

Supplemental Table 1. ICD-9 and ICD-10 Codes

ACHD Category	Diagnosis	ICD-9 Diagnosis or Procedure Codes	ICD-10 Diagnosis or Procedure Code
Single	Common Truncus	745.0	Q20.0
Two	Complete Transposition of Great Vessels	745.10, 745.19	Q20.3, Q20.8
Two	Double Outlet Right Ventricle	745.11	Q20.1
Two	L-Transposition of Great Vessels	745.12	Q20.5
Two	Tetralogy of Fallot	745.2	Q21.3
Single	Common Ventricle or Double Inlet Ventricle	745.3	Q20.4
Two	Ventricular Septal Defect	745.4	Q21.0, I27.83
Two	Endocardial Cushion Defect	745.60, 745.69	Q21.2
Two	Ostium Primum Atrial Septal Defect	745.61	Q21.2
Two	Cor Biloculare	745.70	Q21.1
Two	Other Bulbus Cordis Anomaly of Septal Defect	745.80	Q20.8, Q21.4
Two	Unspecified Defect of Septal Defect	745.90	Q21.9
Two	Pulmonary Valve Anomaly	746.0, 746.09	Q22.3, Q22.2
Two	Pulmonary Atresia	746.01	Q22.0
Two	Congenital Pulmonary Stenosis	746.02, 746.83	Q22.1, Q24.3
Single	Congenital Tricuspid Atresia and Stenosis	746.1	Q22.9, Q22.4, Q22.8
Two	Ebstein's Anomaly	746.2	Q22.5
Two	Congenital Mitral Stenosis	746.5	Q23.2
Two	Congenital Mitral Insufficiency	746.6	Q23.3
Single	Hypoplastic Left Heart Syndrome	746.70	Q23.4
Two	Subaortic Stenosis	746.81	Q24.4
Two	Cor Triatriatum	746.82	Q24.2
Two	Congenital Obstructive Anomalies of Heart	746.84	Q24.8
Two	Congenital Coronary Artery Anomaly	746.85	Q24.5
Two	Malposition of Heart and Cardiac Apex	746.87	Q24.0, Q24.1
Two	Other Congenital Anomalies of Heart	746.89, 746.90	Q23.8, Q24.8, Q23.9, Q20.9, Q24.9
Two	Patent Ductus Arteriosus	747.0	Q25.0
Two	Coarctation of Aorta	747.10	Q25.1
Two	Interruption of Aortic Arch	747.11	Q25.21
Two	Other Congenital Anomalies of Aorta	747.20, 747.21, 747.29	Q25.4, Q25.41, Q25.42, Q25.43, Q25.44, Q25.45,

			Q25.46, Q25.47, Q25.48, Q25.49
Two	Atresia and Stenosis of Aorta	747.22	Q25.29, Q25.3, Q25.2
Two	Congenital Anomalies of Great Veins	747.40	Q26.9, Q26.0, Q26.1, Q26.0, Q26.8
Two	Total Anomalous Pulmonary Venous Return	747.41	Q26.2
Two	Partial Anomalous Pulmonary Venous Connection	747.42	Q26.3, Q26.4
Two	Congenital Anomalies of Pulmonary Artery	747.3	Q25.71, Q25.5, Q25.6, Q25.8, Q25.9, Q25.79
Heart Failure			
	Heart Failure	428, 428.0, 428.1, 428.2, 428.3, 428.4, 428.9	I50, I50.9, I50.1, I50.20, I50.21, I50.22, I50.23, I50.30, I50.31, I50.32, I50.33, I50.40, I50.41, I50.42, I50.43, I50.8
	Cardiogenic shock	785.51, 429.4, 997.1, 389.91, 402.11 402.91, 404.11, 404.13, 404.91, 404.93	R57.0
Comorbidities			
	Arrhythmia	427.0, 427.1, 427.2, 427.3, 427.4, 427.5, 427.9, 427.89	I49.9, I47.0, I47.1, I47.2, I47.9, I48.0, I48.1, I48.2, I48.3, I48.4, I48.91, I48.92, I49.01, I49.02
	Pulmonary hypertension	416.0, 416.8, 416.9	I27.0, I27.2, I27.8, I27.9
	Hypertension	4011, 4019, 40210, 40290, 40410, 40490, 40511, 40519, 40591, 40599	I10, I15
	Diabetes	250	E10, E11, E13, E14
	Chronic kidney disease	40311, 40391, 40412, 40492, 585,	N18, N19

