Identifying Adverse Event Predictors In The Critical Care Resuscitation Unit Using Machine Learning

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Adverse Events

- Adverse events are negative consequences resulting from medical procedures, surgeries, medications, or other treatment modalities
- This study aimed to analyze patient level factors more highly associated with severe harms from adverse events

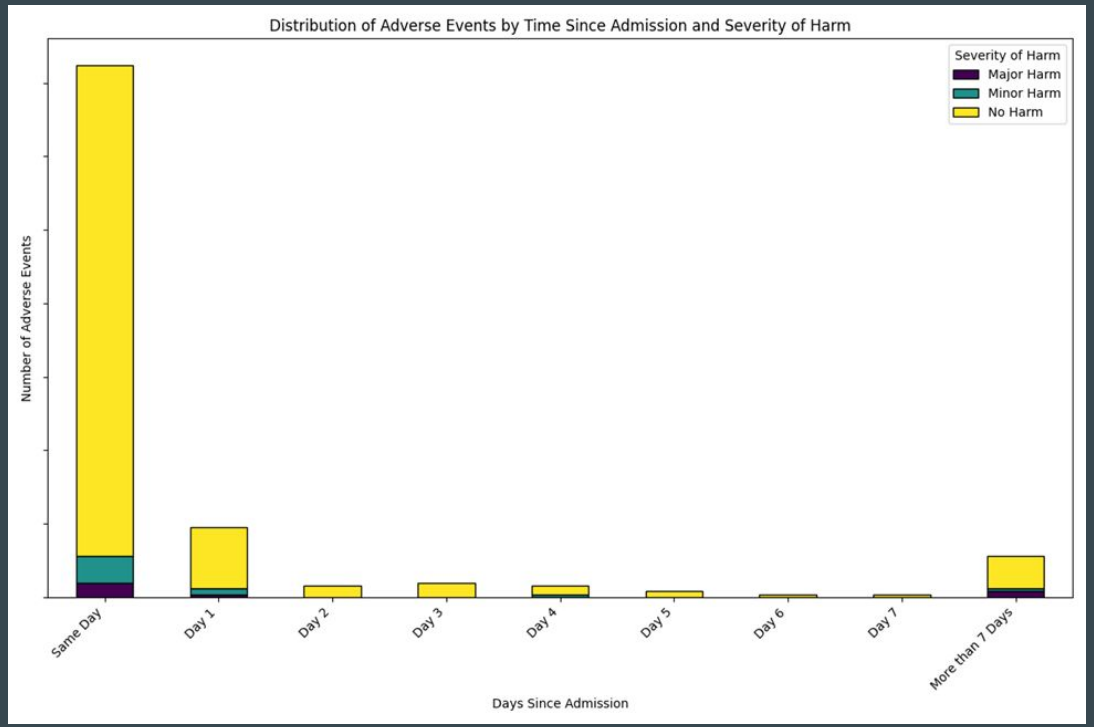

Figure 1.1 - Number and type of adverse events occurring since admission.

- Analyzed patient level variables for 236 CCRU patients from 2016-2023 on arrival to the CCRU

