**Supplemental Digital Content 6 -** Extended Characteristics For Entire Cohort, Non-event Controls, and Deterioration Event Patients; and Training / Validation Set Patients versus Temporal Holdout Test Set Patients

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| **Category** | **Feature** | **Entire Cohort****N =1555****n(%) or median (IQR)** |  |
| **Non-event Control Patients,****N =1370****n(%) or median (IQR)** | **Deterioration Event Patients, N =185****n(%) or median (IQR)** | **p-Value** |  | **Training / Validation Set Patients (2013-2017),** **N =949****n(%) or median (IQR)** | **Holdout Test Set Patients (2017-2020),** **N =606****n(%) or median (IQR)** | **p-Value** |
| **Demographic / Anthropometric Data** | Age, years | 67 [58 - 74] | 66 [57 - 74] | 70 [63 - 77] | 0.457 | 67 [58 - 75] | 65 [58 - 72] | 0.148 |
| Male Gender | 997 (64.1%) | 915 (66.8%) | 82 (44.3%) | <0.001 | 591 (62.3%) | 406 (67.0%) | 0.058 |
| RaceCaucasian | 1370 (88.1%) | 1210 (88.3%) | 160 (86.5%) | 0.005 | 841 (88.6%) | 529 (87.3%) | 0.844 |
| Other | 28 (1.8%) | 27 (2.0%) | 1 (0.5%) | 18 (1.9%) | 10 (1.7%) |
| Unknown | 21 (1.4%) | 19 (1.4%) | 2 (1.1%) | 13 (1.4%) | 8 (1.3%) |
| African American | 99 (6.4%) | 83 (6.1%) | 16 (8.6%) | 55 (5.8%) | 44 (7.3%) |
| Asian | 26 (1.7%) | 22 (1.6%) | 4 (2.2%) | 14 (1.5%) | 12 (2.0%) |
| Patient Refused | 8 (0.5%) | 8 (0.6%) | 0 (0.0%) | 6 (0.6%) | 2 (0.3%) |
| American Indian or Alaskan Native | 1 (0.1%) | 1 (0.1%) | 0 (0.0%) | 1 (0.1%) | 0 (0.0%) |
| Native Hawaiian and Other Pacific Islander | 2 (0.1%) | 0 (0.0%) | 2 (1.1%) | 1 (0.1%) | 1 (0.2%) |
| **Patient Medical History** | Congestive Heart Failure | 659 (42.4%) | 532 (38.8%) | 127 (68.6%) | <0.001 | 326 (34.4%) | 333 (55.0%) | <0.001 |
| Cardiac Arrhythmias | 896 (57.6%) | 762 (55.6%) | 134 (72.4%) | <0.001 | 458 (48.3%) | 438 (72.3%) | <0.001 |
| Valvular Disease | 1357 (87.3%) | 1192 (87.0%) | 165 (89.2%) | 0.403 | 843 (88.8%) | 514 (84.8%) | 0.021 |
| Pulmonary Circulation Disorders | 320 (20.6%) | 244 (17.8%) | 76 (41.1%) | <0.001 | 187 (19.7%) | 133 (21.9%) | 0.286 |
| Peripheral Vascular Disorders | 803 (51.6%) | 713 (52.0%) | 90 (48.6%) | 0.386 | 476 (50.2%) | 327 (54.0%) | 0.143 |
| Hypertension, Complicated | 322 (20.7%) | 254 (18.5%) | 68 (36.8%) | <0.001 | 48 (5.1%) | 274 (45.2%) | <0.001 |