		586, V420, V451, V560, V568	
	Obesity	2780	E66
	Smoking	305.1, V15.82	F17.2, Z72.0
	Chronic Obstructive Pulmonary Disease (COPD)	491.22, 491.21, 491.20	J44
	Coronary Artery Disease	4140.1	I70, I21, I22, I24.0, I24.8, I24.9, I25.0, I25.1, I25.2
Exclusion Criteria			
	Pregnancy	V22.2	Z33.1
	Other Connective Tissue Disease	756.83	M30-M36
	Heart Transplant	V42.1	Z94.1
	Heart-Lung Transplant	V42.1, V42.6	Z94.3
Procedures			
	VAD	37.52, 37.60, 37.65, 37.66	02RK0JZ with 02RL0JZ 5A02216 02HA0RS, 02HA3RS, 02HA4RS, 02HA0RZ, 02HA4RZ with 5A02116 02HA0QZ, 02HA3QZ, 02HA4QZ
	ECMO	39.65	5A0.522C, 5A15223
	Transplant Heart Heart-lung	37.51 33.6	02YA0Z0, 02YA0Z1, 02YA0Z2 02YA0Z0 or 02YA0Z1 or 02YA0Z2 and 0BYM0Z0 or 0BYM0Z1 or 0BYM0Z2
	Intra-aortic Balloon Pump	37.61	5A02210, 5A02110
	Internal Cardiac Defibrillator	37.94-37.96	02H63KZ, 02H73KZ, 02HK3KZ, 02HL3KZ, 02HN0KZ, 02HN4KZ

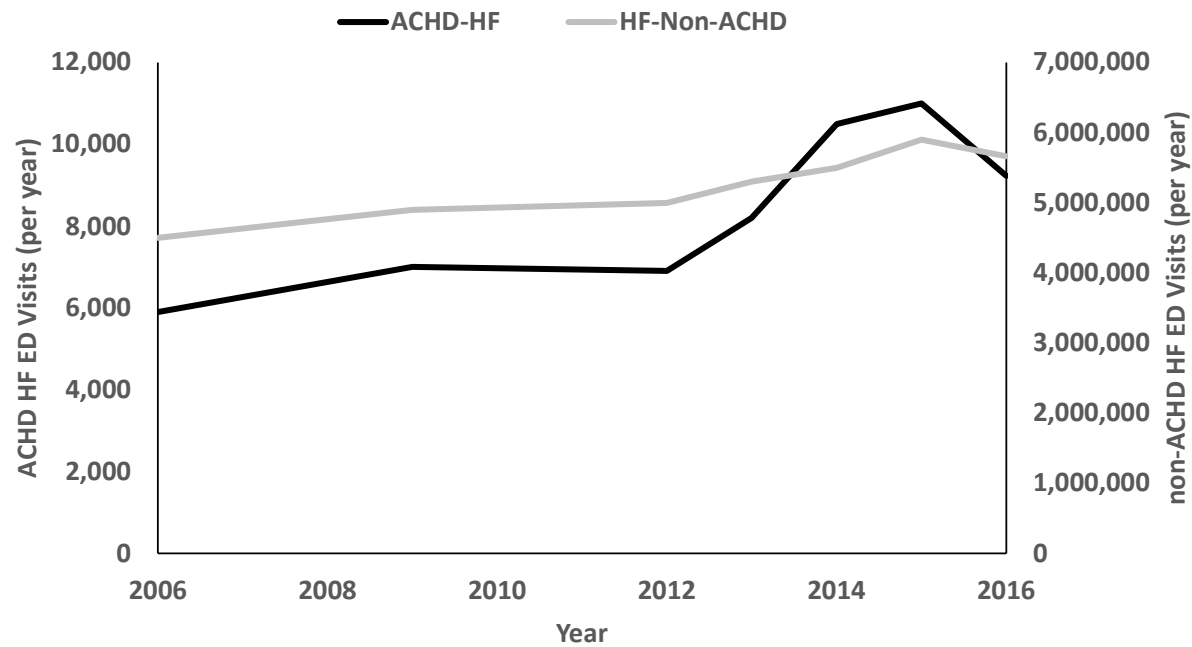
			<p>OJH608Z, OJH638Z, OJH808Z, OJH838Z</p> <p>O2H60KZ, O2H63KZ, O2H64KZ, O2H70KZ, O2H73KZ, O2H74KZ, O2HK0KZ, O2HK3KZ, O2HK4KZ, O2HL0KZ, O2HL3KZ, O2HL4KZ With OJH608Z, OJH638Z, OJH808Z, OJH838Z</p>
	Swann/Central Venous Catheter/Right Heart Catherization	3893, 89.64, 37.21, 37.23, 3722, 3723	<p>O2H633Z, O2HK32Z, O2HK33Z, O2HS32Z, O2HT32Z, O5HY03Z, O5HY32Z, O5HY33Z, O5HY43Z, O6HY03Z, O6HY32Z, O6HY33Z, O6HY43Z, OJH60XZ, OJH63XZ, OJH80XZ, OJH83XZ, OJHDOXZ, OJHD3XZ, OJHFOXZ, OJHF3XZ, OJHG0XZ, OJHG3XZ, OJHH0XZ, OJHH3XZ, OJHLOXZ, OJHL3XZ, OJHMOXZ, OJHM3XZ, OJHNOXZ, OJHN3XZ, OJHPOXZ, OJHP3XZ, O2HP32Z, O2HP42Z, O2HQ32Z, O2HQ42Z, O2HR32Z, O2HR42Z, 4A020N6, 4A023N6, 4A020N8, 4A023N8, 4A020N7, 4A023N7</p>

Supplemental Table 2. Unadjusted Outcomes and Resource Utilization in the Emergency Department for ACHD and HF-non-ACHD patients.

