

**Table S1.** Operational Definitions for Reduced Ejection Fraction Heart Failure (HFrEF) and Preserved Ejection Fraction Heart Failure (HFpEF).

Operational Definition	Role of Code	Care Setting <sup>1</sup>	Code	Description	Code Category	Code Type
<b>Reduced Ejection Fraction Heart Failure (HFrEF)</b>						
HFrEF #1	Index-defining	Any	428.1	Left heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Index-defining	Any	I50.1	Left ventricular failure, unspecified	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	428.2	Systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.20	Unspecified systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.21	Acute systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.22	Chronic systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.23	Acute on chronic systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	I50.20	Unspecified systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.21	Acute systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.22	Chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.23	Acute on chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	428.3	Diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.30	Unspecified diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.31	Acute diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.32	Chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.33	Acute on chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	I50.30	Unspecified diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.31	Acute diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.32	Chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.33	Acute on chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	428.4	Combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.40	Unspecified combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.41	Acute combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.42	Chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	428.43	Acute on chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #1	Exclusion on index date	Any	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM

HFrEF #1	Exclusion on index date	Any	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #1	Exclusion on index date	Any	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Index-defining	Any	428.2	Systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Index-defining	Any	428.20	Unspecified systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Index-defining	Any	428.21	Acute systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Index-defining	Any	428.22	Chronic systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Index-defining	Any	428.23	Acute on chronic systolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Index-defining	Any	I50.20	Unspecified systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Index-defining	Any	I50.21	Acute systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Index-defining	Any	I50.22	Chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Index-defining	Any	I50.23	Acute on chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	428.1	Left heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	I50.1	Left ventricular failure, unspecified	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	428.3	Diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.30	Unspecified diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.31	Acute diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.32	Chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.33	Acute on chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	I50.30	Unspecified diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	I50.31	Acute diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	I50.32	Chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	I50.33	Acute on chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	428.4	Combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.40	Unspecified combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.41	Acute combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.42	Chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	428.43	Acute on chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFrEF #2	Exclusion on index date	Any	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM

HFrEF #2	Exclusion on index date	Any	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFrEF #2	Exclusion on index date	Any	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
<b>Preserved Ejection Fraction Heart Failure (HFpEF)</b>						
HFpEF #1	Index-defining	AV OA ED	428.3	Diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	428.30	Unspecified diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	428.31	Acute diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	428.32	Chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	428.33	Acute on chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	I50.30	Unspecified diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I50.31	Acute diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I50.32	Chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I50.33	Acute on chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	398.91	Rheumatic heart failure (congestive)	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	I09.81	Rheumatic heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	402	Hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.0	Malignant hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.00	Malignant hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.01	Malignant hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.1	Benign hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.10	Benign hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.11	Benign hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.9	Unspecified hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.90	Unspecified hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	402.91	Hypertensive heart disease, unspecified, with heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	I11.0	Hypertensive heart disease with heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I11.9	Hypertensive heart disease without heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	404	Hypertensive heart and chronic kidney disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.0	Hypertensive heart and chronic kidney disease, malignant	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.00	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM

HFpEF #1	Index-defining	AV OA ED	404.01	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.02	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.03	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.1	Hypertensive heart and chronic kidney disease, benign	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.10	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.11	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.12	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.13	Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.9	Hypertensive heart and chronic kidney disease, unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.90	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.91	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.92	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #1	Index-defining	AV OA ED	404.93	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM

HFpEF #1	Index-defining	AV OA ED	I13.0	Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I13.10	Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I13.11	Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM
HFpEF #1	Index-defining	AV OA ED	I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	428.1	Left heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	I50.1	Left ventricular failure, unspecified	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	428.2	Systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.20	Unspecified systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.21	Acute systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.22	Chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.23	Acute on chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	I50.20	Unspecified systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	I50.21	Acute systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	I50.22	Chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	I50.23	Acute on chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	428.4	Combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.40	Unspecified combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.41	Acute combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.42	Chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	428.43	Acute on chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #1	Exclusion on index date	Any	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #1	Exclusion on index date	Any	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM

HFpEF #1	Exclusion on index date	Any	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	428.3	Diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	428.30	Unspecified diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	428.31	Acute diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	428.32	Chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	428.33	Acute on chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	I50.30	Unspecified diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I50.31	Acute diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I50.32	Chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I50.33	Acute on chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	398.91	Rheumatic heart failure (congestive)	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	I09.81	Rheumatic heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	402	Hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.0	Malignant hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.00	Malignant hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.01	Malignant hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.1	Benign hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.10	Benign hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.11	Benign hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.9	Unspecified hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.90	Unspecified hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	402.91	Hypertensive heart disease, unspecified, with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	I11.0	Hypertensive heart disease with heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I11.9	Hypertensive heart disease without heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	404	Hypertensive heart and chronic kidney disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.0	Hypertensive heart and chronic kidney disease, malignant	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.00	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.01	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM

HFpEF #2	Index-defining	IP* IS*	404.02	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.03	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.1	Hypertensive heart and chronic kidney disease, benign	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.10	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.11	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.12	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.13	Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.9	Hypertensive heart and chronic kidney disease, unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.90	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.91	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.92	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	404.93	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Index-defining	IP* IS*	I13.0	Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM

HFpEF #2	Index-defining	IP* IS*	I13.10	Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I13.11	Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM
HFpEF #2	Index-defining	IP* IS*	I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	428.1	Left heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	I50.1	Left ventricular failure, unspecified	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	428.2	Systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.20	Unspecified systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.21	Acute systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.22	Chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.23	Acute on chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	I50.20	Unspecified systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.21	Acute systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.22	Chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.23	Acute on chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	428.4	Combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.40	Unspecified combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.41	Acute combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.42	Chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	428.43	Acute on chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion on index date	Any	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion on index date	Any	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428	Heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.0	Congestive heart failure, unspecified	Diagnosis	ICD-9-CM



HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.1	Left heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.2	Systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.20	Unspecified systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.21	Acute systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.22	Chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.23	Acute on chronic systolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.3	Diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.30	Unspecified diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.31	Acute diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.32	Chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.33	Acute on chronic diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.4	Combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.40	Unspecified combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.41	Acute combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.42	Chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.43	Acute on chronic combined systolic and diastolic heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	428.9	Unspecified heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.1	Left ventricular failure, unspecified	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.20	Unspecified systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.21	Acute systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.22	Chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.23	Acute on chronic systolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.30	Unspecified diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.31	Acute diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.32	Chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.33	Acute on chronic diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM

HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.810	Right heart failure, unspecified	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.811	Acute right heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.812	Chronic right heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.813	Acute on chronic right heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.814	Right heart failure due to left heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.82	Biventricular heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.83	High output heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.84	End stage heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.89	Other heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I50.9	Heart failure, unspecified	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	398.91	Rheumatic heart failure (congestive)	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I09.81	Rheumatic heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402	Hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.0	Malignant hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.00	Malignant hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.01	Malignant hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.1	Benign hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.10	Benign hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.11	Benign hypertensive heart disease with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.9	Unspecified hypertensive heart disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.90	Unspecified hypertensive heart disease without heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	402.91	Hypertensive heart disease, unspecified, with heart failure	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I11.0	Hypertensive heart disease with heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I11.9	Hypertensive heart disease without heart failure	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404	Hypertensive heart and chronic kidney disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.0	Hypertensive heart and chronic kidney disease, malignant	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.00	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM

HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.01	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.02	Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.03	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.1	Hypertensive heart and chronic kidney disease, benign	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.10	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.11	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.12	Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.13	Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.9	Hypertensive heart and chronic kidney disease, unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.90	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.91	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.92	Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	404.93	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease	Diagnosis	ICD-9-CM

