**Supplementary Table 1: Summary of the general demographic and surgical/medical model input features.**

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| **Feature**  | **Description** |
| Age | Patient's age at time of admission |
| Acute Kidney Injury (AKI) Class | Categorical variable; one of: 1, 2, 3 or NA. Computed using method of Mehta *et al*1  |
| Alcohol Consumption | Measured in oz / week |
| ASA Score | American Society of Anesthesiologists (ASA) score. Categorical variable; one of: 1, 2, 3, 4, 5 or NA  |
| Body Mass Index | Measured in kg / m2  |
| Disposition | Where patient was discharged to. Categorical variable; one of: Home or self care, Home health service, Skilled nursing facility, Other |
| Duration of Surgery | Measured in minutes |
| Duration of Mechanical Ventilation | Total duration (in hours) of mechanical ventilation post-operatively. Computed using method of Gabel *et al*2 |
| Ethnicity | Patient's ethnicity. Categorical variable; one of: Cuban, Hispanic/Latino, Hispanic/Spanish Origin Other, Mexican, Not Hispanico or Latino, Null, Patient Refused, Puerto Rican, Unknown |
| Financial Class | Patent's financial class. Categorical variable; one of: Commercial, Group Health Plan, International Payor, Medi-Cal, Medi-Cal Assigned, Medicare, Medicare Assigned, Null, Other, Self-Pay, Tricare, UCLA Managed Care, Worker’s Comp |
| Indicator for Admission with Primary Diagnosis-Related Group (DRG) code | 0/1 to indicate whether patient was admitted with a primary diagnosis-related group (DRG) code |
| Indicator for Alcohol Use | 0/1 to indicate whether patient consumes alcohol |
| Indicator for Anesthesia Type: Bier Block | 0/1 indicators for various types of anesthesia (patients may have more than one type) |
| Indicator for Anesthesia Type: Epidural |
| Indicator for Anesthesia Type: General |
| Indicator for Anesthesia Type: MAC |
| Indicator for Anesthesia Type: MAC with Local |
| Indicator for Anesthesia Type: Regional Block |
| Indicator for Anesthesia Type: Spinal |
| Indicator for Hemodialysis | 0/1 for whether patient is on inpatient dialysis |
| Indicator for Missing Alcohol Use Indicator | 0/1 for whether alcohol use indicator is missing |
| Indicator for Missing Alcohol Consumption | 0/1 for whether alcohol consumption is missing |
| Indicator for Missing Age | 0/1 for whether age is missing |
| Indicator for Pain Management | 0/1 for whether patient has history of pre-admission pain management |
| Indicator for Smoking | 0/1 for whether patient is a smoker |
| Indicator for Tracheostomy  | 0/1 for whether patient was administered tracheostomy during admission  |
| Number of Admissions in Previous Year | Number of prior admissions in one year period before current admission  |
| Patient Class | Categorical variable; one of: Emergency, Inpatient, Outpatient, Overnight recovery, Same day admit, Surgery outpatient |
| Primary Language | Categorical variable; one of: English, Spanish, Other |
| Race | Categorical variable; one of: Asian, Black, White, Other |
| Relative Time to Surgery from Admission | Measured in hours |
| Risk, Injury, Failure, Sustained Loss and End-Stage (RIFLE) Class | Categorical variable; one of: 1, 2, 3 or NA; computed using method of Bellomo *et al*3 |
| Sex | Categorical variable; one of: Male, Female |
| Surgical Service Line | Categorical variable; one of: Cardiac, General, Liver Transplant, Neurosurgery, Obstetrics and Gynecology, Ophthalmology, Oral and Maxillofacial, Orthopaedics, Other, Otolaryngology, Pediatric, Plastic, Radiation Oncology, Radiology, Surgical Oncology, Thoracic Surgery, Urology, Vascular |
| Total Blood Transfused | Measured in mL |
| Total Colloid Transfused | Measured in mL |
| Total Estimated Blood Loss | Measured in mL |
| Total Fluid Transfused | Measured in mL |
| Weight | Patient's weight (in kg) at admission |

**References:**

1. Mehta RL, Kellum JA, Shah S V, Molitoris BA, Ronco C, Warnock DG, Levin A. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. Crit Care 2007;11:R31.

2. Gabel E, Hofer IS, Satou N, Grogan T, Shemin R, Mahajan A, Cannesson M. Creation and Validation of an Automated Algorithm to Determine Postoperative Ventilator Requirements After Cardiac Surgery. Anesth Analg 2017;124:1423–30.

3. Bellomo R, Kellum JA, Ronco C. Defining and classifying acute renal failure: from advocacy to consensus and validation of the RIFLE criteria. Intensive Care Med 2007;33:409–13.