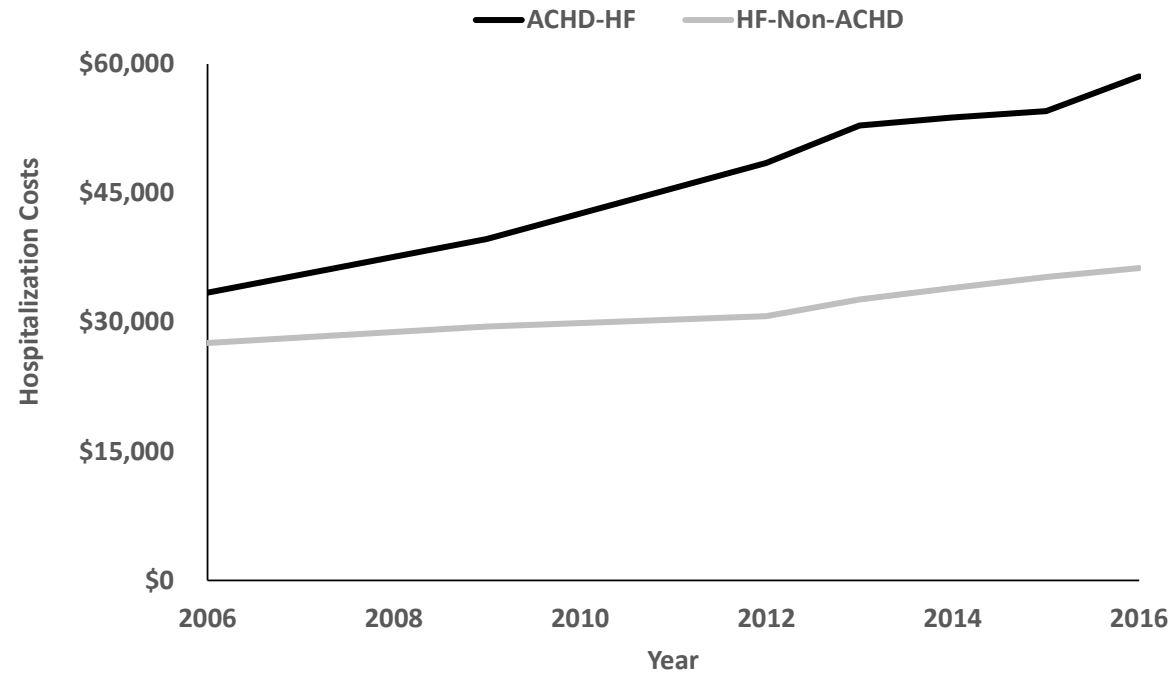
	HF-non-ACHD N=51,970,415	ACHD-HF N=84,963	P-value (vs. Non- ACHD)	Fontan ACHD-HF N=2,252	P-value (vs. Non- ACHD)	Two Ventricle ACHD-HF N=82,711	P-value (vs. Non- ACHD)
HF ED Visits per 100,000 ED visits, n	4593	7.5	<0.0001	0.2	<0.0001	7.3	<0.0001
ED Disposition, n (%)			<0.0001		0.019		<0.0001
Admission	36476778 (70.2%)	66072 (77.8%)		1765 (78.4%)		64307 (77.7%)	
Discharge from ED	12770917 (24.6%)	15224 (17.9%)		390 (17.3%)		14835 (17.9%)	
Died in ED	174612 (0.3%)	228 (0.3%)		14 (0.6%)		214 (0.3%)	
ED costs*, median (IQR)	\$1964 (1216-3314)	\$1982 (1281-3365)	0.0002	\$1994 (1216-3020)	0.49	\$1981 (1283-3373)	<0.0001

Source: NEDS database. *ED costs inflated and adjusted to 2016 costs

Supplemental Figure 1. Trend in ED visits among ACHD and HF-non-ACHD patients from 2006 to 2016.



Supplemental Figure 2. Trend in median hospitalization costs among ACHD and HF-non-ACHD patients from 2006 to 2016.



Supplemental Figure 3. Trend in hospitalizations among ACHD and HF-non-ACHD patients from 2006 to 2016.

