Is out of hours ICU care in sepsis dangerous?

Ngā Rourou Raraunga

"Nau te rourou, naku te rourou, ka ora te manuhiri"

(With your food basket and my food basket, the visitors will be fed)

HACK AOTEAROA
ARTIFICIAL INTELLIGENCE IN HEALTHCARE
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Reproducibility

- Github repo (Jupyter notebooks and Rmarkdown):

  https://github.com/nga-rourou-raraunga/sepsis-icu-time-of-day-analysis

- HTML from Rmarkdown ->

santanalele.github.io

The Problem

- Hospitals have less staff on site 'out of hours' for cost and morale reasons

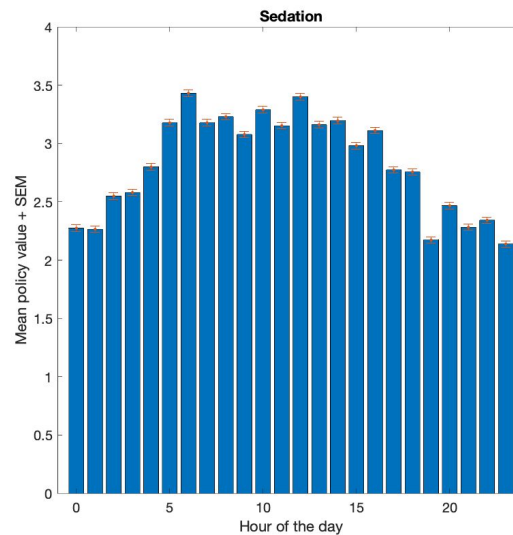- Care may be worse. This has never been quantified.
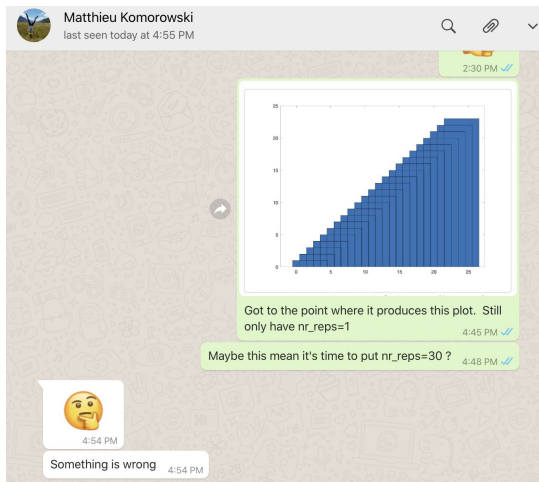
Description of Data

Derived from MIMIC-III and eICU, sepsis patients

- 984,269 rows
- 20,846 ICU admissions
- Data set details, see Komorowski et al 2018

Komorowski, M., et al (2018). The Artificial Intelligence Clinician learns optimal treatment strategies for sepsis in intensive care. *Nature Medicine*, *24*(11), 1716–1720. https://doi.org/10.1038/s41591-018-0213-5

Data provided by paper author.

