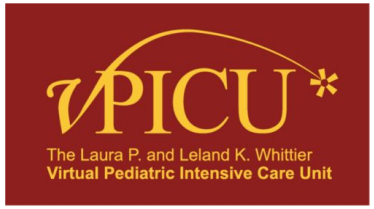

USC University of Southern California

Personalized Predictions of Patient Physiologies Associated with Successful Extubation

Chloe Ling, Laura Pruitt, Cameron Carlin, David Ledbetter, Melissa Aczon, Randall Wetzel

Disclosures

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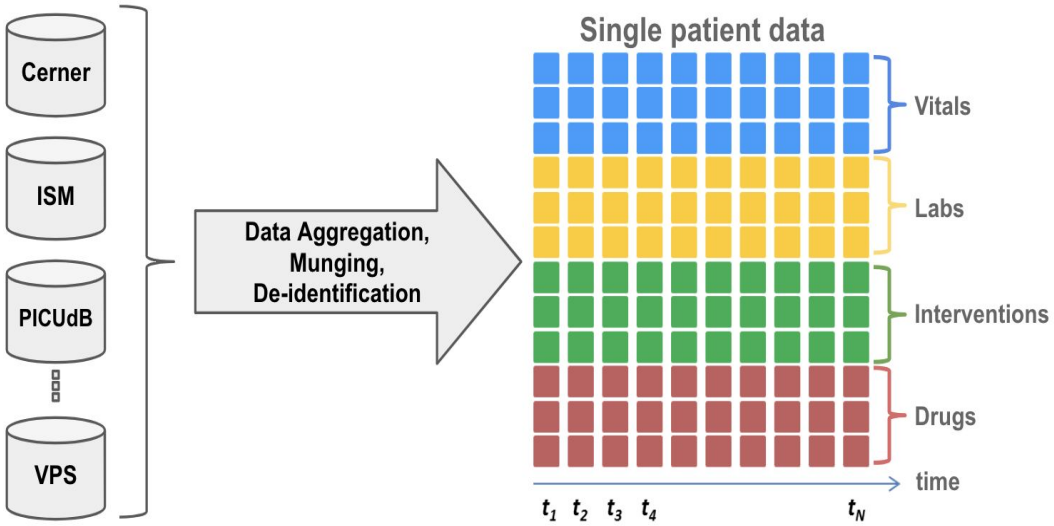
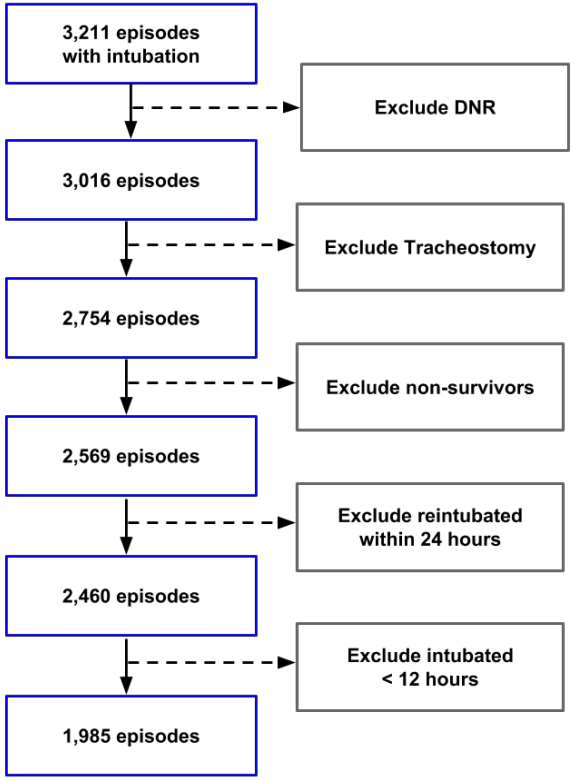
Objectives

