exclude patients if they had a code from Table B.

Of note, also excluded those identified as having HLHS, FUH, TGA, Pulmonary atresia, AVSD , Fallot or aortic stenosis according to the CHANPION rules, which may not be adequately captured by Table B alone.

#### Table B: Coarctation diagnosis Exclusion Codes (codes that are indicative of more complex CHD condition) either diagnosis or surgery codes

As this is a diagnosis-based analysis, we mainly use diagnostic exclusion codes with a small number of key procedure exclusion codes. This is because the procedures undertaken in these patients are variable and we aim to be inclusive to variations in management pathway.

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| **Diagnostic codes** |
| 010101. Tetralogy of Fallot |
| 010106. Pulmonary atresia + ventricular septal defect (VSD) (including Fallot type) |
| 010125. Pulmonary atresia + ventricular septal defect (VSD) + systemic-to-pulmonary collateral artery(ies) (MAPCA(s)) |
| 090525. Tetralogy of Fallot with absent pulmonary valve syndrome |
| 090726. Solitary arterial trunk (absent intrapericardial pulmonary arteries) |
| 010109. Hypoplastic left heart syndrome |
| 060101. Triscuspid atresia |
| 060201. Mitral atresia |
| 091503. Aortic atresia |
| 010114. Double inlet AV connection (double inlet ventricle) |
| 010122. Functionally univentricular heart |
| 010104. Double outlet right ventricle |
| 010124. Double outlet right ventricle: with intact ventricular septum |
| 010119. Double outlet right ventricle with non-committed ventricular septal defect |
| 010140. Double outlet right ventricle with subaortic or doubly committed ventricular septal defect without pulmonary stenosis, ventricular septal defect type |
| 010403. Double inlet RV |
| 010404. Double inlet LV |
| 020305. Solitary ventricle of indeterminate morphology |
| 070841. Ventricular imbalance: dominant left ventricle + hypoplastic right ventricle |
| 070842. Ventricular imbalance: dominant right ventricle + hypoplastic left ventricle |
| 090101. Common arterial trunk (truncus arteriosus) |
| 090200. Truncal valvar abnormality |
| 090203. Truncal valvar regurgitation |
| 092931. Interrupted aortic arch |
| 010103. Congenitally corrected transposition of great arteries (discordant AV & VA connections) |
| 010116. Partially anomalous pulmonary venous connections: Scimitar syndrome |
| 010133. Shone's syndrome: left heart obstruction at multiple sites, |
| 010503. Double outlet left ventricle |
| 050201. Cor triatriatum (divided left atrium) |
| 090401. Aortopulmonary window |
| 091600. Supravalvar aortic stenosis |
| 094101. Anomalous origin of coronary artery from pulmonary artery |
| 060134. Ebstein's malformation of tricuspid valve |
| 050601. Common atrium (virtual absence of atrial septum) |
| 060501. AVSD AV valvar abnormality |
| 060506. AVSD AV valvar regurgitation |
| 060600. Atrioventricular septal defect |
| 060601. AVSD: isolated atrial component (primum ASD)(partial) |
| 060608. AVSD: isolated ventricular component |
| 060609. AVSD: atrial & ventricular components with common AV orifice (complete) |
| 060610. AVSD: atrial & (restrictive) ventricular components + separate AV valves ('intermediate') |
| 010120. AV septal defect and Tetralogy of Fallot |
| 060726. AVSD with ventricular imbalance |
| 010117. Double outlet right ventricle: Fallot type (subaortic or doubly committed VSD & pulmonary stenosis) |
| 091501. Aortic valvar stenosis: congenital |
| 091513. Aortic valvar stenosis |
| 091592. Aortic stenosis |
| 050202. Supravalvar mitral ring |
