

SUPPLEMENTAL MATERIAL

Supplementary Table 1. Variables in John Hopkins Claims-Based Frailty Indicator

<i>B- coefficient</i>	<i>Variable</i>
<i>1.24</i>	<i>Impaired mobility</i>
<i>0.54</i>	<i>Depression</i>
<i>0.50</i>	<i>Congestive Heart Failure</i>
<i>0.50</i>	<i>Parkinson's disease</i>
<i>-0.49</i>	<i>White race</i>
<i>0.43</i>	<i>Arthritis (any type)</i>
<i>0.33</i>	<i>Cognitive impairment</i>
<i>0.31</i>	<i>Charlson comorbidity index (>0, 0)</i>
<i>0.28</i>	<i>Stroke</i>
<i>0.24</i>	<i>Paranoia</i>
<i>0.23</i>	<i>Chronic skin ulcer</i>
<i>0.21</i>	<i>Pneumonia</i>
<i>-0.19</i>	<i>Male sex</i>
<i>0.18</i>	<i>Skin and soft tissue infection</i>
<i>0.14</i>	<i>Mycoses</i>
<i>0.09</i>	<i>Age (in 5 year categories)</i>
<i>0.09</i>	<i>Admission in past 6 months</i>
<i>0.08</i>	<i>Gout or other crystal-induced arthropathy</i>
<i>0.08</i>	<i>Falls</i>
<i>0.05</i>	<i>Musculoskeletal problems</i>
<i>0.05</i>	<i>Urinary tract infection</i>

Supplementary Table 2. Definition of patient characteristics based on ICD-9-CM codes
 (“Present on admission” during the index hospitalization as well as from principal and secondary diagnosis codes from all hospitalizations in the year prior to the index hospitalization)

CARDIAC HISTORY	
Chronic heart failure	39891 402*1 404*3 428*
Diabetes mellitus	249* 250*
Smoker	V1582
Coronary artery disease without revascularization	41000 41001 41002 41010 41011 41012 40120 41021 41022 41030 41031 41032 41040 41041 41042 41050 41051 41052 41060 41061 41062 41070 41071 41072 41080 41081 41082 41090 41091 41092 4110 4111 41181 41189 4130 4131 4139 41400 41401 41402 41403 41404 41405 41406 41407 4144
Prior myocardial infarction	410* 412*
Prior percutaneous coronary intervention	V4582 or (0066 1755 3603 3604 3605 3606 3607 3608 3609=Procedure codes)
Prior valvular surgery	V433
Prior aortic surgery	V151
Prior coronary artery bypass graft surgery	V4581
Peripheral vascular disease	440* 4471
Atrial fibrillation	42731 42732
Left bundle branch block	4262 4263
Right bundle branch block	4264 42651 42652
Cerebrovascular disease	36230 36231 36232 36233 36234 36235 36236 36237 34661 34662 34663 43300 43301 43310 43311 4332 43320 43321 4333 43330 43331 43380 43381 43390 43391 43400 43401 43410 43411 43490 43491 4350 4351 4352 4353 4358 4359 436 437 4370 4371 4372 4373 4374 4375 4376 4377 78043 99702 4378 4379 4380 4381 43810 43811 43812 43813 43814 43819 43820 43821 43822 43830 43831 43832 43840 43841 43842 43850 43851 43852 4386 4387 4388 43881 43882 43883 43884 43885 43889 4389
Tricuspid valve disorders	397.0 424.2
Endocarditis	421*
Aortic aneurysm	4412 4414 4419 4429

