

Congenital aortic insufficiency (bicuspid aortic valve)		Thoracic and thoracoabdominal aortic dissections and ruptures	
746.4, Q23.1		441.01, 441.03, I71.01, I71.03, 441.1, 441.10, 441.6, 441.60, I71.1, I71.5	
Aortic valve interventions			
Repair	Transcatheter aortic valve replacement	Surgical aortic valve replacement	Ross procedure
Only 02QF0ZZ, 35.11, 027F0ZZ, 02NF0ZZ	02RF38Z, 02RF3JZ, 02RF3KZ, 02RF37Z, 02RF38Z, 02RF3JZ, 02RF3KZ, 35.05	02RF07Z, 02RF08Z, 02RF0JZ, 02RF0KZ, 35.21, 35.22	02RF07Z, 35.21 + Pulmonary Valve Intervention or Right Ventricle to Pulmonary Artery Conduit
Congenital heart disease			
Diagnosis	ICD9/10 Code	Diagnosis	ICD9/10 Code
Ventricular septal defect	745.4, Q21.0	Ebstein's anomaly	746.2, Q22.5
Pulmonary infundibular stenosis	Q24.3	Supravalvar aortic stenosis	756.81, Q25.3
Coarctation of the aorta	747.10, Q25.1	Partial anomalous pulmonary venous return	747.42, Q26.3
Atrial ventricular septal defect	745.69, Q21.2	Tetralogy of Fallot	745.2, Q21.3
Congenital pulmonary valve stenosis	746.02, Q22.1	Congenital pulmonary valve insufficiency	Q22.2
Congenital stenosis of aortic valve	746.3, Q23.0	Congenital mitral valve stenosis	Q23.2
Other/unspecified congenital malformation of aortic or mitral valve	Q23.8, Q23.9	Congenital subaortic stenosis	Q24.4
Coarctation of the pulmonary artery	Q25.71	Endocardial cushion defect	745.69
Total anomalous pulmonary venous return	747.41, Q26.2	Truncus arteriosus	745.0, Q20.0
Double outlet right ventricle	745.11, Q20.1	D-transposition of the great arteries	745.10, Q20.3
Other single ventricle	745.3, 746.1, Q20.4, Q22.6	Discordant atrial-ventricular connection	Q20.5
Atrial isomerism	Q20.6	Interruption of the Aortic arch	747.11, Q25.21
Congenitally corrected transposition of the great arteries	745.12	Hypoplastic left heart syndrome	746.7, Q23.5
Pulmonary artery atresia	Q25.5		
Risk factors			
Turner syndrome	758.6, Q96.9	Marfan syndrome	759.82, Q87.40, Q87.410, Q87.418, Q87.42, Q87.43
Elhers-Danlos syndrome	756.83, Q79.6		
Hypertension		Atherosclerosis (non-coronary)	
401.0, 401.1, 401.9, 402.00, 402.01, 402.10, 402.11, 402.90, 402.91, 403.00, 403.01, 403.10, 403.11, 403.90, 403.91, 404.00, 404.01, 404.02, 404.03, 404.10, 404.11, 404.12, 404.13, 404.90, 404.91, 404.92, 404.93, 405.01, 405.09, 405.11, 405.19, 405.91, 405.99, 642, I10, I11.0, I11.9, I12.0, I12.9, I13.0, I13.10, I13.11, I13.2, I15.0, I15.1, I15.2, I15.8, I15.9, I16.0, I16.1, I16.9, O10.011, O10.012, O10.013, O10.019, O10.02, O10.03, O10.111, O10.112, O10.113, O10.119, O10.12, O10.13, O10.211, O10.212, O10.213, O10.219, O10.22, O10.23, O10.311, O10.312, O10.313, O10.319, O10.32, O10.33, O10.411, O10.412, O10.413, O10.419, O10.42, O10.43, O109.11, O10.912, O10.913, O10.919, O10.92, O10.93, O11.1, O11.2, O11.3, O11.4, O11.5, O11.9, O13.1, O13.2, O13.3, O13.4, O13.5, O13.9, O16.1, O16.2, O16.3, O16.4, O16.5, O16.9		440.0, 440.1, 440.4, 440.8, 440.9, 440.20, 440.21, 440.22, 440.23, 440.24, 440.29, 440.30, 440.31, 