| 060207. Mitral valvar stenosis: congenital |
| 060213. Mitral subvalvar stenosis |
| 060256. Parachute malformation of mitral valve |
| 060292. Mitral stenosis |
| 060293. Mitral valve stenosis |
| 040600. Totally anomalous pulmonary venous connection: supracardiac |
| 040805. Totally anomalous pulmonary venous connection |
| 040806. Obstructed pulmonary venous connection(s) |
| 040810. Totally anomalous pulmonary venous connection: intracardiac |
| 040820. Totally anomalous pulmonary venous connection: infracardiac |
| 040830. Totally anomalous pulmonary venous connection: mixed |
| 030104. Right isomerism ('asplenia') |
| 030105. Left isomerism ('polysplenia') |
| 010118. Double outlet right ventricle: transposition type (subpulmonary VSD) |
| 010501. Discordant VA connections (TGA) |
| 010102. Transposition of great arteries (concordant AV & discordant VA connections) & IVS |
| 070530. Subpulmonary stenosis |
| 090501. Pulmonary valvar stenosis |
| 090504. Pulmonary valvar stenosis: congenital |
| 090592. Pulmonary stenosis |
| 090511. Pulmonary atresia |
| 090512. Pulmonary atresia: imperforate valve |
| 010107. Pulmonary atresia with intact ventricular septum |
| 091701. Aortoventricular tunnel |
| 091702. Aorto - left ventricular tunnel |
| 010309 AV and or/VA connections abnormal |
| 070301. Double chambered right ventricle |
| 010405.Double inlet to solitary ventricle of indeterminate morphology. |
| 020303.Crisscross heart (twisted atrioventricular connections). |
| 060311.Congenital anomaly of right-sided atrioventricular valve in double inlet ventricle. |
| 060411.Congenital anomaly of left-sided atrioventricular valve in double inlet ventricle. |
| 090111. Common arterial trunk (truncus arteriosus) with aortic dominance and one pulmonary artery absent from trunk. isolated pulmonary artery. |
| 090112. Common arterial trunk (truncus arteriosus) with pulmonary dominance and aortic arch obstruction. |
| 090114. Common arterial trunk (truncus arteriosus) with aortic dominance and both pulmonary arteries arising from trunk. |
| 090115. Common arterial trunk (truncus arteriosus) with aortic dominance (no aortic arch obstruction). |
| 090118. Common arterial trunk (truncus arteriosus) with pulmonary dominance and interrupted aortic arch. |
| 090119. Common arterial trunk (truncus arteriosus) with pulmonary dominance and aortic coarctation. |
| 090201.Dysplasia of truncal valve. |
| 090218.Congenital truncal valvar stenosis. |
| 090219.Congenital truncal valvar regurgitation. |
| 010110.Transposition of the great arteries with concordant atrioventricular connections and ventricular septal defect. |
| 092932. Interrupted aortic arch distal to subclavian artery. type A. |
| 092933. Interrupted aortic arch between subclavian & common carotid arteries. type B. |
| 092934. Interrupted aortic arch between carotid arteries. type C. |
| 090908. Pulmonary artery from ascending aorta (hemitruncus) |
| 091010. Discontinuous (non-confluent) pulmonary arteries |
| 010126.Tetralogy of Fallot with pulmonary atresia. |
| 010157.Tetralogy of Fallot with pulmonary atresia and systemic-to-pulmonary collateral artery(ies) (MAPCA(s)). |
| 090516.Congenital pulmonary atresia. |
| 090705. Absent or atretic pulmonary trunk (main pulmonary artery). |
| 090902.Right pulmonary artery from arterial duct. |
| 090903.Right pulmonary artery from ascending aorta. |
| 090904.Left pulmonary artery from arterial duct. |
| 090905.Left pulmonary artery from ascending aorta. |
| 090911. Pulmonary artery from arterial duct. |
| 091030.Congenitally discontinuous. non-confluent right and left pulmonary arteries. |