| Hypertension, Uncomplicated | 1125 (72.3%) | 990 (72.3%) | 135 (73.0%) | 0.839 | 641 (67.5%) | 484 (79.9%) | <0.001 |
| Paralysis | 28 (1.8%) | 20 (1.5%) | 8 (4.3%) | 0.006 | 11 (1.2%) | 17 (2.8%) | 0.017 |
| Other Neurological Disorders | 86 (5.5%) | 65 (4.7%) | 21 (11.4%) | <0.001 | 34 (3.6%) | 52 (8.6%) | <0.001 |
| Chronic Pulmonary Disease | 509 (32.7%) | 425 (31.0%) | 84 (45.4%) | <0.001 | 304 (32.0%) | 205 (33.8%) | 0.462 |
| Diabetes, Complicated | 173 (11.1%) | 143 (10.4%) | 30 (16.2%) | 0.019 | 31 (3.3%) | 142 (23.4%) | <0.001 |
| Diabetes, Uncomplicated | 377 (24.2%) | 322 (23.5%) | 55 (29.7%) | 0.064 | 219 (23.1%) | 158 (26.1%) | 0.179 |
| Liver Disease | 155 (10.0%) | 125 (9.1%) | 30 (16.2%) | 0.003 | 82 (8.6%) | 73 (12.0%) | 0.029 |
| Coagulopathy | 312 (20.1%) | 252 (18.4%) | 60 (32.4%) | <0.001 | 109 (11.5%) | 203 (33.5%) | <0.001 |
| Coronary Artery Disease | 722 (46.4%) | 618 (45.1%) | 104 (56.2%) | 0.004 | 364 (38.4%) | 358 (59.1%) | <0.001 |
| Recent MI | 28 (1.8%) | 21 (1.5%) | 7 (3.8%) | 0.031 | 22 (2.3%) | 6 (1.0%) | 0.055 |
| Active Endocarditis | 109 (7.0%) | 87 (6.4%) | 22 (11.9%) | 0.006 | 75 (7.9%) | 34 (5.6%) | 0.084 |
| Preoperative Labs/Studies & Status | Left ventricular ejection fraction, % | 55 [55 - 65] | 57 [55 - 65] | 55 [45 - 60] | 0.916 | 59 [55 - 65] | 55 [55 - 64] | 0.077 |
| Estimated glomerular filtration rate (mL/min/1.73m2) | 75.0 [58.8 - 88.5] | 76.5 [61.4 - 89.4] | 59.7 [41.7 - 78.9] | 0.201 | 74.2 [58.4 - 88.6] | 76.0 [60.1 - 88.5] | 0.750 |
| Preoperative inotrope infusion | 6 (0.4%) | 3 (0.2%) | 3 (1.6%) | 0.004 | 3 (0.3%) | 3 (0.5%) | 0.579 |
| ASA Physical Status Classification234 | 2 (0.1%)308 (19.8%)1244 (80.0%) | 2 (0.1%)283 (20.7%)1085 (79.2%) | 0 (0.0%)25 (13.5%)159 (85.9%) | 0.067 | 0 (0.0%)189 (19.9%)760 (80.1%) | 2 (0.3%)119 (19.6%)484 (79.9%) | 0.207 |
| Surgery Type | Isolated CABGIsolated Non-CABG2 Procedures3+ Procedures | 160 (10.3%)829 (53.3%)437 (28.1%)38 (2.4%) | 147 (10.7%)737 (53.8%)375 (27.4%)28 (2.0%) | 13 (7.0%)92 (49.7%)62 (33.5%)10 (5.4%) | 0.007 | 51 (5.4%)480 (50.6%)299 (31.5%)29 (3.1%) | 109 (18.0%)349 (57.6%)138 (22.8%)9 (1.5%) | <0.001 |
| Thoracic Aortic Surgery | 375 (24.1%) | 350 (25.5%) | 25 (13.5%) | <0.001 | 218 (23.0%) | 157 (25.9%) | 0.187 |
| Aortic Valve Surgery | 665 (42.8%) | 601 (43.9%) | 64 (34.6%) | 0.017 | 448 (47.2%) | 217 (35.8%) | <0.001 |