440.32, I70.0, I70.1, I70.201, I70.202, I70.203, I70.208, I70.209, I70.211, I70.212, I70.213, I70.218, I70.219, I70.221, I70.222, I70.223, I70.228, I70.229, I70.231, I70.232, I70.233, I70.234, I70.235, I70.238, I70.239, I70.241, I70.242, I70.243, I70.244, I70.245, I70.248, I70.249, I70.25, I70.261, I70.262, I70.263, I70.268, I70.269, I70.291, I70.292, I70.293, I70.298, I70.299, I70.301, I70.302, I70.303, I70.308, I70.309, I70.311, I70.312, I70.313, I70.318, I70.319, I70.321, I70.322, I70.323, I70.328, I70.329, I70.331, I70.332, I70.333, I70.334, I70.335, I70.338, I70.339, I70.341, I70.342, I70.343, I70.344, I70.345, I70.348, I70.349, I70.35, I70.361, I70.362, I70.363, I70.368, I70.369, I70.391, I70.392, I70.393, I70.398, I70.399, I70.401, I70.402, I70.403, I70.408, I70.409, I70.411, I70.412, I70.413, I70.418, I70.419, I70.421, I70.422, I70.423, I70.428, I70.429, I70.431, I70.432, I70.433, I70.434, I70.435, I70.438, I70.439, I70.441, I70.442, I70.443, I70.444, I70.445, I70.448, I70.449, I70.45, I70.461, I70.462, I70.463, I70.468, I70.469, I70.491, I70.492, I70.493, I70.498, I70.499, I70.501, I70.502, I70.503, I70.508, I70.509, I70.511, I70.512, I70.513, I70.518, I70.519, I70.521, I70.522, I70.523, I70.528, I70.529, I70.531, I70.532, I70.533, I70.534, I70.535, I70.538, I70.539, I70.541, I70.542, I70.543, I70.544, I70.545, I70.548, I70.549, I70.55, I70.561, I70.562, I70.563, I70.568, I70.569, I70.591, I70.592, I70.593, I70.598, I70.599, I70.601, I70.602, I70.603, I70.608, I70.609, I70.611, I70.612, I70.613, I70.618, I70.619, I70.621, I70.622, I70.623, I70.628, I70.629, I70.631, I70.632, I70.633, I70.634, I70.635, I70.638, I70.639, I70.641, I70.642, I70.643, I70.644, I70.645, I70.648, I70.649, I70.65, I70.661, I70.662, I70.663, I70.668, I70.669, I70.691, I70.692, I70.693, I70.698, I70.699, I70.701, I70.702, I70.703, I70.708, I70.709, I70.711, I70.712, I70.713, I70.718, I70.719, I70.721, I70.722, I70.723, I70.728, I70.729, I70.731, I70.732, I70.733, I70.734, I70.735, I70.738, I70.739, I70.741, I70.742, I70.743, I70.744, I70.745, I70.748, I70.749, I70.75, I70.761, I70.762, I70.763, I70.768, I70.769, I70.791, I70.792, I70.793, I70.798, I70.799, I70.8, I70.90, I7091	
Lipid disorder		Diabetes	

<p>272.0, 272.1, 272.2, 272.3, 272.4, 272.5, 272.6, 272.7, 272.8, 272.9, E78.4, E78.00, E78.01, E78.2, E78.49, E78.5</p>	<p>250.00, 250.01, 250.02, 250.03, 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.40, 250.41, 250.42, 250.43, 250.50, 250.51, 250.52, 250.53, 250.60, 250.61, 250.62, 250.63, 250.70, 250.71, 250.72, 250.73, 250.80, 250.81, 250.82, 250.83, 250.90, 250.91, 250.92, 250.93, O24.011, O24.012, O24.013, O24.019, O24.02, O24.03, O24.111, O24.112, O24.113, O24.119, O24.12, O24.13, O24.311, O24.312, O24.313, O24.319, O24.32, O24.33, O24.811, O24.812, O24.813, O24.819, O24.82, O24.83, O24.911, O24.912, O24.913, O24.919, O24.92, O24.93, E08.00, E08.01, E08.10, E08.11, E08.21, E08.22, E08.29, E08.311, E08.319, E08.3211, E08.3212, E08.3213, E08.3219, E08.3291, E08.3292, E08.3293, E08.3299, E08.3311, E08.3312, E08.3313, E08.3319, E08.3391, E08.3392, E08.3393, E08.3399, E08.3411, E08.3412, E08.3413, E08.3419, E08.3491, E08.3492, E08.3493, E