NON-CARDIAC HISTORY	
Chronic kidney disease without dialysis	40400 40401 40402 40403 40410 40411 40412 40413 40490 40491 40492 40493 5820 5821 5822 5824 5828 58281 58289 5829 5830 5831 5832 5834 5836 5837 5838 58381 58389 5839 5851 5852 5853 5854 5855 5856 5859 586 587 5880 5889 V420
Renal dialysis	V560 V561 V562 V563 V5631 V5632 V568 V4511 V4512
Liver disease	07022 07023 07032 07033 07044 07054 0706 0709 4560 4561 45620 45621 570* 5710 5711 5712 5713 5714* 5715 5716 5718 5719 5722 5723 5724 5728 5733 5734 5735 5738 5739 7824 7891 78959 7904 7948 V427
Chronic obstructive pulmonary disease	491-496
Home O ₂	E0431 E0433 E0434 E0435 E0439 E0441 E0442 E0443 E1390 E1393 V462
Hypothyroidism	244*
Coagulopathy	286* 2871 28730 2875 28984
Obesity	278 2780 27800 27801 27802 27803
Anemia	2800 2801 2808 2809 2810 2811 2812 2813 2814 2818 2819 2822 2823 2828 2829 2830 28310 28319 2839 28409 28489 2849 2850 2851 28521 28522 28529 2853 2858 2859
PROCEDURAL CHARACTERISTICS	
Transapical	3506
Pre-procedural-shock	7855* (<i>present on admission only index hospitalization</i>)
NON-TRADITIONAL FRAILITY MARKERS	
Parkinson`s disease	3320
Arthritis	7140 7141 7142 71430 71431 71432 71433 7144 71481 71489 7149 7200 71500 71504 71509 71510 71511 71512 71513 71514 71515 71516 71517 71518 71520 71521 71522 71523 71524 71525 71526 71527 71528 71530 71531 71532 71533 71534 71535 71536 71537 71538 71580 71589 71590 71591 71592 71593 71594 71595 71596 71597 71598 V134
Cognitive impairment	2900 29010 29011 29012 29013 29020 29021 2903 29040 29041 29042 29043 2908 2909 2930 2931 2940 2941 29410 29411 29420 29421 2948

	2949 3100 3102 3108 31081 31089 3109 3310 3311 33111 33119 3312 33182 797
Depression	3090 3091 30922 30923 30924 30928 30929 3093 3094 30982 30983 30989 3099 29383 29600 29601 29602 29603 29604 29605 29606 29610 29611 29612 29613 29614 29615 29616 29620 29621 29622 29623 29624 29625 29626 29630 29631 29632 29633 29634 29635 29636 29640 29641 29642 29643 29644 29645 29646 29650 29651 29652 29653 29654 29655 29656 29660 29661 29662 29663 29664 29665 29666 2967 29680 29681 29682 29689 29690 29699 3004 311
Falls	E8800 E8801 E8809 E8810 E8811 E882 E8830 E8831 E8832 E8839 E8840 E8841 E8842 E8843 E8844 E8845 E8846 E8849 E885 E8850 E8851 E8852 E8853 E8854 E8859 E8860 E8869 E888 E8880 E8881 E8888 E8889 E9681 E9870 E9871 E9872 E9879
Impaired mobility	V463
Musculoskeletal problems	7130 7131 7132 7133 7134 7135 7136 7137 7138 71600 71601 71602 71603 71604 71605 71606 71607 71608 71609 71620 71621 71622 71623 71624 71625 71626 71627 71629 71629 71630 71631 71632 71633 71634 71635 71636 71637 71638 71639 71640 71641 71642 71643 71644 71645 71646 71647 71648 71649 71650 71651 71652 71653 71654 71655 71656 71657 71658 71659 71660 71661 71662 71663 71664 71665 71666 71667 71668 71680 71681 71862 71863 71684 71685 71686 71687 71688 71689 71690 71691 71692 71693 71694 71695 71696 71697 71698 71699 71810 71811 71812 71813 71814 71815 71817 71818 71819 71820 71821 71822 71823 71824 71825 71826 71827 71828 71829 71850 71851 71852 71853 71854 71855 71856 71857 71858 71859 71860 71865 71870 71871 71872 71873 71874 71875 71876 71877 71878 71879 71880 71881 71882 71883 71884 71885 71886 71887 71888 71889 71890 71891 71892 71893 71894 71895 71897 71898 71899 71900 71901 71902 71903 71904 71905 71906 71907 71908 71909 71910 71911 71912 71913 71914 71915 71916 71917 71918 71919 71920 71921 71922 71923 71924 71925 71926 71927 71928 71929 71930 71931 71932 71933

