Appendix

Table A1: Positive Predictive Values for Individual ICD-9 Codes

ICD-9 Code	Algorithm-positive events fulfilling ICD-9 and DRG code criteria		Algorithm-positive events fulfilling only ICD-9 code criteria	
	Hospitalizations, N	Positive Predictive Value[a], (95% Confidence Interval [CI])[b]	Hospitalizations, N	Positive Predictive Value[a], (95% CI)
428.x Heart failure	293	92.8 (89.3, 95.3)	68	85.3 (75.0, 91.8)
428.0 Congestive heart failure unspecified	229	93.0 (89.7, 96.3)	55	89.1 (78.2, 94.9)
428.1 Left heart failure	0		0	
428.20 Systolic heart failure unspecified	5	80.0 (37.6, 96.4)	0	
428.21 Acute systolic heart failure	2	100 (34.2, 100.0)	2	50.0 (9.5, 90.5)
428.22 Chronic systolic heart failure	9	90.0 (70.1, 100.0)	1	0 (0, 79.3)
428.23 Acute on chronic systolic heart failure	14	100.0 (78.5, 100.0)	5	100.0 (56.6, 100.0)
428.30 Diastolic heart failure unspecified	7	85.7 (48.7, 97.4)	0	

428.31 Acute diastolic heart failure	1	100.0 (20.7, 100.0)	0	
428.32 Chronic diastolic heart failure	8	62.5 (30.6, 86.3)	1	100.0 (20.7, 100.0)
428.33 Acute on chronic diastolic heart failure	7	100.0 (64.6, 100.0)	1	100.0 (20.7, 100.0)
428.40 Combined systolic and diastolic heart failure	3	100.0 (43.9, 100.0)	0	
428.41 Acute combined systolic and diastolic heart failure	1	0 (0, 79.3)	1	0 (0, 79.3)
428.42 Chronic combined systolic and diastolic heart failure	0		0	
428.43 Acute on chronic combined systolic and diastolic heart failure	8	100.0 (67.6, 100.0)	1	100. 0 (20.7, 100.0)
428.9 Heart failure unspecified	0		1	0 (0, 79.3)
425.x Cardiomyopathy	0		12	50.0 (25.4, 74.6)
425.1 Hypertrophic obstructive cardiomyopathy	0		2	0 (0, 65.8)
425.2 Obscure cardiomyopathy of Africa	0		0	
425.3 Endocardial fibroelastosis	0		0	

425.4 Other primary cardiomyopathy	0		8	62.5 (30.6, 86.3)
425.5 Alcoholic cardiomyopathy	0		0	
425.7 Metabolic cardiomyopathy	0		0	
425.8 Cardiomyopathy in other diseases classified elsewhere	0		0	
425.9 Secondary cardiomyopathy unspecified	0		2	50.0 (9.5, 90.5)
404.x Hypertensive heart disease and chronic kidney disease with heart failure	4	50.0 (15.0, 85.0)	1	0 (0, 79.3)
404.01 Malignant hypertensive heart and chronic kidney disease with heart failure	0		1	0 (0, 79.3)
404.03 Malignant hypertensive heart and chronic kidney disease with heart failure with chronic kidney disease stage V or end stage renal disease	0		0	
404.11 Benign hypertensive heart and chronic kidney disease with heart failure and with chronic kidney disease stage I – stage IV or unspecified	0		0	

404.13 Benign hypertensive heart and chronic kidney disease with heart failure and with chronic kidney disease stage V or end stage renal disease	0		0	
404.91 Hypertensive heart disease and chronic kidney disease unspecified with heart failure and with chronic kidney disease stage I – stage IV or unspecified	3	66.7 (20.8, 93.9)	0	
404.93 Hypertensive heart disease and chronic kidney disease unspecified with heart failure and with chronic kidney disease stage V or end stage renal disease	1	0 (0, 79.3)	0	
402.x Hypertensive heart disease with heart failure	6	83.3 (43.6, 97.0)	6	83.3 (43.6, 97.0)
402.01 Malignant hypertensive heart disease with heart failure	1	0 (0, 79.3)	2	100.0 (34.2, 100.0)
402.11 Benign hypertensive heart disease with heart failure	0		0	

402.91 Hypertensive heart disease unspecified with heart failure	5	100.0 (56.5, 100.0)	4	75.0 (30.0, 95.4)
398.91 Rheumatic heart failure	0		0	

[a] Positive predictive values were calculated by unweighted analysis. Sampling weights were not needed as each analysis was completed within a given sampling stratum.

[b] Wilson's formula was used to calculate 95% confidence interval

Table A2: Sensitivity analysis – Positive and negative predictive value, sensitivity, specificity of alternate algorithm allowing heart failure (HF) or cardiomyopathy codes in any discharge diagnosis position, weighted analysis

	Confirmed HF hospitalization, sum weight[a] (n)[b]	**Confirmed non-HF hospitalization, sum weight (n)**	**Total hospitalizations, sum weight (n)**	**Predictive value (95% Confidence interval, CI)[c]**
HF algorithm positive	929 (358)	1307 (57)	2236 (415)	Positive predictive value 41.5% (24.5, 58.6)
HF algorithm negative	208 (2)	8322 (80)	8530 (82)	Negative predictive value 97.6% (94.2, 100.0)
Total	1137 (360)	9629 (137)	10766 (497)	
	Sensitivity (95% CI)	Specificity (95% CI)		
	81.7% (59.9, 100.0)	86.4% (79.6, 93.3)		

[a] sum weight represents the number of hospitalizations from the overall study population that would have fallen into each category when inverse probability of sampling weights were applied to the study sample

[b] n represents the actual number of charts reviewed that were true positives, false positives, false negatives, or true negatives in each category

[c] To create 95% confidence intervals, Stata uses a Taylor Series linearization to calculate standard errors with sampling weights