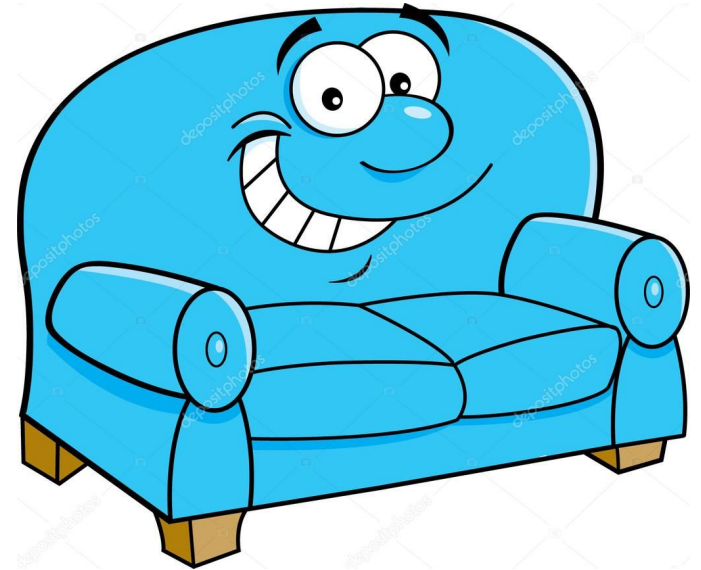# Method: Reinforcement Learning
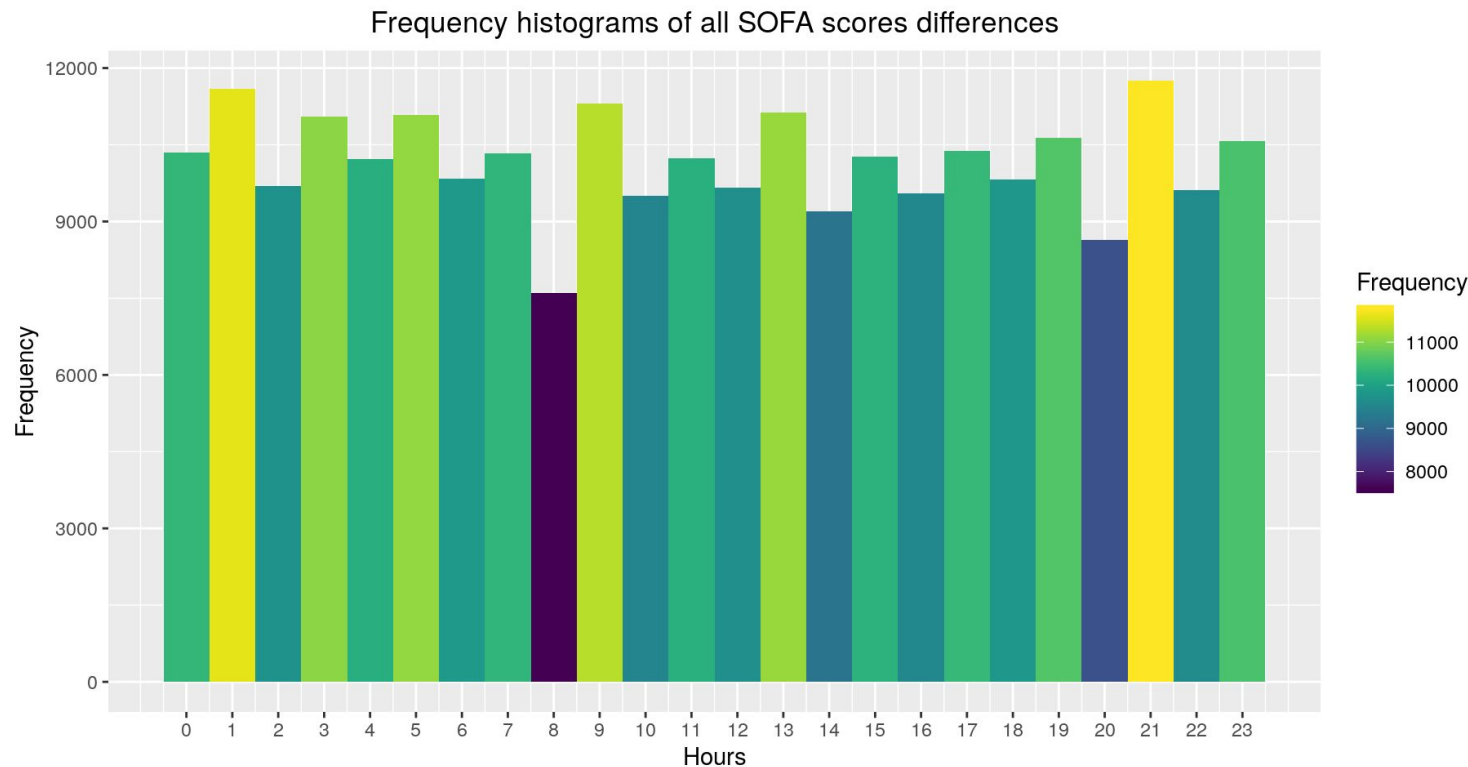
Method: Data Exploration