	<p>71934 71935 71936 71937 71938 71939 71940 71941 71942 71943 71944 71945 71946 71947 71948 71949 71950 71951 71952 71953 71954 71955 71956 71957 71958 71959 71960 71961 71962 71963 71964 71965 71966 71967 71968 71969 7197 71970 71975 71976 71977 71978 71979 71980 71981 71982 71983 71984 71985 71986 71987 71988 71989 71990 71991 71992 71993 71994 71995 71996 71997 71998 71999 7201 7202 72081 72089 7209 7210 7211 7212 7213 72141 72142 7215 7216 7217 7218 72190 72191 7220 72210 72211 7222 72230 72231 72232 72239 7224 72251 72252 7226 72270 72271 72272 72273 72280 72281 72282 72283 72290 72291 72292 72293 7230 7231 7232 7233 7234 7235 7236 7237 7238 7239 72400 72401 72402 72403 72409 7241 7242 7243 7244 7245 7246 72470 72471 72479 7248 7249 73300 73301 73302 73393 73309 7331 73310 73311 73312 73313 73314 73315 73316 73319 73393 73394 73395 73396 73397 73398 V1351 4350 4351 4352 4353 4358 4359</p>
Paranoia	<p>29381 29382 29500 29501 29502 29503 29504 29505 29510 29511 29512 29513 29514 29515 29520 29521 29522 29523 29524 29525 29530 29531 29532 29533 29534 29535 29540 29541 29542 29543 29544 29545 29550 29551 29552 29553 29554 29555 29560 29561 29562 29563 29564 29565 29570 29571 29572 29573 29574 29575 29580 29581 29582 29583 29584 29585 29590 29591 29592 29593 29594 29595 2970 2971 2972 2973 2978 2979 2980 2981 2982 2983 2984 2988 2989</p>
Mycoses	<p>1100 1101 1102 1103 1104 1105 1106 1108 1109 1110 1111 1112 1113 1118 1119 1120 1121 1122 1123 1125 11282 11284 11285 11289 1129 1141 1143 1149 11500 11509 11510 11519 11590 11599 1160 1161 1162 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 118</p>
Urinary tract infections	<p>03284 59000 59001 59010 59011 5902 5903 59080 59081 5909 5950 5951 5952 5953 5954 59581 59582 59589 5959 5970 59780 59781 59789 59800 59801 5990</p>

Gout or other crystal-induced arthropathy	2740 27400 27401 27402 27403 27410 27411 27419 27481 27482 27489 2749 71210 71211 71212 71213 71214 71215 71216 71217 71218 71219 71220 71221 71222 71223 71224 71225 71226 71227 71228 71229 71230 71231 71232 71233 71234 71235 71236 71237 71238 71239 71280 71281 71282 71283 71284 71285 71286 71287 71288 71289 71290 71291 71292 71293 71294 71295 71296 71297 71298 71299
Skin and soft tissue infections	0201 0210 0220 0311 03285 035 0390 6800 6801 6802 6803 6804 6805 6806 6807 6808 6809 68100 68101 68102 68110 68111 6819 6820 6821 6822 6823 6824 6825 6826 6827 6828 6829 684 6850 6851 6860 68600 68601 68609 6861 6868 6869
Chronic skin ulcer	7070 70700 70701 70702 70703 70704 70705 70706 70707 70709 7071 70710 70711 70712 70713 70714 70715 70719 70720 70721 70722 70723 70724 70725 7078 7079
Pneumonia	00322 0203 0204 0205 0212 0221 0310 0391 0521 0551 0730 0830 1124 1140 1144 1145 11505 11515 11595 1304 1363 4800 4801 4802 4803 4808 4809 481 4820 4821 4822 4823 48230 48231 48232 48239 4824 48240 48241 48242 48249 4828 48281 48282 48283 48284 48289 4829 483 4830 4831 4838 4841 4843 4845 4846 4847 4848 485 486 5130 5171

