**Supplemental Digital Content**

|  |
| --- |
| **Supplemental Content 1**. Fit statistics for latent class analysis model for patients undergoing intraabdominal general surgery. |
| **Number of latent classes** | **Bayesian Information Criterion** |
| 2 | 10,615,424 |
| 3 | 10,387,048 |
| 4 | 10,254,043 |
| 5 | 10,185,529 |
| 6 | 10,137,018 |
| 7 | 10,076,506 |
| 8 | 10,043,441 |
| 9 | 10,013,693 |
| 10 | 9,989,384 |

|  |
| --- |
| **Supplemental Content 2.** Baseline characteristics of the total sample and each latent class in the 9-class model in patients undergoing intraabdominal general surgery procedures, American College of Surgeons National Surgical Quality Improvement Program, 2005-2010. |
|   | **Total Sample** | **Nine Class Latent Class Analysis Model** |
|   |  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** |
| **N** | 466,177 | 56,302 | 64,100 | 20,011 | 49,635 | 95,440 | 48,642 | 30,831 | 68,338 | 32,878 |
| **% of Total** |   | 12.1 | 13.8 | 4.3 | 10.6 | 20.5 | 10.4 | 6.6 | 14.7 | 7.1 |
| **Mortality Risk (%)** | 2.6 | 0.06 | 0.12 | 0.46 | 0.47 | 0.76 | 0.94 | 2.6 | 3.5 | 21.9 |
|   |  |   |   |   |   |   |   |   |   |   |
|   | **%** | **Class Percentages (%)** |
|   |  |  |  |  |  |  |  |  |  |  |
| Female | 57.8 | 31.2 | **80.7** | **59.1** | **81.9** | 48.7 | **58.6** | 54.2 | 56.0 | 48.9 |
| Age (years) |   |  |  |  |  |  |  |  |  |  |
| <40 | 23.7 | **68.3** | **41.5** | **31.2** | **64.2** | 3.9 | 1.2 | 1.5 | 0.0 | 6.0 |
| 40-50 | 17.4 | **21.4** | **35.3** | **21.8** | **22.0** | **19.9** | 11.7 | 13.8 | 0.0 | 9.2 |
| 50-60 | 21.0 | 9.2 | 20.6 | **22.2** | 10.4 | **37.2** | **38.6** | **29.2** | 0.3 | 18.6 |
| 60-70 | 17.9 | 1.1 | 2.6 | 14.1 | 3.3 | **29.7** | **40.0** | **27.9** | 16.4 | **24.0** |
| 70-80 | 12.9 | 0.0 | 0.0 | 7.8 | 0.1 | 9.1 | 8.5 | **17.4** | **48.0** | **23.4** |
| >80 | 7.3 | 0.0 | 0.0 | 2.9 | 0.0 | 0.2 | 0.0 | **10.2** | **35.2** | **18.8** |
| Body Mass Index (kg/m2) |   |  |  |  |  |  |  |  |  |  |
| <18.5 | 2.8 | 1.7 | 0.0 | 1.6 | **6.0** | **3.0** | 0.3 | **3.0** | **3.2** | **7.0** |
| 18.5-25 | 25.5 | **32.0** | 0.0 | 21.7 | **40.1** | **33.0** | 3.2 | **26.9** | **36.7** | **31.3** |
| 25-30 | 27.2 | **36.5** | 0.0 | 25.8 | 24.1 | **39.2** | 14.0 | **34.5** | **37.8** | **27.4** |
| 30-35 | 16.6 | **18.9** | 5.4 | **17.1** | 14.2 | **19.7** | **21.7** | **20.5** | 16.5 | 16.2 |
| >35 | 28.0 | 10.9 | **94.6** | **33.7** | 15.6 | 5.2 | **60.8** | 15.2 | 5.7 | 18.1 |
| Emergency | 24.0 | **63.3** | 2.2 | 11.7 | **31.7** | 1.6 | 4.5 | **83.7** | 9.3 | **58.6** |
| Functionally Dependent | 7.8 | 1.4 | 0.5 | 1.5 | 4.0 | 1.3 | 2.7 | 7.5 | **10.2** | **62.5** |
| Current Smoker | 19.4 | **28.4** | 16.3 | 19.3 | **23.6** | **24.0** | 14.7 | 19.4 | 6.2 | **24.1** |
| Congestive Heart Failure | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | **1.3** | **10.3** |