- Outcome of interest:
  - Delta SOFA
  - Time of death
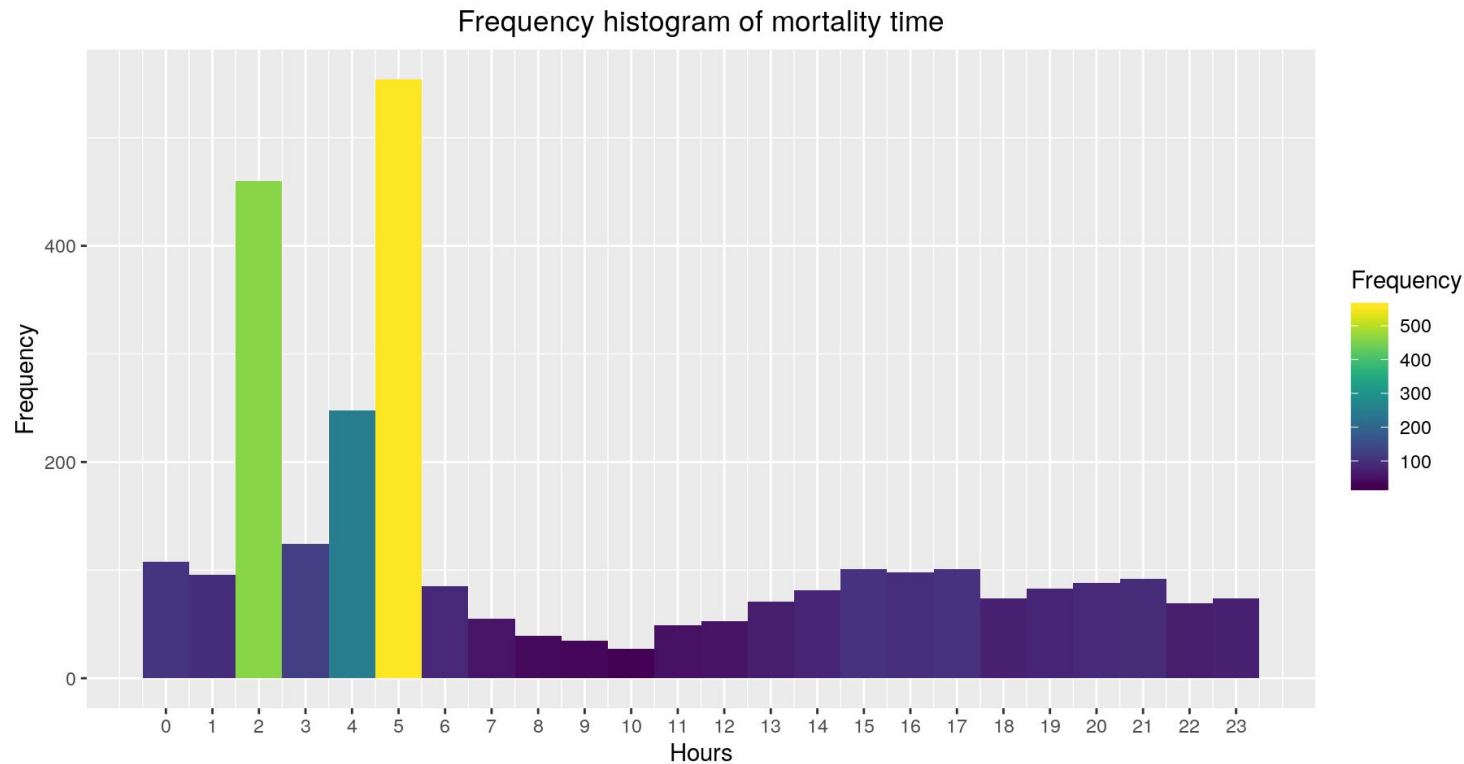
Sequential Organ Failure Assessment (SOFA)

- 3 physiologic and 3 lab variables

- Scored from 0 to 24 (higher worse)

- Used to define Sepsis (SOFA>1)

Data Exploration with clinicians

Frequency histograms of all SOFA scores differences

Data Exploration with clinicians

Frequency histogram of mortality time

Next Steps

Reinforcement learning:

- Matlab → Python (easier reproducibility)
- Broader actions than just Sedation
- Reward: delta-SOFA (current model just terminal reward on 90-day mortality)

Data interpolation of SOFA

- Multiple SOFA scores for one patient in a hour

Thank you

Ngā mihi