| Mitral Valve Surgery | 527 (33.9%) | 445 (32.5%) | 82 (44.3%) | 0.001 | 370 (39.0%) | 157 (25.9%) | <0.001 |
| Tricuspid Valve Surgery | 322 (20.7%) | 257 (18.8%) | 65 (35.1%) | <0.001 | 174 (18.3%) | 148 (24.4%) | 0.004 |
| Other Cardiac Procedure | 23 (1.5%) | 20 (1.5%) | 3 (1.6%) | 0.864 | 2 (0.2%) | 21 (3.5%) | <0.001 |
| MAZE | 258 (16.6%) | 206 (15.0%) | 52 (28.1%) | <0.001 | 163 (17.2%) | 95 (15.7%) | 0.438 |
| Anesthesia Duration, min | 429 [350 - 525] | 422 [349 - 515] | 482 [365 - 600] | <0.001 | 413 [340 - 505] | 450 [368 - 547] | <0.001 |
| Cardiopulmonary Bypass Duration, min | 166 [117 - 235] | 162 [115 - 229] | 202 [132 - 290] | 0.024 | 161 [114 - 228] | 173 [123 - 245] | 0.247 |
| Postoperative non-waveform derived vital signs  | SpO2, % | 97 [95 - 99] | 97 [95 - 99] | 96 [95 - 98] | 0.884 | 97 [95 - 99] | 97 [95 - 99] | 0.119 |
| Temperature, Celsius | 36.9 [36.6 - 37.2] | 36.9 [36.6 - 37.2] | 36.8 [36.5 - 37.3] | 0.030 | 36.9 [36.6 - 37.2] | 36.9 [36.6 - 37.2] | 0.502 |
| Postoperative outputs | Median hourly urine output, mL | 35 [0 - 71] | 38 [0.3 - 75] | 25 [0. - 50] | 0.067 | 30 [0 - 60] | 47 [30 - 95] | <0.001 |
| Postoperative Laboratory Values          | Creatinine RangeUnknown<0.5 (female) or <0.7 (male)0.5-1.0 (female) or 0.7-1.3 (male)1.1-2.0 (female) or 1.3-2.0 (male)>2.0 | 0 (0.0%)95 (6.1%)1072 (68.9%)282 (18.1%)106 (6.8%) | 0 (0.0%)92 (6.7%)999 (72.9%)212 (15.5%)67 (4.9%) | 0 (0.0%)3 (1.6%)73 (39.5%)70 (37.8%)39 (21.1%) | <0.001 | 0 (0.0%)65 (6.8%)656 (69.1%)172 (18.1%)56 (5.9%) | 0 (0.0%)30 (5.0%)416 (68.6%)110 (18.2%)50 (8.3%) | 0.268 |
|  | Glucose Range, mg/dLUnknown<4040-6970-180>180 | 0 (0.0%)0 (0.0%)4 (0.3%)1442 (92.7%)109 (7.0%) | 0 (0.0%)0 (0.0%)3 (0.2%)1272 (92.8%)95 (6.9%) | 0 (0.0%)0 (0.0%)1 (0.5%)170 (91.9%)14 (7.6%) | 0.943 | 0 (0.0%)0 (0.0%)4 (0.4%)885 (93.3%)60 (6.3%) | 0 (0.0%)0 (0.0%)0 (0.0%)557 (91.9%)49 (8.1%) | 0.371 |
|  | Hematocrit RangeUnknown<21%21-35 (female) or 21-39 (male)36-48 (female) or 40-50 (male)>48 (female) or >50 (male) | 0 (0.0%)56 (3.6%)1431 (92.0%)66 (4.2%)2 (0.1%) | 0 (0.0%)41 (3.0%)1266 (92.4%)61 (4.5%)2 (0.1%) | 0 (0.0%)15 (8.1%)165 (89.2%)5 (2.7%)0 (0.0%) | 0.009 | 0 (0.0%)29 (3.1%)876 (92.3%)43 (4.5%)1 (0.1%) | 0 (0.0%)27 (4.5%)555 (91.6%)23 (3.8%)1 (0.2%) | 0.626 |