| Myocardial Infarction | 0.6 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.4 | 0.2 | **0.9** | **5.6** |
| Coronary Revascularization | 8.1 | 0.2 | 0.3 | 3.2 | 0.2 | 2.7 | **17.2** | 7.2 | **22.2** | **23.6** |
| Angina | 0.6 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | **1.1** | 0.4 | **1.1** | **3.6** |
| Hypertension | 44.8 | 3.9 | 43.1 | 31.8 | 4.4 | 31.2 | **93.1** | **56.5** | **78.1** | **71.9** |
| Peripheral Vascular Disease | 1.4 | 0.0 | 0.1 | 0.4 | 0.1 | 0.4 | **1.9** | 0.7 | **2.7** | **8.1** |
| Diabetes | 15.8 | 1.3 | **18.9** | 9.3 | 2.3 | 5.7 | **49.7** | 12.0 | **19.7** | **30.2** |
| Dyspnea | 12.0 | 0.5 | **21.2** | 8.4 | 2.4 | 4.7 | **23.6** | 5.1 | **14.9** | **35.1** |
| Ventilator Dependent | 1.6 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | **21.9** |
| Chronic Obstructive Pulmonary Disease | 4.7 | 0.0 | 0.9 | 2.0 | 0.3 | 2.8 | **7.6** | **5.0** | **8.5** | **20.0** |
| Pneumonia | 0.9 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.2 | 0.2 | **10.6** |
| Ascites | 2.2 | 0.7 | 0.0 | 0.3 | 2.0 | 1.3 | 0.4 | **4.3** | 1.5 | **14.2** |
| Varices | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | **0.3** | 0.2 | 0.2 | 0.1 | **1.2** |
| Acute Renal Failure | 0.8 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | **10.3** |
| Dialysis | 1.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | **15.0** |
| Impaired Sensorium | 1.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.5 | 0.3 | **14.1** |
| Stroke | 4.9 | 0.1 | 0.6 | 1.8 | 0.6 | 1.8 | **7.1** | 4.2 | **13.6** | **17.7** |
| Wound Infection | 3.4 | 0.6 | 0.8 | 1.6 | **3.9** | 1.5 | 3.1 | 1.2 | 2.0 | **23.1** |
| Steroid Use | 4.1 | 1.3 | 0.7 | 2.1 | **7.1** | 2.9 | **4.5** | 3.9 | **4.2** | **13.9** |
| Bleeding Disorders | 5.4 | 0.4 | 1.0 | 1.7 | 2.8 | 2.1 | **6.4** | **6.7** | **8.5** | **27.4** |
| Transfusion | 0.9 | 0.0 | 0.0 | 0.1 | 0.6 | 0.2 | 0.1 | 0.2 | 0.7 | **8.6** |
| Sepsis/Septic Shock | 16.1 | **30.1** | 1.4 | 3.7 | **19.8** | 1.7 | 3.8 | **52.1** | 5.4 | **66.5** |
| Cancer | 21.8 | 0.4 | 1.4 | 13.0 | 8.9 | **48.7** | 19.7 | 3.2 | **47.8** | 14.6 |
| Estimated Glomerular Filtration Rate (ml/min/1.73m2) |   |  |  |  |  |  |  |  |  |  |
| Missing | 7.9 | 5.1 | 5.8 | **99.3** | 4.3 | 4.5 | 3.4 | 0.5 | 2.2 | 1.3 |
| <15 | 1.3 | 0.1 | 0.1 | 0.0 | 0.2 | 0.1 | **1.4** | 0.2 | 0.2 | **14.5** |
| 15-30 | 2.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 1.6 | **3.0** | **3.4** | **16.6** |
| 30-60 | 12.6 | 0.4 | 1.0 | 0.0 | 0.9 | 4.6 | **20.3** | **22.8** | **39.8** | **25.7** |
| 60-90 | 33.2 | 19.6 | 28.0 | 0.6 | 9.5 | **46.4** | **43.9** | **52.2** | **50.7** | 19.1 |
| >90 | 42.8 | **74.8** | **65.2** | 0.1 | **85.0** | **44.3** | 29.3 | 21.4 | 3.7 | 22.8 |
| Hematocrit (%) |   |  |  |  |  |  |  |  |  |  |
| Missing | 5.4 | 0.7 | 2.5 | **88.5** | 0.6 | 1.4 | 3.4 | 0.3 | 1.7 | 1.0 |
| <34 | 19.3 | 0.0 | 3.8 | 0.0 | **32.9** | 14.9 | 14.4 | 12.6 | **32.7** | **64.6** |
