

Supplementary Table 1. Cohort identification of heart failure diagnoses, left ventricular ejection fraction, heart failure medications, symptoms, and comorbid cardiovascular conditions

	Traditional approach			Advanced approach			Concept occurrence	Encounter occurrence	P-value
	Recall, %	Precision, %	F ₁ score, %	Recall, %	Precision, %	F ₁ score, %			
HF diagnosis									
HF	46.9	95.4	62.9	96.0	94.7	95.3	265	155	<0.001
HFrEF	0	N/A*	N/A [†]	94.8	100.0	97.3	382	124	N/A [§]
HFmrEF	0	N/A*	N/A [†]	80.4	100.0	89.2	62	35	N/A [§]
HFpEF	0	N/A*	N/A [†]	83.5	100.0	91.0	103	55	N/A [§]
LVEF	N/A [‡]	N/A [‡]	N/A [‡]	93.7	100.0	96.7	677	238	N/A [§]
HF medications									
Carvedilol	95.1	100.0	97.5	99.7	99.7	99.7	407	141	<0.001
Furosemide	87.7	100.0	93.4	99.3	99.8	99.5	1572	371	0.116
Lisinopril	83.9	100.0	91.2	99.7	99.9	99.8	1068	386	<0.001
Metoprolol	92.2	100.0	95.9	97.7	100.0	98.8	1370	397	<0.001
Symptoms									

Angina	7.8	60.0	13.8	84.4	82.3	83.3	265	155	<0.001
Chest pain	21.4	70.8	32.9	95.4	86.1	90.5	2332	756	<0.001
Dyspnea	12.7	78.2	21.9	94.7	92.0	93.3	4474	832	<0.001
Fatigue	1.4	75.0	2.8	96.5	94.5	95.5	1711	371	<0.001
Palpitation	8.2	52.9	14.2	90.9	82.6	86.6	896	493	<0.001
Comorbid cardiovascular conditions									
Atrial fibrillation	72.2	98.7	83.4	93.0	98.7	95.8	1214	222	<0.001
Aortic regurgitation	19.4	100.0	32.5	92.5	100.0	96.1	153	90	<0.001
Mitral regurgitation	13.5	97.1	23.8	92.8	99.6	96.1	483	185	<0.001
Myocardial infarction	21.1	90.9	34.3	95.5	83.4	89.0	1220	578	<0.001
Tricuspid regurgitation	0	N/A*	N/A [†]	92.2	100.0	95.9	162	78	N/A [§]

*These elements did not occur when using the traditional approach. [†]F₁ scores could not be calculated due to a lack of data for precision. [‡]Structured data recall is not applicable for ejection fraction because there was no code available within the problem list. [§]P-value could not be calculated due to the unavailability of F₁ scores for the traditional approach. P-values are derived from the chi-square test.

HF, heart failure; HFmrEF, heart failure with mildly reduced ejection fraction; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; LVEF, left ventricular ejection fraction; N/A, not applicable.