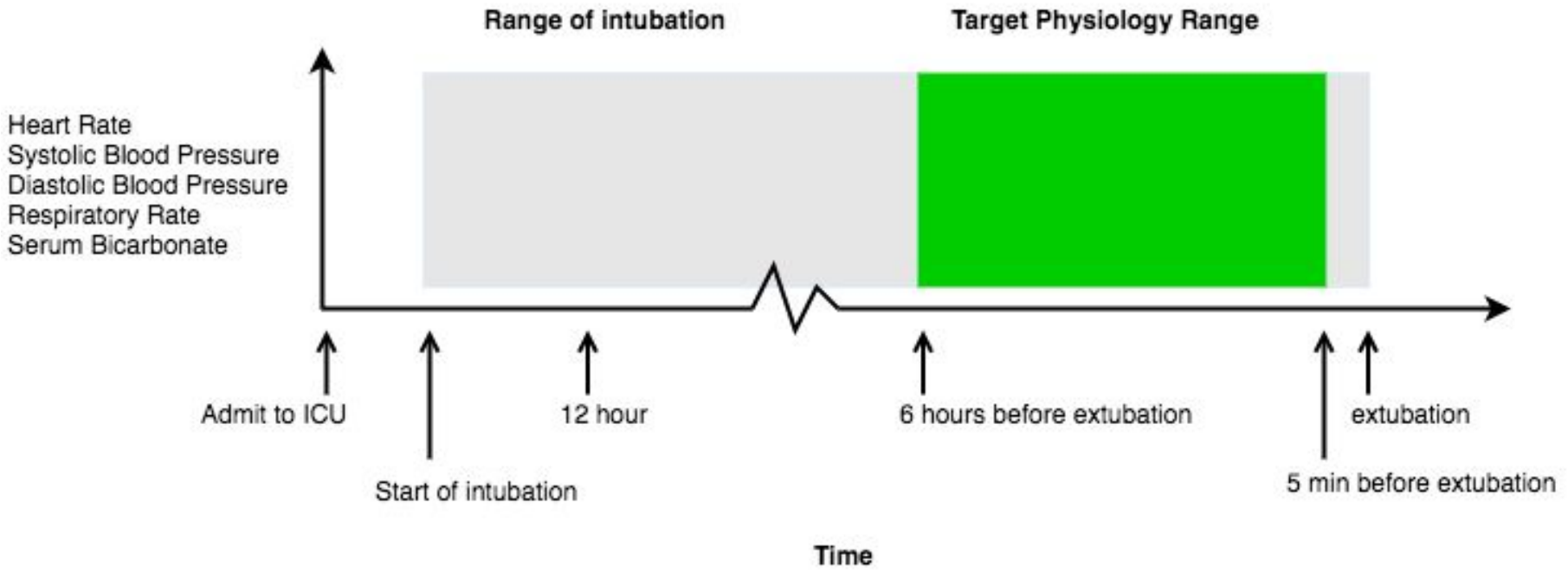
- Quantify the physiologic state of successfully extubated children
- Develop a machine learning model that can predict patient-specific physiological values associated with successful extubation

