

Analysis of Clinical Practice Guidelines through Biological Pathway Bioinformatics

Presented by:

Varun Ramraj
M.Sc. Candidate, Bioinformatics
University of British Columbia

Supervisor:

Kendall Ho, MD FRCPC
Associate Professor of Emergency Medicine
Director, eHealth Strategy Office
Faculty of Medicine, University of British Columbia

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FACULTY OF MEDICINE
eHealth Strategy Office

A Question...

Do you observe variations in your clinical practice while treating heart attacks, pneumonia or sepsis?

Different cities/EDs?

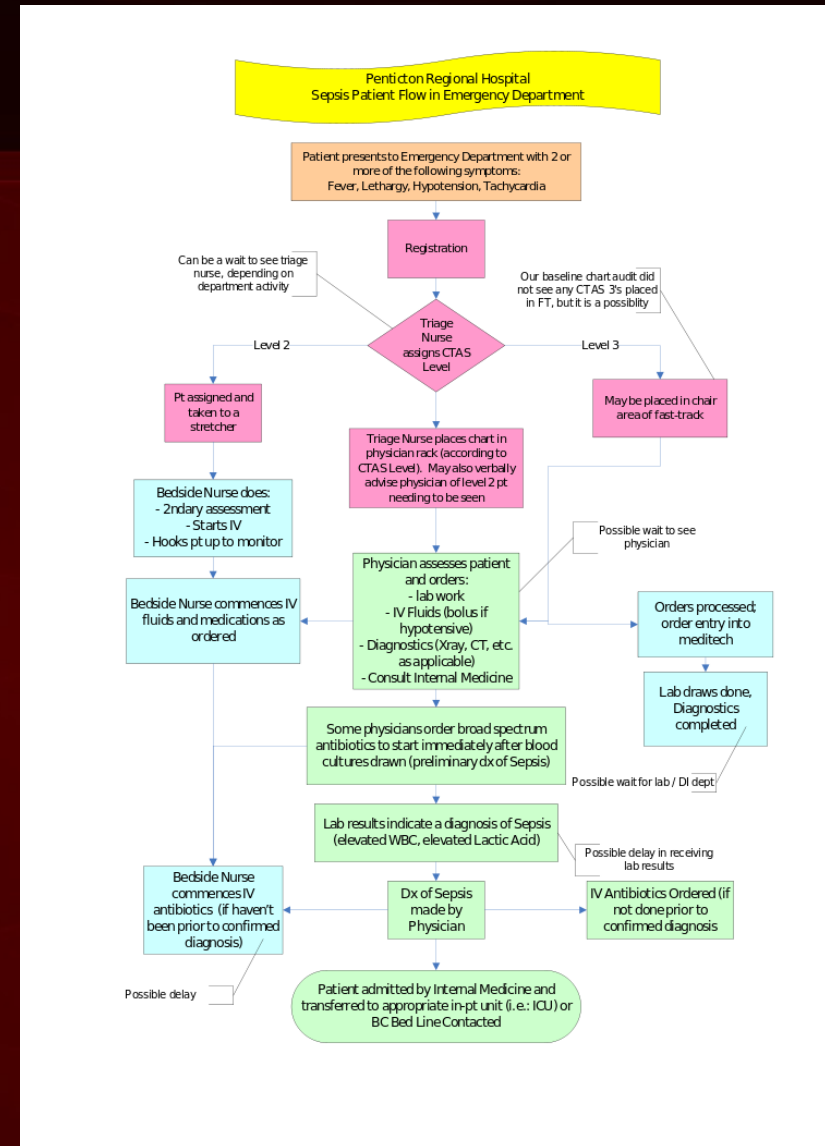
Why? What effects might these variations have on clinical outcome?

Current Knowledge Gap

- ◆ Different EDs implement CPGs differently
→ contextual differences in EDs.
- ◆ Comparing differences:
 - EDs can learn from each other.
 - EDs can improve their own care.
- ◆ How to quantify and pinpoint differences?

Objective

- Digitize sepsis care maps to facilitate comparison and track longitudinal evolution of practices.
- Background:
 - ◇ CPGs try to harmonize optimal, evidence based care.
 - ◇ Care maps are visual representations of CPGs manifestations.



Why Compare Care Maps?