| 091075.Absent or atretic right pulmonary artery. |
| 091077.Absent or atretic left pulmonary artery. |
| 150503. Pulmonary vein obstruction |
| 020101.Extrathoracic heart (ectopia cordis). |
| 040802.Congenital atresia of pulmonary vein(s). |
| 040804.Congenital anomaly of pulmonary vein(s). |
| 040831.Congenital pulmonary venous stenosis and-or hypoplasia. |
| 090407.Congenital aortopulmonary window. |
| 091506. Aortic valvar atresia. |
| 091618. Congenital supravalvar aortic stenosis. |
| 093134.Vascular ring of left aortic arch and right arterial duct or ligament. |
| 093135.Vascular ring of right aortic arch and left arterial duct or ligament. |
| 094103. Anomalous origin of left coronary artery from pulmonary artery (ALCAPA). |
| 094221.Anomalous aortic origin of coronary artery with ventriculo-arterial concordance. |
| 060598. Deficient mural-lateral leaflet of left ventricular component of common atrioventricular valve (left atrioventricular vale) |
| 050603.Common atrium with common atrioventricular junction. |
| 060514.Atypical common atrioventricular valve. |
| 060525. Double orifice of left ventricular component of common atrioventricular valve (left atrioventricular valve). |
| 060560.Common atrioventricular valvar regurgitation. |
| 060571.Atypical right ventricular component of common atrioventricular valve (right atrioventricular valve). |
| 060572.Atypical left ventricular component of common atrioventricular valve (left atrioventricular valve). |
| 060705. Atrioventricular septal defect (AVSD) with ventricular imbalance with dominant right ventricle and hypoplastic left ventricle. |
| 060706. Atrioventricular septal defect (AVSD) with ventricular imbalance with dominant left ventricle and hypoplastic right ventricle. |
| 060727. Atrioventricular septal defect (AVSD) with balanced ventricles. |
| 060728.Common atrioventricular junction with spontaneous fibrous closure of atrioventricular septal defect (AVSD). |
| 060736. Common atrioventricular valve with unbalanced commitment of valve to ventricles. |
| 060737.Common atrioventricular valve with unbalanced commitment of valve to right ventricle. |
| 060738.Common atrioventricular valve with unbalanced commitment of valve to left ventricle. |
| 060104. Tricuspid annular hypoplasia. |
| 060105. Overriding tricuspid valve. |
| 060107. Congenital tricuspid valvar stenosis. |
| 060111. Congenital anomaly of tricuspid valve. |
| 060126. Tricuspid atresia with absent valvar annulus (connection-junction). |
| 060202. Mitral atresia with imperforate mitral valve. |
| 060203.Dysplasia of mitral valve. |
| 060204. Mitral annular hypoplasia. |
| 060205. Overriding mitral valve. |
| 060211.Congenital anomaly of mitral valve. |
| 060221.Congenital anomaly of mitral subvalvar apparatus. |
| 060222. Congenital mitral subvalvar stenosis. |
| 060226. Mitral atresia with absent valvar annulus (connection-junction). |
| 060272. Congenital mitral valvar prolapse. |
| 040807. Anomalous pulmonary venous connection. |
| 090711. Pulmonary trunk hypoplasia |
| 090713. Supravalvar pulmonary trunk stenosis |
| 091001. Pulmonary arterial stenosis |
| 091006. Peripheral pulmonary arterial stenoses: at-beyond hilar bifurcation |
| 091007. Central pulmonary arterial stenosis: proximal to hilar bifurcation |
| 091025. Right pulmonary arterial stenosis |
| 091026. Left pulmonary arterial stenosis |
| 070520.Congenital right ventricular outflow tract obstruction. |
| 070532.Congenital subpulmonary stenosis. |
| 090505.Pulmonary 'annular' hypoplasia. |