|  | Hemoglobin Range, g/dLUnknown<7.07.0-11.9 (female) or 7.0-13.4 (male)12.0-16.0 (female) or 13.5-17.0 (male)>16.0 (female) or >17.0 (male) | 0 (0.0%)25 (1.6%)1453 (93.4%)76 (4.9%)1 (0.1%) | 0 (0.0%)16 (1.2%)1282 (93.6%)71 (5.2%)1 (0.1%) | 0 (0.0%)9 (4.9%)171 (92.4%)5 (2.7%)0 (0.0%) | 0.003 | 0 (0.0%)13 (1.4%)887 (93.5%)48 (5.1%)1 (0.1%) | 0 (0.0%)12 (2.0%)566 (93.4%)28 (4.6%)0 (0.0%) | 0.801 |
|  | INR RangeUnknown<0.90.9 - 1.21.3 - 2.0>2.0 | 2 (0.1%)0 (0.0%)1350 (86.8%)177 (11.4%)26 (1.7%) | 2 (0.1%)0 (0.0%)1220 (89.1%)131 (9.6%)17 (1.2%) | 0 (0.0%)0 (0.0%)130 (70.3%)46 (24.9%)9 (4.9%) | <0.001 | 2 (0.2%)0 (0.0%)833 (87.8%)95 (10.0%)19 (2.0%) | 0 (0.0%)0 (0.0%)517 (85.3%)82 (13.5%)7 (1.2%) | 0.128 |
|  | Lactate Range, mmol/LUnknown<0.50.5-1.6 (arterial) or 0.5-2.2 (venous)1.7-4.0 (arterial) or 2.3-4.0 (venous)>4.0 | 13 (0.8%)1 (0.1%)867 (55.8%)620 (39.9%)54 (3.5%) | 13 (0.9%)1 (0.1%)763 (55.7%)553 (40.4%)40 (2.9%) | 0 (0.0%)0 (0.0%)104 (56.2%)67 (36.2%)14 (7.6%) | 0.013 | 13 (1.4%)0 (0.0%)541 (57.0%)367 (38.7%)28 (3.0%) | 0 (0.0%)1 (0.2%)326 (53.8%)253 (41.7%)26 (4.3%) | 0.010 |
|  | Platelet Count Range, 109/LUnknown<5050-149150-400>400 | 1 (0.1%)9 (0.6%)939 (60.4%)596 (38.3%)10 (0.6%) | 1 (0.1%)3 (0.2%)816 (59.6%)541 (39.5%)9 (0.7%) | 0 (0.0%)6 (3.2%)123 (66.5%)55 (29.7%)1 (0.5%) | <0.001 | 1 (0.1%)5 (0.5%)602 (63.4%)336 (35.4%)5 (0.5%) | 0 (0.0%)4 (0.7%)337 (55.6%)260 (42.9%)5 (0.8%) | 0.034 |
|  | Potassium Range, mmol/LUnknown<3.53.5-5.05.1-6.0>6.0 | 0 (0.0%)35 (2.3%)1422 (91.4%)94 (6.0%)4 (0.3%) | 0 (0.0%)32 (2.3%)1259 (91.9%)75 (5.5%)4 (0.3%) | 0 (0.0%)3 (1.6%)163 (88.1%)19 (10.3%)0 (0.0%) | 0.118 | 0 (0.0%)21 (2.2%)882 (92.9%)44 (4.6%)2 (0.2%) | 0 (0.0%)14 (2.3%)540 (89.1%)50 (8.3%)2 (0.3%) | 0.066 |
|  | Sodium Range, mmol/LUnknown<136136-146147-155>155 | 0 (0.0%)97 (6.2%)1398 (89.9%)56 (3.6%)4 (0.3%) | 0 (0.0%)83 (6.1%)1250 (91.2%)37 (2.7%)0 (0.0%) | 0 (0.0%)14 (7.6%)148 (80.0%)19 (10.3%)4 (2.2%) | <0.001 | 0 (0.0%)56 (5.9%)860 (90.6%)31 (3.3%)2 (0.2%) | 0 (0.0%)41 (6.8%)538 (88.8%)25 (4.1%)2 (0.3%) | 0.819 |
|  | White Blood Cell Count Range, 109/LUnknown<44-1011-20>20 | 0 (0.0%)10 (0.6%)467 (30.0%)963 (61.9%)115 (7.4%) | 0 (0.0%)9 (0.7%)416 (30.4%)853 (62.3%)92 (6.7%) | 0 (0.0%)1 (0.5%)51 (27.6%)110 (59.5%)23 (12.4%) | 0.096 | 0 (0.0%)7 (0.7%)307 (32.3%)572 (60.3%)63 (6.6%) | 0 (0.0%)3 (0.5%)160 (26.4%)391 (64.5%)52 (8.6%) | 0.105 |