| 34-38 | 22.0 | 0.8 | **22.4** | 0.7 | **45.5** | 20.2 | **24.4** | 19.6 | **29.2** | 16.9 |
| >38 | 53.4 | **98.4** | **71.3** | 10.8 | 21.0 | **63.5** | **57.7** | **67.5** | 36.4 | 17.4 |
| Note: Percentages in bold indicate that the proportion of patients with the given characteristic in the latent class is higher than the proportion in the overall sample. |

|  |
| --- |
| **Supplemental Content 3.** Descriptions of the main characteristics of each latent class in the 9-class model. |
| **Class** | **Class Descriptions** |
| **A** | Young (age <50), low comorbidity burden, emergent procedures. |
| **B** | Young (age <50), morbidly obese females. |
| **C** | Young (age <60), low comorbidity burden, obesity, no preoperative labs. |
| **D** | Young (age <50), normal to underweight females, emergent procedures. |
| **E** | Middle aged (age 40-70), low comorbidity burden, with cancer. |
| **F** | Middle aged (age 50-70), morbidly obese with cardiovascular and associated comorbidities (diabetes, chronic kidney disease, etc.). |
| **G** | Older (age >50), moderate comorbidity burden, emergent procedures. |
| **H** | Older (age >60), moderate to severe comorbidity burden, with cancer. |
| **I** | Older (age >60), severe comorbidity burden, functionally dependent. |

|  |
| --- |
| **Supplemental Content 4.** Adjusted risk ratios of 30-day mortality based on latent risk class in patients undergoing intraabdominal general surgery procedures, American College of Surgeons National Surgical Quality Improvement Program, 2005-2010. |
|  |  |  | **Adjusted for Procedure** | **Adjusted for Procedure** |
|  |  |  | **Original Sample** | **Bootstrapped Samples** |
| **Class** | **N** | **30-Day Mortality (%)** | **RR** |  | **95% CI** | **RR** |  | **95% CI** |
| **5** | 32,878 | 22 | 5.42 | \* | [5.20, | 5.65] | 5.20 | \* | [4.99, | 5.41] |
| **4** | 99,169 | 3.3 | 1.00 |  |  |   | 1.00 |  |  |  |
| **3** | 213,728 | 0.71 | 0.238 | \* | [0.224, | 0.253] | 0.240 | \* | [0.226, | 0.255] |
| **2** | 64,100 | 0.12 | 0.072 | \* | [0.056, | 0.093] | 0.083 | \* | [0.064, | 0.106] |
| **1** | 56,302 | 0.06 | 0.041 | \* | [0.029, | 0.057] | 0.047 | \* | [0.032, | 0.063] |
| **Total** | **466,177** | **2.6** |   |   |   |   |   |   |   |   |
|  |  |  | **AUC** |   | **95% CI** | **AUC** |   | **95% CI** |
|  |  |  | 0.895 |   | [0.892, | 0.898] | 0.893 |   | [0.890, | 0.895] |
| RR, risk ratio; CI, confidence interval; AUC, area under the curve of the receiver operator characteristic curve. |
| Adjustment for procedure based on the Clinical Classifications Software of the Agency for Healthcare Research and Quality. |
| In the original sample, the latent risk class is assigned based on the highest posterior probability. In the bootstrapped samples, the latent risk class can vary based in proportion to the estimated posterior probabilities of belonging to any particular latent risk class. |
| \*P<0.05 |