- CPGs → narrative → difficult!
- Care maps → graphical → easier!
- Positive feedback loop:
 - ◇ CPGs created with evidence.
 - ◇ Comparison of implementations → more evidence.
 - ◇ Alter implementations using new evidence.
 - ◇ Rinse and repeat.

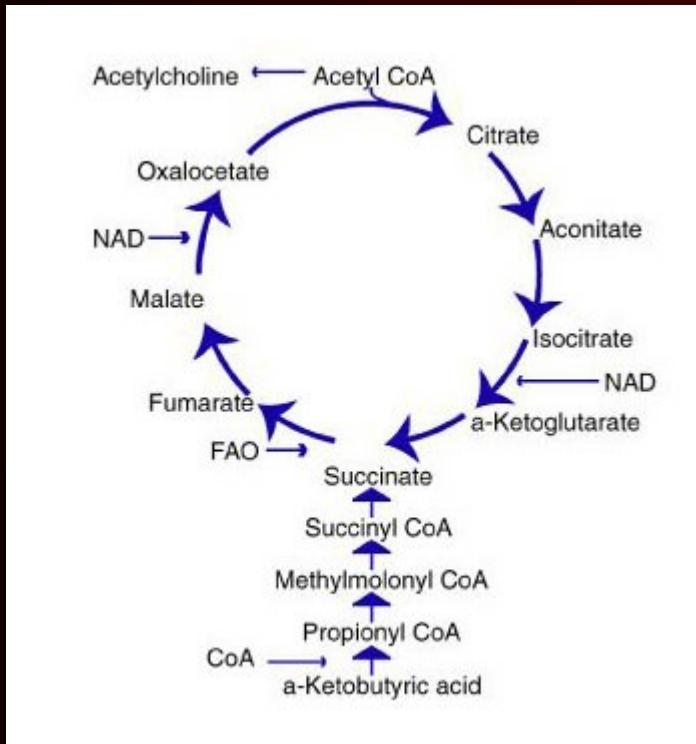
Computational Analysis

- ◆ Quantitative information obtained:
 - ◆ Cross-sectional → comparison across EDs.
 - ◆ Longitudinal → comparison within single ED over time.
 - ◆ Consensus → across all EDs.
- ◆ Challenges:
 - ◆ No document standard
 - ◆ Non-standardized vocabulary
 - ◆ Noncomputable documents

Bioinformatics Concepts – A Solution

- Care maps look like biological pathways.

- Pathways have document standards.



<http://www.science-autism.org/>

- Pathways have analysis algorithms
→ coefficients of similarity btwn.
Pathways.

- Think of Krebs' cycle between two species:

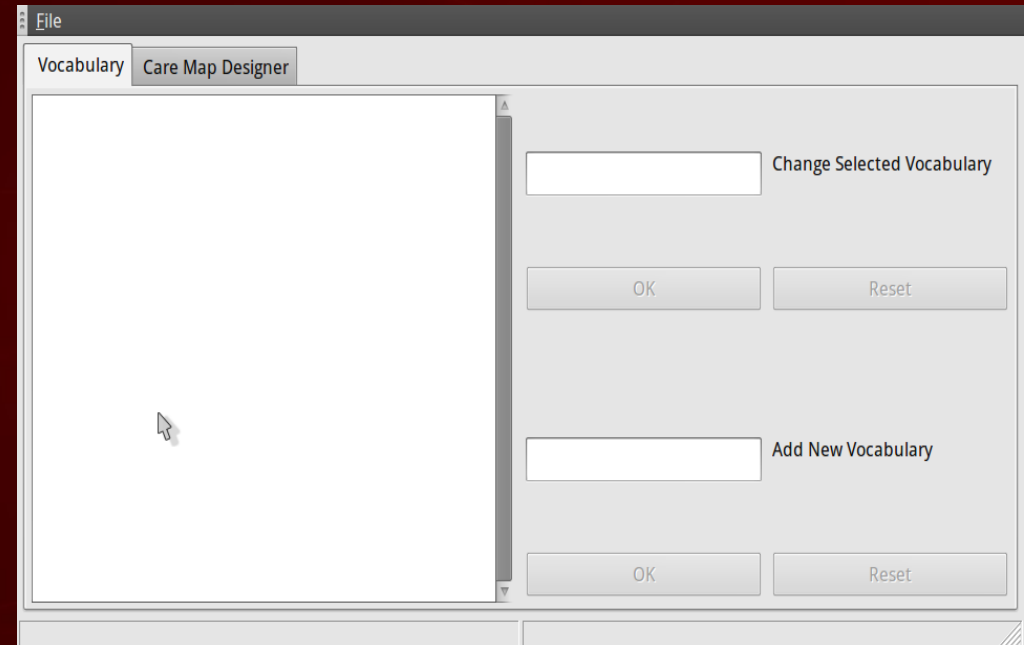
- ◆ Closer related → small coefficient!