Supplementary Table 3. A comparison of factors predictive of long-term mortality in administrative versus clinical datasets

Variables from Administrative Claims	Hazard Ratio	Variables from Clinical Studies	Hazard Ratio
CARDIAC HISTORY			
Age (by year)	1.015	Age $\geq 85^1$	1.68
		Age (by year) ^{2,3}	1.02, 1.19
Male	1.223	Male ^{1,2,4}	1.81, 1.50, 1.21
		Female ^{3, 5}	0.66, 0.54
Smoker	0.886		
Chronic Heart Failure	1.249	Left ventricular ejection fraction $<35\%^1$	1.98
		Left ventricular ejection fraction $40\%–49\%^2$	1.36
		Left ventricular ejection fraction $30\%–39\%^2$	1.33
		Left ventricular ejection fraction $30\%–49\%^6$	1.49
Diabetes Mellitus	1.047	Diabetes mellitus ^{2,3}	1.20, 1.46
Coronary artery disease without revascularization	0.924	Recent myocardial infarction (< 90 days) ¹	3.78
Prior percutaneous coronary intervention	0.930	Prior myocardial infarction ³	1.29
Prior coronary artery bypass surgery	0.883	Prior mitral regurgitation $\geq II^{\circ 3,5}$	1.42, 1.77
Atrial fibrillation	1.394	Atrial fibrillation ^{3,7,8}	1.38, 1.28, 1.37
Aortic aneurysm	1.141	Porcelain Aorta ¹	2.56
		Aortic valve mean gradient ≥ 70 mmHg ¹	2.46
		Residual aortic regurgitation $\geq II^{\circ 3,6, 9}$	1.52, 3.78, 1.66
		Low gradient aortic stenosis ³	1.48
Left bundle branch block	0.893		
Right bundle branch block	0.840		
		Prior Stroke ⁹	5.46
NON-CARDIAC HISTORY			
Chronic kidney disease without dialysis	1.378	Creatinine clearance ≤ 30 ml/kg/min ^{1,9}	1.76, 2.53
Renal dialysis	2.033	Renal failure ^{2,3}	1.43, 2.04
		e-Glomerular filtration rate ²	0.94
		Creatinine ≥ 2 mg/dL without dialysis ⁴	1.26
		Dialysis ⁴	1.66
Liver disease	2.046		
Charlson comorbidity index	1.136	Severe Charlson score ¹⁰	1.27

Chronic obstructive pulmonary disease	1.198	Chronic Lung Disease ⁴	1.39
		Prior pulmonary edema ⁹	2.69
		Chronic obstructive pulmonary disease ⁶	1.41
		Systolic pulmonary artery pressure ⁵	1.15
Home O ₂	1.556	Home O ₂ ¹⁰	1.90
Coagulopathy	1.100		
		STS score >7% ^{4,10}	1.36, 1.33
		STS score >15% ⁴	1.82
Obesity	0.789	Obesity ¹¹	0.74
Anemia	1.132	Hemoglobin < 10 g/dL ¹	2.03
PROCEDURAL CHARACTERISTICS			
Pre-procedural shock	2.369	Prior decompensation ³	1.32
Emergency admission	1.298	Urgent TAVR ³	1.25
Urgency admission	1.166		
Transapical	1.123	Surgical TAVR ³	1.43
NON-TRADITIONAL FRAILITY MARKERS	1.342	Frailty ³	1.31
		Albumin < 3.3 g/dL ¹⁰	1.40
		Albumin < 4.0 g/dL ¹²	3.03
		Falls in past 6 months ¹⁰	1.36
Impaired mobility	1.240		
Depression	1.067		
Cognitive Impairment	1.229		
Paranoia	1.252		
Chronic Skin Ulcer	1.670		
Pneumonia	1.883		
Skin and Soft Tissue Infections	1.269		
Mycoses	1.446		
Urinary Tract Infection	1.279		
<i>STS: Society for Thoracic Surgery, TAVR: transcatheter aortic valve replacement</i>			

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