| 090715.Congenital supravalvar pulmonary stenosis. |
| 090716.Congenital anomaly of pulmonary arterial tree. |
| 090719. Congenital pulmonary trunk (main pulmonary artery) anomaly. |
| 090720. Congenital pulmonary trunk hypoplasia. |
| 091027.Congenital pulmonary arterial branch stenosis. |
| 091028.Congenital right pulmonary arterial stenosis. |
| 091029. Congenital left pulmonary arterial stenosis. |
| 091037.Congenital central pulmonary arterial stenosis or hypoplasia proximal to hilar bifurcation. |
| 091038. Congenital peripheral pulmonary arterial stenoses or hypoplasia at or beyond hilar bifurcation. |
| **Procedure exclusion codes (that have a special link to this diagnosis and therefore can lead to patients being misallocated)** |
| 120903: Damus-Kaye-Stansel type procedure: pulmonary trunk to aorta end/side anastomosis, |
| 121004: Application of bilateral pulmonary arterial bands & transcatheter placement of stent in arterial duct, |
| 121605: Balloon dilation of aortic valve, |
| 121602: Aortic valvotomy: open, |
| 120712: Left ventricular outflow tract obstruction relief: complex (Konno etc), |
| 122300: Anomalous coronary artery (eg ALCAPA) repair, |
| 120806: Ventricular septal defect (VSD) enlargement, |
| 121629: Aortic valvar replacement using mechanical prosthesis, |
| 123103: Modified right Blalock interposition shunt, |
| 123146:Modified Blalock interposition shunt, |
| 123720: Double lung transplant |
| 122920: Double outlet right ventricle repair, |
| 120157: Atrial baffle procedure, |
| 121604: Aortic valvotomy: closed, |
| 121663: Aortic root replacement using homograft, |
| 120605: Balloon dilation of right ventricular outflow tract, |
| 123134: Occlusion of systemic-to-pulmonary arterial shunt by transluminal device-embolus, |
| 123119: Balloon dilation of systemic-to-pulmonary arterial shunt, |
| 121302: Pulmonary valvotomy: open, |
| 120835: Supravalvar aortic stenosis repair, |
| 120002: Partially anomalous pulmonary venous connection repair, |
| 120400: Atrioventricular septal defect procedure, |
| **Specific Procedure exclusion list (exclude patients if had the following allocated specific procedure in records, using specific procedure algorithm of NCHDA)** |
| 01:norwood |
| 04:common\_arterial\_trunk\_aorta\_repair |
| 05:common\_arterial\_trunk\_repair |
| 06:cctga\_repair\_a |
| 07:cctga\_repair\_b |
| 08:atrial\_switch |
| 09:rastelli\_rev |
| 10:transposition\_complex |
| 11:transposition\_arch |
| 12:transposition\_vsd |
| 13:transposition |
| 14:tapvc\_shunt |
| 15:tapvc |
| 16:fontan |
| 17:glenn |
| 18:avsd\_fallot\_a |
| 19:avsd\_fallot\_b |
| 20:avsd\_complete |
| 21:avsd\_partial |
| 22:mitral\_valve\_replacement |
| 23:ross\_konno\_a |
| 24:ross\_konno\_b |
| 25:ross |
| 26:aortic\_root\_replacement |
| 27:aortic\_valve\_replacement |
| 28:tricuspid\_valve\_replacement |
| 29:pulmonary\_valve\_replacement |
| 33:pulmonary\_atresia\_vsd |
| 34:mapca\_unifocalisation |
| 35:absent\_pulmonary\_valve\_syndrome |
| 36:fallot |
| 37:rv\_pa\_conduit |
| 38:vsd\_rvoto |
| 39:supra\_valvar\_aortic\_stenosis |
| 41:ap\_window |
| 42:anomalous\_coronary |
| 43:cor\_triatriatum |
| 45:arterial\_shunt |
| 46:iaa |
| 48:pulmonary\_vein\_stenosis |
| 49:conduit\_replacement |
| 58:pda\_stent |
| 59:pulmonary\_valve\_replacement\_transluminal |
| 60:rvot\_stent |
| 61:pulmonary\_valve\_radiofrequency |
| 62:blade\_atrial\_septostomy |
| 63:balloon\_atrial\_septostomy |
| 64:pulmonary\_vein\_intervention |
| 69:balloon\_pulmonary\_valve |
| 74:pa\_stent |
| 75:pa\_ballooning |
| 76:mapca\_transluminal |
| 77:conduit\_balloon\_stent |