HFpEF #2	Exclusion (-183, -1)	IPP ISP	I13.0	Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I13.10	Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I13.11	Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM
HFpEF #2	Exclusion (-183, -1)	IPP ISP	I13.2	Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease	Diagnosis	ICD-10-CM

<sup>1</sup>Care setting definitions per the Sentinel Common Data Model: AV OA ED = Ambulatory visit, other ambulatory visit, or emergency department encounter; IP\* IS\* = Inpatient hospital stay or non-acute institutional stay, any diagnostic position; IPP or ISP = Inpatient hospital stay or non-acute institutional stay, primary diagnostic position.

**Table S2.** Demographic and Clinical Characteristics of HFrEF and HFpEF Patients (and HFpEF patients with no MI during the baseline period) in the Sentinel Distributed Database in the ICD-9 Era (1 July 2010—30 September 2015) and the ICD-10 Era (1 April 2016—30 September 2018).

	HFrEF (ICD-9 era)	HFrEF (ICD-10 era)	HFpEF (ICD-9 era), not excluding MI at baseline	HFpEF (ICD-10 era), not excluding MI at baseline	HFpEF (ICD-9 era), excluding MI at baseline	HFpEF (ICD-10 era), excluding MI at baseline
Number of unique patients	1,157,558	998,619	5,693,622	4,773,384	5,569,822	4,646,229
<b>Demographics</b>						
Mean Age	73.8±12.3	73.8±11.9	72.8±12.2	74.5±11.7	72.8±12.2	74.5±11.7
Age: 0-17	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Age: 18-44	2.5%	2.3%	3.2%	2.0%	3.3%	2.0%
Age: 45-64	17.8%	17.5%	18.7%	15.7%	18.7%	15.6%
Age: 65+	79.7%	80.3%	78.0%	82.3%	78.0%	82.3%
Gender (Female)	42.6%	40.1%	58.8%	56.5%	58.9%	56.7%
Gender (Male)	57.4%	59.9%	41.2%	43.5%	41.1%	43.3%
Race (American Indian or Alaska Native)	0.5%	0.5%	0.3%	0.4%	0.3%	0.4%
Race (Asian)	1.5%	1.4%	2.5%	2.2%	2.5%	2.2%
Race (Black or African American)	14.0%	13.6%	13.1%	12.5%	13.1%	12.6%
Race (Native Hawaiian or Other Pacific Islander)	0.1%	0.2%	0.1%	0.2%	0.1%	0.2%
Race <sup>3</sup> (Unknown)	12.3%	12.5%	18.6%	14.5%	18.8%	14.6%
Race (White)	71.6%	71.8%	65.3%	70.2%	65.1%	70.1%
Hispanic Origin	2.4%	2.1%	3.3%	2.6%	3.3%	2.6%
<b>Recorded on heart failure index diagnosis:</b>						
Diastolic heart failure		--	31.0%	37.6%	30.6%	37.4%
Left heart failure	16.7%	5.7%	--	--	--	--
Systolic heart failure	83.3%	94.3%	--	--	--	--
Unspecified heart failure	4.6%	20.3%	70.9%	73.4%	71.3%	73.6%
<b>Spironolactone use in the prior 183 days:</b>						
Spironolactone	6.2%	6.7%	1.3%	1.8%	1.3%	1.7%