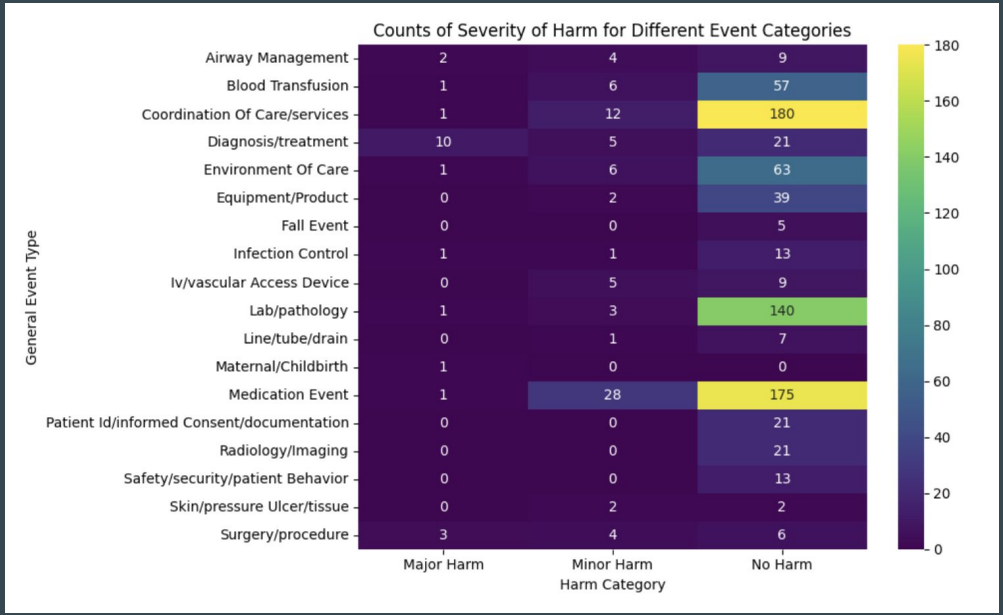

Figure 1.2 - Number of adverse events types based on severity.

- Adverse events were categorized as major, minor, or no harm
- Clinicians categorized the adverse events into general event types

Lactate Levels

- **Hypothesis:** Patients who have higher lactate levels may be at a higher risk of experiencing more severe harms from adverse events
- Higher lactate levels can occur as a result of anaerobic metabolism, indicating that the patient may be experiencing a lack of oxygen
- Lactate levels data was analyzed using an independent T test

Variables

- GCS
- Blood pressure
- Temperature
- Heart rate
- Pulse
- Respiratory rate
- Oxygen flow
- Admission to vitals time
- Length of stay
- Lactate
- POC glucose
- Artificial airway (yes or no)
- Motor response lower extremity
- Motor response upper extremity

Methods

- Independent T test was used for serum lab markers (lactate and bicarbonate)
- Used Classification and Regression Tree (CART) since some of the variables used were continuous and others were categorical
- CART uses recursive partition to assign percentages of Relative Variable Importance (RVI) to the patient level variables that have the largest influence on the occurrence of adverse events

Results

- Lactate levels were higher for patients who were experiencing major harm
- Respiratory rate was determined to be the most important predictor (RVI 100%) followed by maximum mean arterial pressure (RVI 30%)(both on arrival to CCRU)

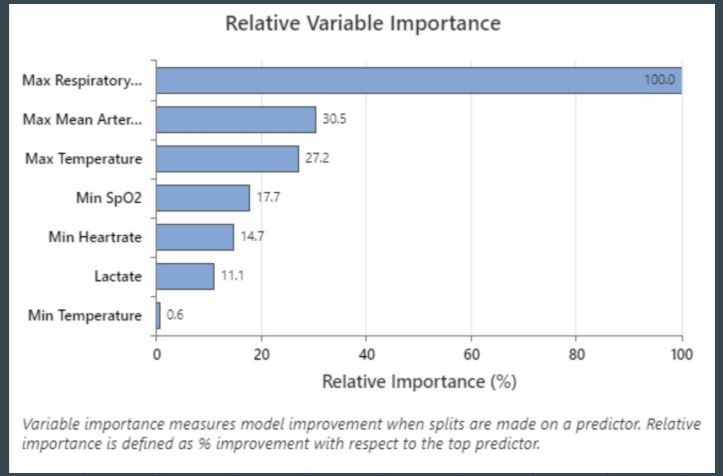

Figure - RVI assigned by CART for different patient level factors

Conclusions

- The hypothesis was supported since patients with higher lactate levels experienced more severe harms as a result of their adverse event
- Sicker patients may be more likely to suffer major harm from their adverse events
- Extra vigilance could be useful in preventing severe harms for sicker patients (high lactate, high respiratory rate)

Thank You