08.3499, E08.3511, E08.3512, E08.3513, E08.3519, E08.3521, E08.3522, E08.3523, E08.3529, E08.3531, E08.3532, E08.3533, E08.3539, E08.3541, E08.3542, E08.3543, E08.3549, E08.3551, E08.3552, E08.3553, E08.3559, E08.3591, E08.3592, E08.3593, E08.3599, E08.36, E08.37X1, E08.37X2, E08.37X3, E08.37X9, E08.39, E08.40, E08.41, E08.42, E08.43, E08.44, E08.49, E08.51, E08.52, E08.59, E08.610, E08.618, E08.620, E08.621, E08.622, E08.628, E08.630, E08.638, E08.641, E08.649, E08.65, E08.69, E08.8, E08.9, E10.10, E10.11, E10.21, E10.22, E10.29, E10.311, E10.319, E10.3211, E10.3212, E10.3213, E10.3219, E10.3291, E10.3292, E10.3293, E10.3299, E10.3311, E10.3312, E10.3313, E10.3319, E10.3391, E10.3392, E10.3393, E10.3399, E10.3411, E10.3412, E10.3413, E10.3419, E10.3491, E10.3492, E10.3493, E10.3499, E10.3511, E10.3512, E10.3513, E10.3519, E10.3521, E10.3522, E10.3523, E10.3529, E10.3531, E10.3532, E10.3533, E10.3539, E10.3541, E10.3542, E10.3543, E10.3549, E10.3551, E10.3552, E10.3553, E10.3559, E10.3591, E10.3592, E10.3593, E10.3599, E10.36, E10.37X1, E10.37X2, E10.37X3, E10.37X9, E10.39, E10.40, E10.41, E10.42, E10.43, E10.44, E10.49, E10.51, E10.52, E10.59, E10.610, E10.618, E10.620, E10.621, E10.622, E10.628, E10.630, E10.638, E10.641, E10.649, E10.65, E10.69, E10.8, E10.9, E11.00, E11.01, E11.10, E11.21, E11.22, E11.29, E11.311, E11.319, E11.3211, E11.3212, E11.3213, E11.3219, E11.3291, E11.3292, E11.3293, E11.3299, E11.3311, E11.3312, E11.3313, E11.3319, E11.3391, E11.3392, E11.3393, E11.3399, E11.3411, E11.3412, E11.3413, E11.3419, E11.3491, E11.3492, E11.3493, E11.3499, E11.3511, E11.3512, E11.3513, E11.3519, E11.3521, E11.3522, E11.3523, E11.3529, E11.3531, E11.3532, E11.3533, E11.3539, E11.3541, E11.3542, E11.3543, E11.3549, E11.3551, E11.3552, E11.3553, E11.3559, E11.3591, E11.3592, E11.3593, E11.3599, E11.36, E11.37X1, E11.37X2, E11.37X3, E11.37X9, E11.39, E11.40, E11.41, E11.42, E11.43, E11.44, E11.49, E11.51, E11.52, E11.59, E11.610, E11.618, E11.620, E11.621, E11.622, E11.628, E11.630, E11.638, E11.641, E11.649, E11.65, E11.69, E11.8, E11.9, E13.00, E13.01, E13.10, E13.11, E13.21, E13.22, E13.29, E13.311, E13.319, E13.3211, E13.3212, E13.3213, E13.3219, E13.3291, E13.3292, E13.3293, E13.3299, E13.3311, E13.3312, E13.3313, E13.3319, E13.3391, E13.3392, E13.3393, E13.3399, E13.3411, E13.3412, E13.3413, E13.3419, E13.3491, E13.3492, E13.3493, E13.3499, E13.3511, E13.3512, E13.3513, E13.3519, E13.3521, E13.3522, E13.3523, E13.3529, E13.3531, E13.3532, E13.3533, E13.3539, E13.3541, E13.3542, E13.3543, E13.3549, E13.3551, E13.3552, E13.3553, E13.3559, E13.3591, E13.3592, E13.3593, E13.3599, E13.36, E13.37X1, E13.37X2, E13.37X3, E13.37X9, E13.39, E13.40, E13.41, E13.42, E13.43, E13.44, E13.49, E13.51, E13.52, E13.59, E13.610, E13.618, E13.620, E13.621, E13.622, E13.628, E13.630, E13.638, E13.641, E13.649, E13.65, E13.69, E13.8, E13.9</p>
<p>Smoking</p>	<p>Aortic aneurysm or dilation</p>