### Exclude patients who had heart transplant then Coarctation repair (exclude after pathway analysis)

# Step 3 Identify Coarctation diagnosis - Pathway

Consider patients selected in [step 1](#_Step_1:_Diagnostic) and [step 2](#_Step_2:_Procedure) and then assign pathway type to each procedure.

The individual types of pathway procedure are ‘Stage one palliative procedures’ , ‘reparative procedures for Coarctation diagnosis’ and “VSD closure” all of these are biventricular procedures.

If multiple types of pathway procedure happened in the same record, then we mark the individual procedure as the most complex one, i.e., the hierarchy/complexity order is reparative procedure for Coarctation diagnosis then VSD closure then palliative procedures.

The first occurrence of a pathway procedure Identifies the occurrence of this type of pathway procedure. For any of the defined pathway procedures, palliative and reparative, only the first occurrence will be the pathway procedure of that type. Other subsequent occurrence of these individual procedures will be identified as re-do and off pathway. Patients can have up to 2 pathway procedures in whole history.  Of note, additional reparative or stage one procedure(s) after final expected reparative procedure will be identified as additional or off pathway.

Patients who have a procedure before the first pathway procedure are considered to have had a ‘pre-pathway procedure’. These will be described.

Patients who have no pathway procedures will be described.

Then patients who have a pathway procedure and then have additional post pathway / off pathway procedures which will be described divided by the stage at which they occur.

## Pathway applicable to Coarctation diagnosis

Assign pathway type to each procedure:

### Palliative procedures applicable in Coarctation diagnosis

Look for staged palliative procedures, i.e., palliative first stage procedure

### Table C: Palliative stage one type procedures that may occur in Coarctation diagnosis only banding type.

This is a pre pathway if it occurs without any Table D reparative code

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| **Palliative procs in Coarctation – Type** |
| 121402: Pulmonary trunk band (PA band) |

### Reparative procedure for Coarctation diagnosis (in hierarchy)

The pathway is determined by the first pathway procedure that occurs for the patient.

Coarctation repair can occur with or without VSD repair. The reparative procedure has 3 types (type A, B and C):

#### Type A Coarctation with VSD

Coarctation with VSD reparative procedure is a Table D code PLUS a Table E VSD closure code in the same operation.

#### Type B Coarctation plus PA band

Coarctation reparative procedure consisting of a Table D code and no Table E VSD code, and occur with Table C PA band code

#### Type C Coarctation in isolation

Reparative procedure consisting of a Table D code and no Table E VSD code and no Table C PA band code

#### Table D: Coarctation arch repair procedures

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| **Stage one Type B: Coarctation arch repair** |
| 121800: Coarctation-hypoplasia of aorta repair |
| 121801: Aortic coarctation-hypoplasia repair by resection & end to end anastomosis |
| 121802: Aortic coarctation-hypoplasia repair by patch aortoplasty |
| 121803: Aortic coarctation-hypoplasia repair by subclavian flap aortoplasty |
| 121804: Balloon dilation of native aortic coarctation-hypoplasia |
| 121808: Balloon dilation of aortic recoarctation, |
| 121810: Aortic coarctation-hypoplasia repair by resection & extended end to end anastomosis |
| 121815: Aortic coarctation-hypoplasia repair by resection & insertion of tube graft |
| 121827: Aortic coarctation transluminal obstruction relief |
| 121830: Aortic arch repair |
| 121817. Stent placement at site of aortic coarctation, |
| 121822. Stent placement at site of aortic recoarctation, |
| 121827. Aortic coarctation transluminal obstruction relief, |
| 121848. Stent placement at site of native aortic coarctation-hypoplasia, |

#### Table E: Reparative procedures for VSD

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|  |
| 120801. Ventricular septal defect (VSD) closure, |
| 120802. Ventricular septal defect (VSD) closure by direct suture, |
| 120803. Ventricular septal defect (VSD) closure using patch, |
| 120807. Ventricular septal defect (VSD) closure with transluminal device, |
| 120816. Closure of multiple ventricular septal defect (VSD)s, |
| 120828. Intraoperative ventricular septal defect (VSD) closure with transluminal device (hybrid approach), |

### VSD closure

Table E VSD procedure and no coarctation code Table D at time of procedure. VSD closure is only allowed as pathway if there is no type A reparative procedure before it. If type A reparative occurs first, then this VSD closure is off pathway as it is a redo

# Step 4: Identify diagnostic subgroups

There are two subgroups.