Goals

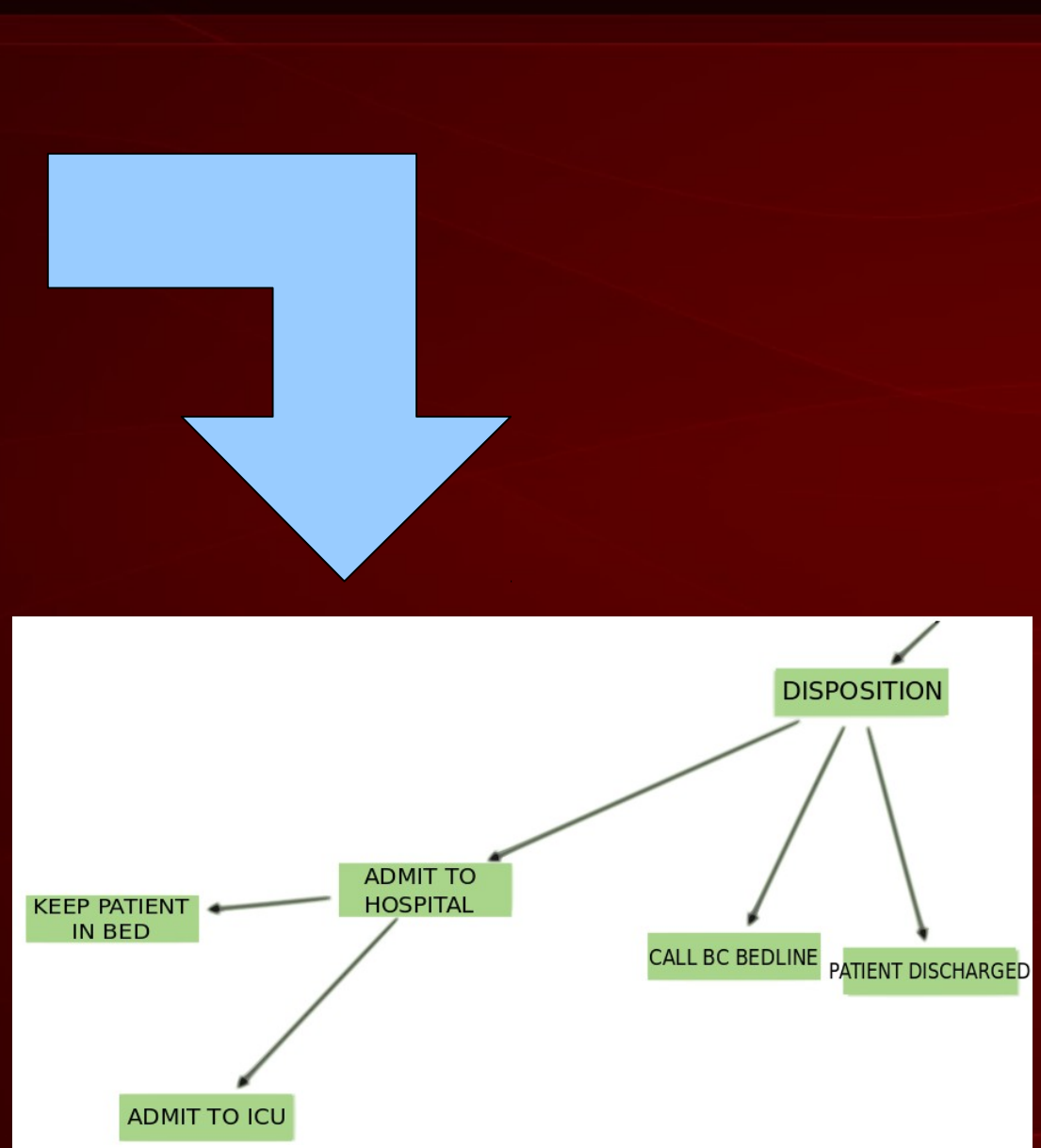
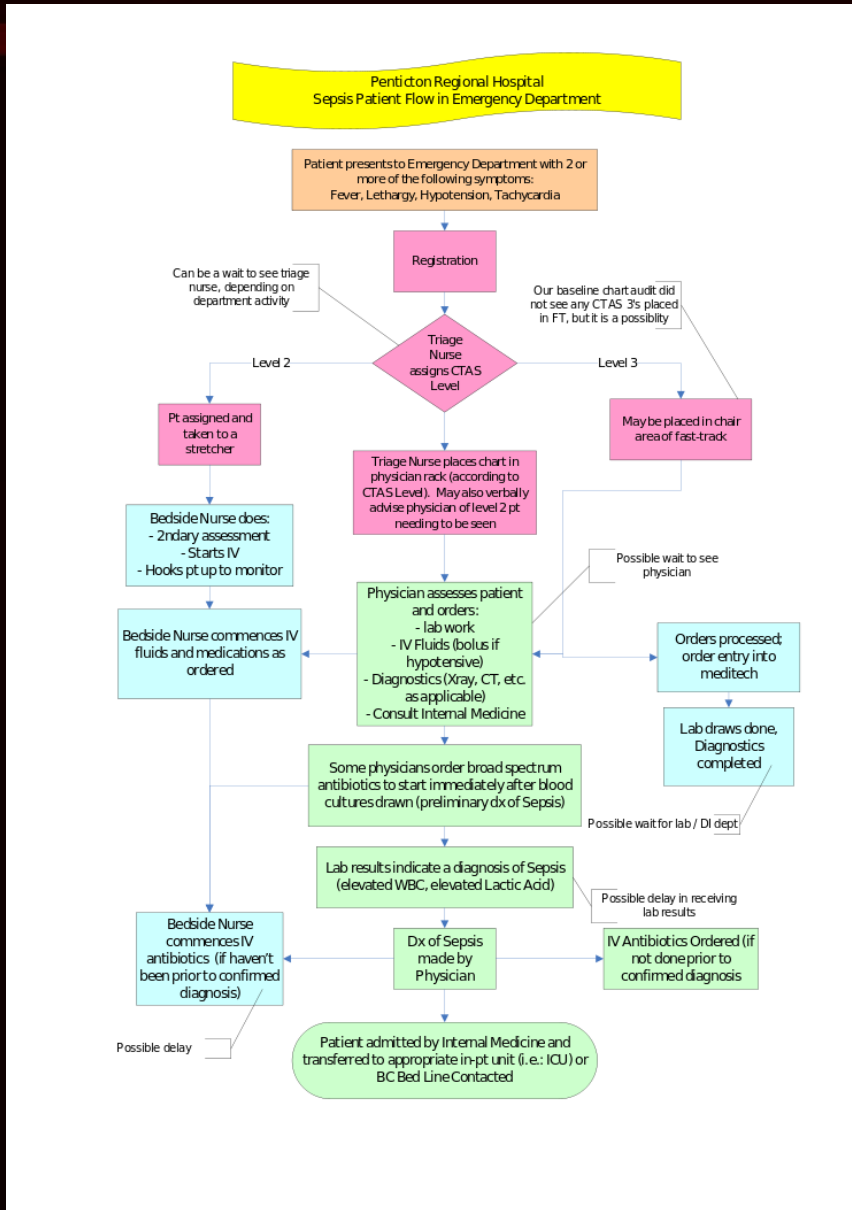
- Define a care map document standard.
- Find a method of care map analysis.
- Write software.
- Do everything using existing concepts, standards, algorithms.

Methods

- SBML → biological pathway document standard.
- Translation → care map to pathway.
- Alignment.
- Software engineering.



Current Results



Future Directions

- 1) Develop map comparison software.
- 2) Validate and compare sepsis maps from BC EDs (E2E).
- 3) Collect new maps in 2 yrs - longitudinal changes.
- 4) Identify other clinical areas of potential application.

Full Potential of Project

- 1) Physicians and teams can learn from each other → team-based learning.
- 2) This learning is quantitatively driven.
- 3) Help departments to be able to improve team-based care over time and then evaluate it. Learning between EDs.
- 4) Allows a single ED to internally improve its process as well.

The End