Overcrowding in Emergency Departments:
Using predictive modeling to facilitate patient disposition and decrease length of stay

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Background

- Overcrowding is a widespread problem, and is associated with negative clinical outcomes and decreased patient satisfaction (Pines et al, Academic EM, 2008)
- Lengthy boarding times are a key driver of overcrowding (Sun et al, Annals of EM, 2013)
  - 154 minutes in adult EDs
  - 98 minutes in pediatric EDs
- An accurate prediction of which patients will require inpatient admission could allow an earlier start to the bed allocation process and reduce boarding times
Early identification of likely admissions can facilitate bed assignment and shorten ED boarding times

POPP (Prediction of Patient Placement)

- Real-time forecasting tool predicts admissions
- Model trains on hospital-specific, historical data
- EHR and hospital agnostic
  - Cerner, EPIC
  - Adults and children
  - Community and academic tertiary
  - East Coast and West Coast

POPP model identifies 50.6% of the hospitalizations at the moment of arrival, 60.0% after 10 minutes, 73.4% after 30 minutes (Barak Cohen et al, Pediatrics, 2017)
Aims

1. To compare the accuracy of an EMR-based model against the predictions of pediatric emergency physicians based on data generated within the first 60 minutes of presentation to an ED

1. To identify the chief complaints for which clinician gestalt is least accurate, and retrain the computer-based model focusing on these specific clinical scenarios where clinical gestalt ‘fails’
**Approach**

- Generate a physician gestalt questionnaire
- Recruit emergency physicians to participate
- Initiate data collection
- Complete data collection (approximately 200 patients) *expected 6/2019*
- Data analysis and publication *expected 8/2019*

**Physician gestalt questionnaire (I/III)**

Based on all the information available to you at this time, do you think the patient will be admitted to the hospital? (select one)

- Will not be admitted (< 20% chance of admission)
- Unlikely to be admitted (20%-40% chance of admission)
- May be admitted (40%-60% chance of admission)
- Likely to be admitted (60%-80% chance of admission)
- Will be admitted (>80% chance of admission)
Physician gestalt questionnaire (II/III)

Please select the most important factors that are driving your decision (up to 5)

- Admission required by ED protocols
- Clinical appearance ("eyeball")
- Patient’s social situation (e.g. homeless)
- Time of day
- Parental concern or preferences
- Referring physician’s request
- Current ED attending MD’s practice style
- Patient’s medical history

- Chief complaint
- Labs
- Radiology
- Vital signs
- Medications given or ordered
- Hospital bed availability / capacity
- ED bed availability / capacity
- Clinical scores (CHEWS, HASS)
- Other: __________

Physician gestalt questionnaire (III/III)

What is the main purpose of the admission?

- Treatment (IV, oxygen, etc.)
- Diagnostic work-up (e.g labs, radiology, consultants)
- Care coordination (e.g. complex care between multiple services)
- Observation
- Social
- Other: ____ (specify)
We look forward to sharing preliminary data in the near future!