## Coarctation plus VSD

If there is ever a code in Table E OR there is a VSD diagnostic code from Table F OR there is PA band procedure in records then the subgroup is Coarctation PLUS VSD

##### Table F Diagnosis codes VSD as listed for Top rank

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| **Diagnosis codes for VSD as listed for Top rank** |
| 071000. VSD |
| 071001. Perimembranous VSD |
| 071012. VSD + malaligned outlet septum |
| 071101. Muscular VSD |
| 071200. Subarterial VSD |
| 071201. Doubly committed subarterial VSD |
| 071402. Communication between left ventricle + right atrium (Gerbode defect) |
| 071405. Inlet VSD |
| 071501. Tiny VSD (Maladie de Roger) |
| 071504. Multiple VSDs |
| 071505. Single VSD |
| 071002.Inlet perimembranous ventricular septal defect (VSD) without atrioventricular malalignment without a common atrioventricular junction. |
| 071004. Outlet perimembranous ventricular septal defect (VSD) with anteriorly malaligned of outlet septum. |
| 071017.Outlet ventricular septal defect (VSD) with anteriorly malaligned outlet septum. |
| 071018.Outlet ventricular septal defect (VSD) with posteriorly malaligned outlet septum. |
| 071019. Outlet perimembranous ventricular septal defect (VSD) with posteriorly malaligned outlet septum. |
| 071102.Inlet muscular ventricular septal defect (VSD). |
| 071103.Trabecular muscular ventricular septal defect (VSD) apical. |
| 071104.Trabecular muscular ventricular septal defect (VSD) midseptal. |
| 071105.Trabecular muscular ventricular septal defect (VSD)s multiple (Swiss cheese septum). |
| 071106. Outlet muscular ventricular septal defect (VSD) without malalignment. |
| 071107.Trabecular muscular ventricular septal defect (VSD) anterosuperior. |
| 071112.Trabecular muscular ventricular septal defect (VSD) postero-inferior. |
| 071115. Outlet muscular ventricular septal defect (VSD) with anteriorly malaligned outlet septum. |
| 071116. Outlet muscular ventricular septal defect (VSD) with posteriorly malaligned outlet septum. |
| 071202. Doubly committed juxta-arterial ventricular septal defect (VSD) without malalignment and with muscular postero-inferior rim. |
| 071203. Doubly committed juxta-arterial ventricular septal defect (VSD) without malalignment and with perimembranous extension. |
| 071205. Doubly committed juxta-arterial ventricular septal defect (VSD) with anteriorly malaligned fibrous outlet septum and perimembranous extension. |
| 071206. Doubly committed juxta-arterial ventricular septal defect (VSD) with posteriorly malaligned fibrous outlet septum and perimembranous extension. |
| 071207. Doubly committed juxta-arterial ventricular septal defect (VSD) with anteriorly malaligned fibrous outlet septum and muscular postero-inferior rim. |
| 071208. Doubly committed juxta-arterial ventricular septal defect (VSD) with posteriorly malaligned outlet septum and muscular postero-inferior rim. |
| 071209.Outlet ventricular septal defect (VSD) without malalignment. |
| 071212.Doubly committed juxta-arterial ventricular septal defect (VSD) with anteriorly malaligned fibrous outlet septum. |
| 071213.Doubly committed juxta-arterial ventricular septal defect (VSD) with posteriorly malaligned fibrous outlet septum. |
| 071406.Inlet perimembranous ventricular septal defect (VSD) with atrioventricular septal malalignment and without common atrioventricular junction. |

## Isolated Coarctation

If there is no code from either table E or Table F then the diagnosis subgroup is isolated Coarctation .

# Step 6: Remove patients according to the violation rules.

I think we need to discuss with the wider team how to report these patients in champion research project. In a future audit these would be reported to centres for correction and once corrected could then be added back into the analysis.

## Generic rule: Exclude patients if

* had only non-contributory procedure records via activity algorithm.

## Coarctation specific violation rule:

* had VSD closure and no Coarctation reparative procedure in history.

# Step 7: Flagging rules to centre

## Patients with suspected miscoded/missing data

NONE

## Minor data errors or patients with unusual records

Patients can be included in analysis.

### Generic flagging rule:

Flag patients if there is a cardiopulmonary bypass surgery as a pre-pathway procedure - please check this patient’s diagnostic and procedure coding is correct .

### Coarctation specific rule:

* Patient who had VSD closure in isolation as pathway and then Coarctation repair.
* Patients who had PA band with no VSD evidence in records (Table E and Table F).
* Coarctation plus VSD patients who had neither PA banding nor VSD closure in records.