

Challenges of Data-Driven Public Health in the 21st century: Clinical Analytics Prediction Engine (CAPE)

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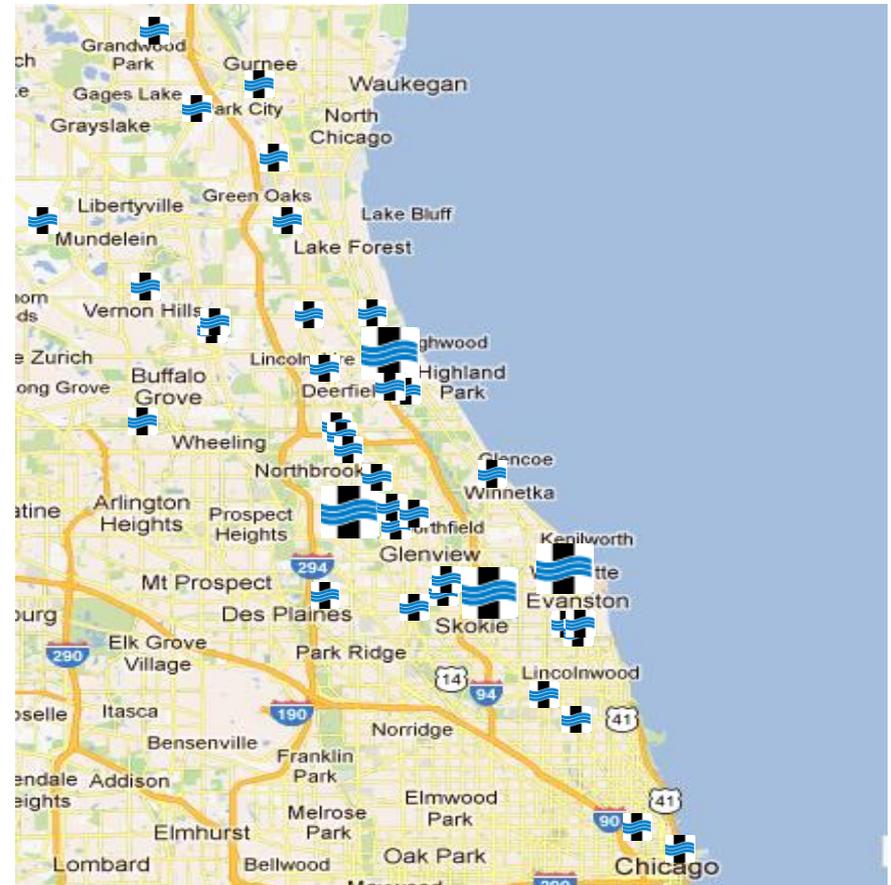


1. Vision
2. Models
3. Visualization
4. Case study: eCART and compliance
5. Lessons Learned

Organizational Profile



- 5 (soon to be 6) Hospitals
- 1,119 Beds
- 12,957 Employees
- 3,081 Physician Medical Staff
- 1,111 Employed Physician Medical Group
- 67,000 Annual Admissions
- 1.8 Million Annual Office Visits
- 140,000 Annual ED Visits
- \$100M+ Research Institute
- HIMSS stage 7 Inpatient, Ambulatory, Analytics
- H&HN Most Wired 15 years in a row



Clinical Analytics Prediction Engine (CAPE)

Vision



Data enabled population healthcare delivery across the care continuum.

Paradigm



Shift

1

Evolving from single siloed predictive models to a unifying risk profile

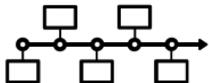
2

Population level enhanced and targeted interventions

3

Collaboratively designed, prioritized and coordinated care through the Electronic Health Record

