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## **Identifying Adverse Events Predictors In The Critical Care Resuscitation Unit Using Machine Learning**

### **Introduction/Objectives**

The Critical Care Resuscitation Unit (CCRU) excels in reducing interhospital transfer time and lowering mortality rates for critically ill patients. The severity and type of adverse events (AE) that patients may face while in the CCRU have not been studied. The study aimed to characterize the type and severity of AE in the CCRU and identify patient-level factors that increase risk for more severe harm due to AE. We hypothesized that patients with higher lactate levels would have higher risk of more severe adverse events.

### **Methods**

This retrospective observational study included CCRU patients from 2016 to 2023 who experienced AE. Patients who did not have complete data were excluded. Types of AE, as being reported by clinicians, were categorized as leading to no, minor, or major harm. A Classification and Regression Tree (CART) was employed to identify variables associated with severity of harm. The CART uses recursive partition to create a decision tree and assigns significant factors as percentages of Relative Variable Importance (RVI).

### **Results**

We evaluated 236 patients, with a mean age of 62 (SD = 19.3 years) and 118 (50%) were female. There were 201 (85%) patients who experienced AE leading to “no harm”, 27 (11%) leading to “minor harm” and 8 (4%) leading to “major harm”. Mean lactate on CCRU arrival was higher with patients experiencing “major harm” (4.74 mmol/dL) than those who experienced AE associated with “no harm” (2.76 mmol/dL, P=0.019). The CART analysis identified maximum respiratory rate (RR), at 30 breaths per minute, as the most important predictor (RVI 100%), and maximum mean arterial pressure (MAP) as second most important (RVI 30%).

### **Conclusions**

Adverse events, although low frequency (<4%), do occur among patients transferred to the CCRU, and RR and MAP were among significant predictors for harmful AE's. Thus, clinicians

may need to pay more attention to patients with high respiratory rate, and “stable” patients, despite their high MAP, to avoid further adverse events.

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