Data Sources and Cohort Selection

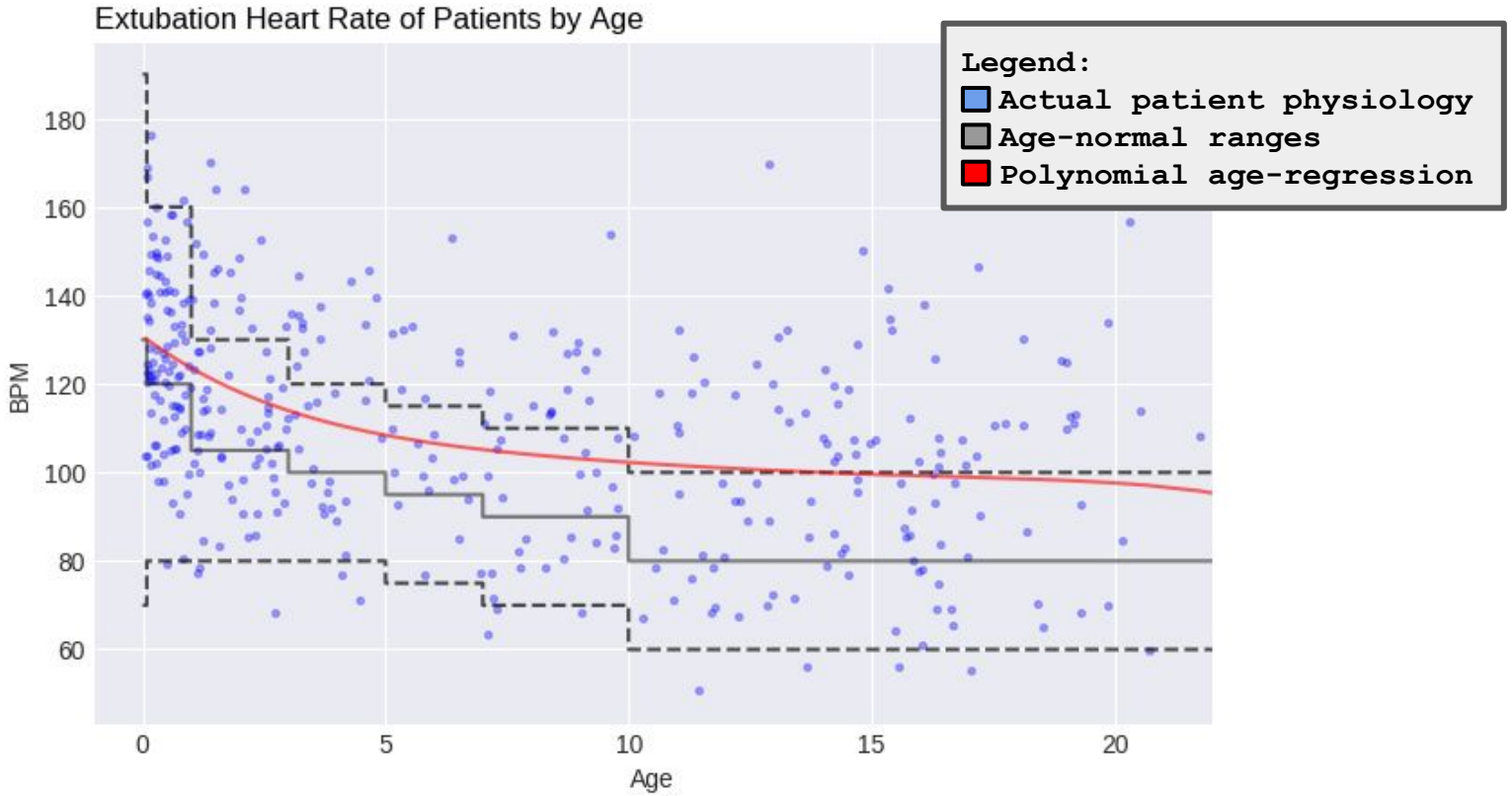




Quantifying the physiologic state of successful extubations

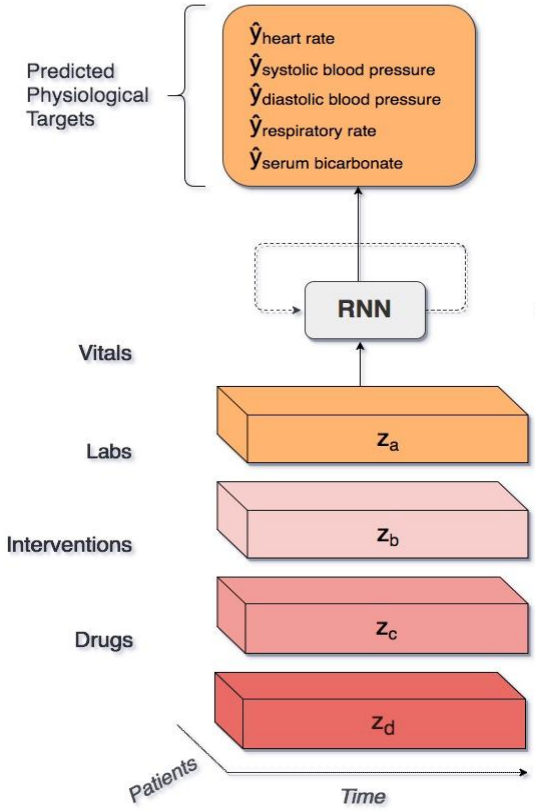


Successful Extubation Heart Rates



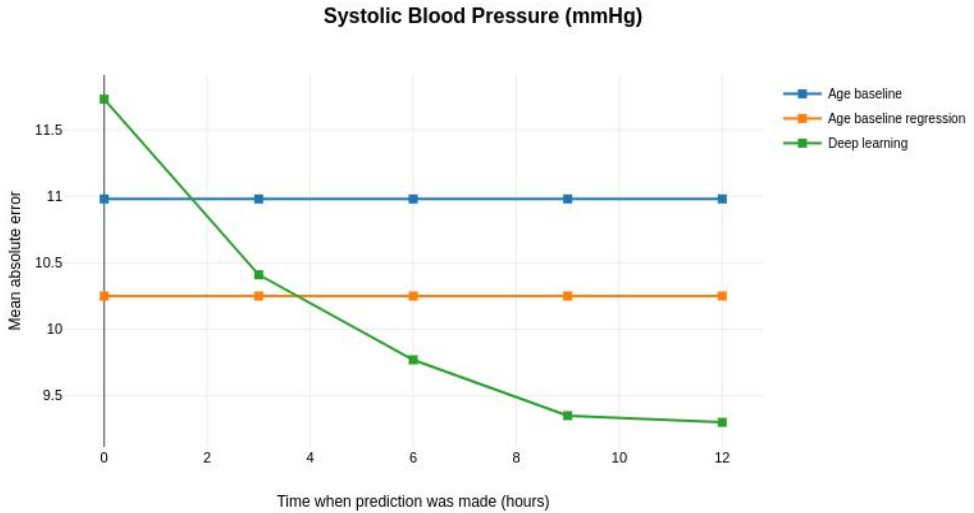
Recurrent Neural Network Model

- Input is a sequence of measurements (vitals, labs, drugs, interventions) of a single patient
- Output is prediction of that patient's physiologically acceptable state for successful extubation
  - heart rate
  - systolic blood pressure
  - diastolic blood pressure
  - respiratory rate
  - serum bicarbonate
- Output is generated each time there is a measurement



Results

Notes:
→ Increased performance with additional observation window
→ Moderate performance increase compared to age-normal baselines across physiologies tested



Model	Heart Rate MAE (bpm)	Systolic Blood Pressure MAE (mmHg)	Diastolic Blood Pressure MAE (mmHg)	Respiratory Rate MAE (bpm)	Serum Bicarbonate MAE (mg/dL)
Age-Normal	20.0	11.0	10.7	7.1	3.8
Age-Regression	16.7	10.3	**8.6**	5.3	3.8
RNN (12th hr)	**16.0**	**9.3**	9.3	**5.0**	**3.2**

Conclusion

The RNN model:

- Can more accurately predict patient-specific physiologic states than a polynomial age-regression model
- Has significant improvement over the models generated from published age-normalized values