



Imitation Learning for Clinical Decision Support in Pediatric ECMO

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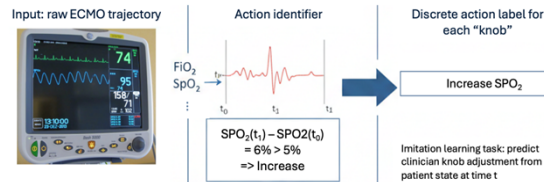
What?

Motivation and Background

Pediatric critical care involves high-stakes adjustments in ECMO (Extracorporeal Membrane Oxygenation)

Gap in Support: A critical lack of automated decision support tools for this domain, particularly for pediatric patients.

Safety Constraints: Evaluating new strategies directly on live patients is ethically and practically unfeasible.



ECMO: a life-support system used for patients with severe cardiac or respiratory failure.

Imitation Learning: Learn a policy that mimics expert behavior using offline historical demonstration trajectories.

TabPFN: a transformer-based tabular foundation model designed for small tabular datasets.

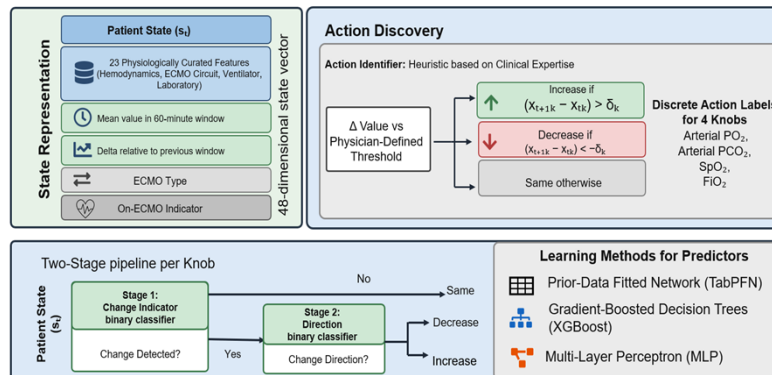
Lin, J. C. (2017). Extracorporeal membrane oxygenation for severe pediatric respiratory failure.
Hollmann, et al, 2025. Accurate predictions on small data with a tabular foundation model, Nature

How?

Our Method

Goal:

Learn action models (policies) from observational clinical trajectories where actions are not explicitly labeled.



Future Work

- Incorporate clinical reward signals to move beyond imitation toward improved policy learning.
- Study whether disagreement regions are associated with neurological injury
- Extend validation to larger and more diverse pediatric ECMO cohorts.

Acknowledgement

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<https://starling-lab.github.io/>

What we get?

Empirical Evaluation

- Q1. Do the learned policies generalize to unseen data?
Q2. Are the policies calibrated?
Q3. Where do the learned policies disagree with the clinicians?

Balanced Accuracy (Mean):



Calibration (ECE):



Lower ECE indicates more reliable confidence estimates.

Disagreement Analysis

Top split features in regression trees where model predictions diverge from clinicians:

- FIO2:** Most frequent disagreement signal.
- SpO2:** High impact on TabPFN splits.
- Lactate/pH:** Correlated with MLP errors.