History of cardiovascular-related medication use in the prior 183 days:						
Angiotensin-converting enzyme inhibitors	45.7%	40.0%	35.0%	31.1%	34.7%	30.8%
Angiotensin II receptor blockers	19.5%	23.9%	23.2%	25.8%	23.3%	25.8%
Antiarrhythmics	13.4%	14.0%	4.7%	5.8%	4.7%	5.8%
Beta blockers	72.0%	74.1%	47.8%	53.1%	47.3%	52.7%
Digoxin	14.9%	9.8%	4.6%	3.4%	4.5%	3.4%
Hydralazine	7.5%	8.1%	3.9%	5.7%	3.8%	5.6%
Loop diuretics	56.0%	55.2%	26.9%	32.7%	26.7%	32.6%
Mineralocorticoid receptor antagonists (eplerenone)	0.8%	1.1%	0.1%	0.2%	0.1%	0.2%
Nitrates	22.9%	19.4%	10.3%	10.8%	9.8%	10.3%
Potassium-sparing diuretics	9.9%	10.3%	5.0%	4.5%	4.9%	4.4%
Thiazide diuretics	16.9%	14.5%	27.0%	23.0%	27.0%	23.1%
History of cardiovascular-related comorbidities in the prior 183 days:						
Anemia	46.5%	44.1%	30.5%	31.9%	29.9%	31.2%
Atrial fibrillation or flutter	46.5%	49.2%	19.4%	25.4%	19.0%	25.1%
Cardiomyopathy	68.2%	66.3%	0.0%	0.0%	0.0%	0.0%
Chronic obstructive pulmonary disease	37.1%	34.7%	21.0%	23.6%	20.6%	23.2%
Coronary artery bypass graft	2.7%	2.3%	0.5%	0.5%	0.3%	0.3%
Depression	19.6%	21.3%	15.4%	18.6%	15.1%	18.4%
Diabetes mellitus	50.4%	49.6%	40.2%	43.2%	39.9%	42.9%
Endocarditis	1.9%	2.1%	0.6%	0.9%	0.6%	0.8%
Heart transplant	1.4%	0.1%	0.4%	0.0%	0.4%	0.0%
Human immunodeficiency virus	0.5%	0.6%	0.4%	0.3%	0.4%	0.3%
Hyperkalemia	11.6%	12.1%	4.2%	5.3%	4.0%	5.0%
Hyperlipidemia	72.1%	72.6%	61.5%	61.9%	61.1%	61.3%
Hypertension	88.5%	88.5%	81.1%	84.2%	80.7%	83.9%
Hypertensive nephropathy	30.9%	35.0%	12.3%	18.0%	11.8%	17.4%
Hypotension	17.8%	17.9%	5.5%	6.5%	5.1%	6.0%
Implantable cardioverter defibrillator	22.7%	27.0%	0.0%	0.0%	0.0%	0.0%
Ischemic stroke or transient ischemic attack	24.0%	22.1%	15.9%	16.3%	15.5%	15.8%
Myocardial infarction	32.8%	31.5%	3.2%	3.9%	0.0%	0.0%

Nephropathy	51.4%	58.7%	25.6%	39.4%	24.9%	38.7%
Obesity	16.7%	24.9%	12.1%	22.1%	11.9%	21.8%
Other dysrhythmias	48.8%	47.4%	18.5%	20.0%	17.7%	19.1%
Psychosis	6.0%	10.8%	4.4%	9.5%	4.3%	9.3%
Pulmonary hypertension	17.1%	17.6%	4.9%	6.7%	4.7%	6.4%
Renal disorders	39.5%	43.0%	19.3%	27.3%	18.8%	26.8%
Rheumatic heart disease	15.9%	16.0%	4.7%	5.3%	4.4%	5.0%
Sleep apnea	13.5%	18.2%	8.4%	13.3%	8.3%	13.2%
Smoking	14.0%	16.1%	7.0%	9.5%	6.7%	9.2%
Stable angina	9.7%	14.9%	4.9%	7.4%	4.7%	6.8%
Unstable angina	16.4%	19.3%	6.6%	8.7%	5.9%	7.9%
Valve disorders	20.0%	20.9%	7.4%	8.8%	7.1%	8.5%
<sup>1</sup> All metrics are based on total number of episodes per group, except for sex and race which are based on total number of unique patients.						
<sup>2</sup> Value represents standard deviation where no % follows the value.						
<sup>3</sup> Race data may not be completely populated at all Data Partners; therefore, data about race may be incomplete.						