Timeline

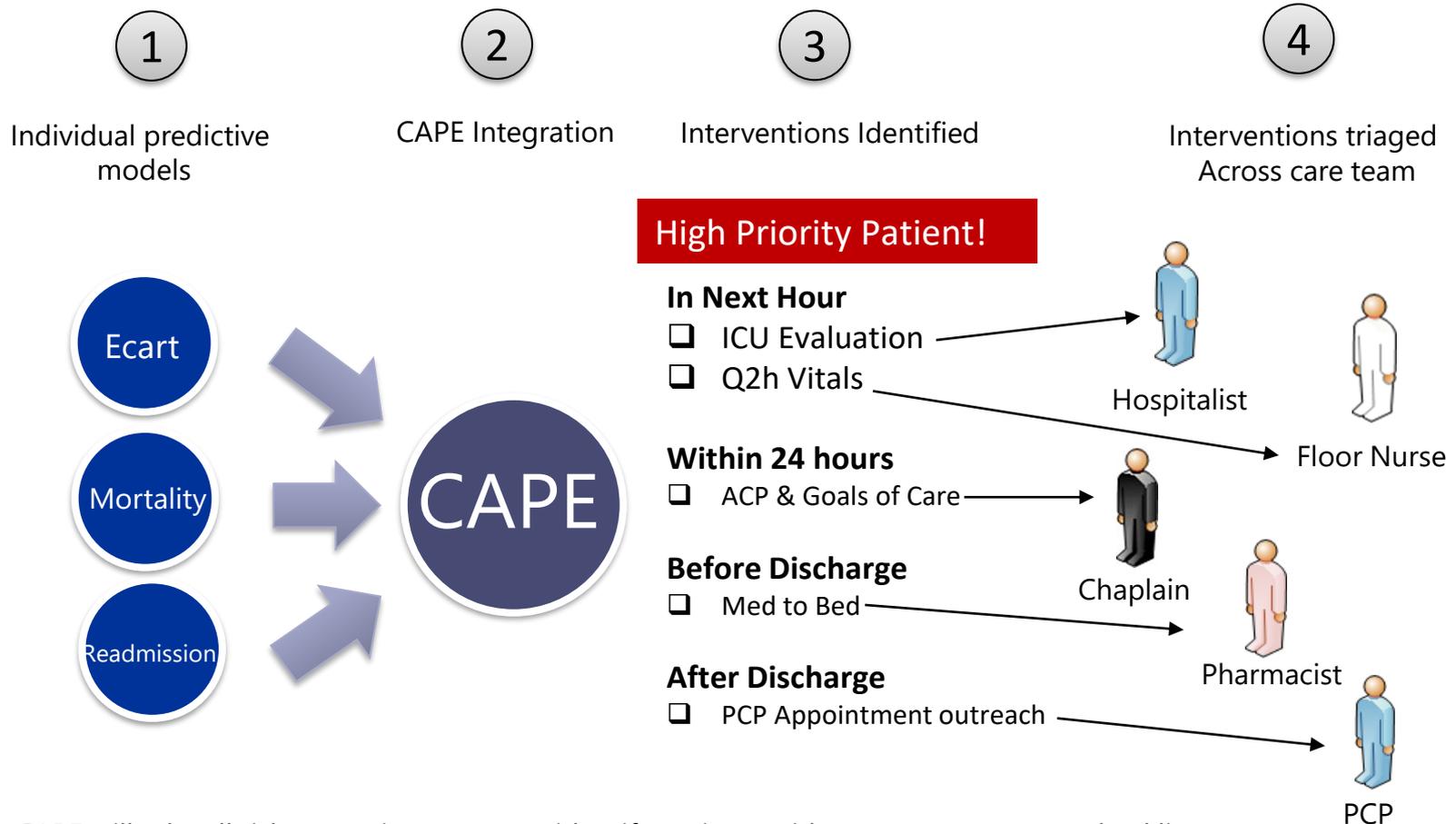


Phase I (Live September 2018): E-Cart*, Mortality and Readmission Risk

Phase II (Planned go live June 2021): Ambulatory ER visit and Admission Risk

*A predictive model designed in partnership with University of Chicago based upon NorthShore and UofC patient populations to detect patient deterioration. All other models described were developed by NorthShore