<p>V15.82, 305.1, 649.00, 649.01, 649.02, 649.03, 649.04, 989.84, O99.330, O99.331, O99.332, O99.333, O99.334, O99.335, T65.221A, T65.221D, T65.221S, T65.222A, T65.222D, T65.222S, T65.223A, T65.223D, T65.223S, T65.224A, T65.224D, T65.224S, F17.210, F17.211, F17.213, F17.218, F17.219, Z71.6, Z72.0</p>	<p>93.0, 441.7, 441.2, A52.01, I71.2, I71.6, Q25.43, Q25.44, 447.71, 447.73, I77.810, I77.812</p>
<p>Coronary artery bypass</p>	<p>Right ventricle to pulmonary artery conduit</p>
<p>36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 210093, 02100A3, 02100J3, 02100K3, 02100Z3, 210493, 02104A3, 02104J3, 02104K3, 02104Z3, 021009W, 02100AW, 02100JW, 02100KW, 021049W, 02104AW, 02104JW, 02104KW, 021109W, 02110AW, 02110JW, 02110KW, 021149W, 02114AW, 02114JW, 02114KW, 021209W, 02120AW, 02120JW, 02120KW, 021249W, 02124AW, 02124JW, 02124KW, 021309W, 02130AW, 02130JW, 02130KW, 021349W, 02134AW, 02134JW, 02134KW, 210098, 210099, 021009C, 02100A8, 02100A9, 02100AC, 02100J8, 02100J9, 02100JC, 02100K8, 02100K9, 02100KC, 02100Z8, 02100Z9, 02100ZC, 0210498, 0210499, 021049C, 02104A8, 02104A9, 02104AC, 02104J8, 02104J9, 02104JC, 02104K8, 02104K9, 02104KC, 02104Z8, 02104Z9, 02104ZC, 0211098, 0211099, 021109C, 02110A8, 02110A9, 02110AC, 02110J8, 02110J9, 02110JC, 02110K8, 02110K9, 02110KC, 02110Z8, 02110Z9, 02110ZC, 0211498, 0211499, 021149C, 02114A8, 02114A9, 02114AC, 02114J8, 02114J9, 02114JC, 02114K8, 02114K9, 02114KC, 02114Z8, 02114Z9, 02114ZC, 021209C, 02120AC, 02120JC, 02120KC, 02120ZC, 021249C, 02124AC, 02124JC, 02124KC, 02124ZC, 021309C, 02130AC, 02130JC, 02130KC, 02130ZC, 021349C, 02134AC, 02134JC, 02134KC, 02134ZC, 021009F, 02100AF, 02100JF, 02100KF, 02100ZF, 021049F, 02104AF, 02104JF, 02104KF, 02104ZF, 0210093, 02100A3, 02100J3, 02100K3, 02100Z3, 0210493, 02104A3, 02104J3, 02104K3, 02104Z3</p>	<p>35.92, 021K09P, 021K09Q, 021K09R, 021K0AP, 021K0AQ, 021K0AR, 021K0JP, 021K0JQ, 021K0JR, 021K0KP, 021K0KQ, 021K0KR, 021K0ZP, 021K0ZQ, 021K0ZR, 021K49P, 021K49Q, 021K49R, 021K4AP, 021K4AQ, 021K4AR, 021K4JP, 021K4JQ, 021K4JR, 021K4KP, 021K4KQ, 021K4KR, 021K4ZP, 021K4ZQ, 021K4ZR, 021L0ZW, 021L4ZW</p>

Outcomes	
Permanent pace maker	Temporary pacing
50, 53, 37.80, 37.81, 37.82, 37.83, 02H40JZ, 02H40NZ, 02H43JZ, 02H43NZ, 02H44JZ, 02H44NZ, 02H60JZ, 02H60NZ, 02H63JZ, 02H63NZ, 02H64JZ, 02H64NZ, 02H70JZ, 02H70NZ, 02H73JZ, 02H73NZ, 02H74JZ, 02H74NZ, 02HK0JZ, 02HK0NZ, 02HK3JZ, 02HK3NZ, 02HK4JZ, 02HK4NZ, 02HLOJZ, 02HLONZ, 02HL3JZ, 02HL3NZ, 02HL4JZ, 02HL4NZ, 02HN0JZ, 02HN3JZ, 02HN4JZ, 0JH604Z, 0JH605Z, 0JH606Z, 0JH607Z, 0JH634Z, 0JH635Z, 0JH636Z, 0JH637Z, 0JH804Z, 0JH805Z, 0JH806Z, 0JH807Z, 0JH834Z, 0JH835Z, 0JH836Z, 0JH837Z	37.78, 5A1213Z, 5A1223Z
Ventricular assist device	Temporary mechanical circulatory support
02HA0QZ, 02HA3QZ, 02HA4QZ, 37.52, 37.66	5A02116, 5A0211D, 5A02216, 5A0221D, 02HA3RZ, 37.68, 02HA0RS, 02HA3RS, 02HA4RS, 5A02116, 5A02216, 02HA0RZ, 02HA4RZ, 5A02216, 37.60, 37.65
Extracorporeal membrane oxygenation	Ventilator support > 96 hours
5A15223, 5A1522F, 5A1522G, 5A1522H, 39.65	5A1955Z, 96.72
Acute renal failure	
N17.0, N17.1, N17.2, N17.8, N17.9, 584.5, 584.6, 584.7, 584.8, 584.9	

Figure S1 ICD 9/10 diagnosis and procedure codes utilized to identify diagnoses and procedures analyzed.