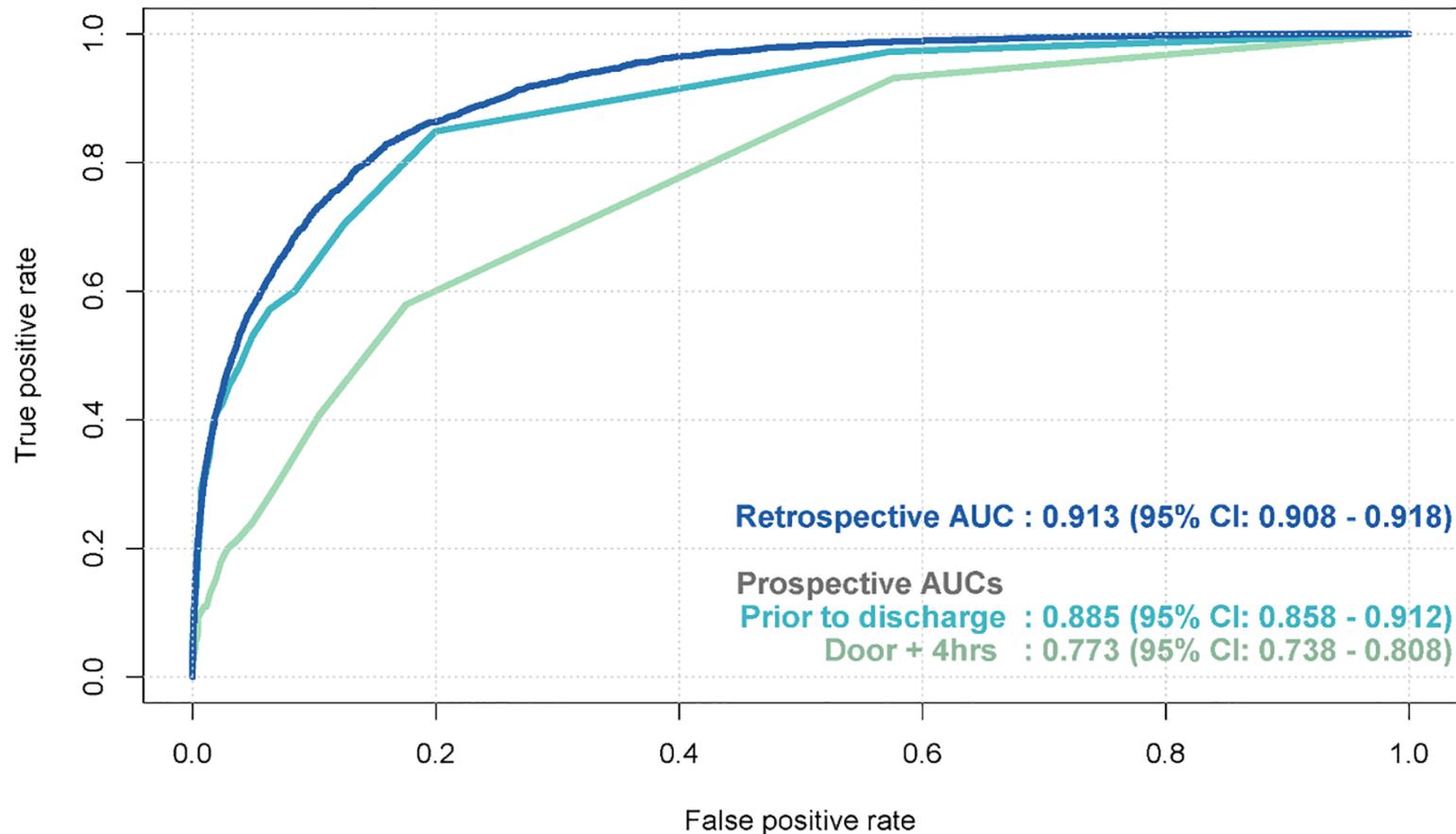
Prescriptive Analytics



CAPE will take all risk scores into account, identify patients with a care gap, present checklists of interventions to the right caregivers and assign a priority of how quickly the task needs to be performed all within EPIC

CAPE – Hospital Mortality

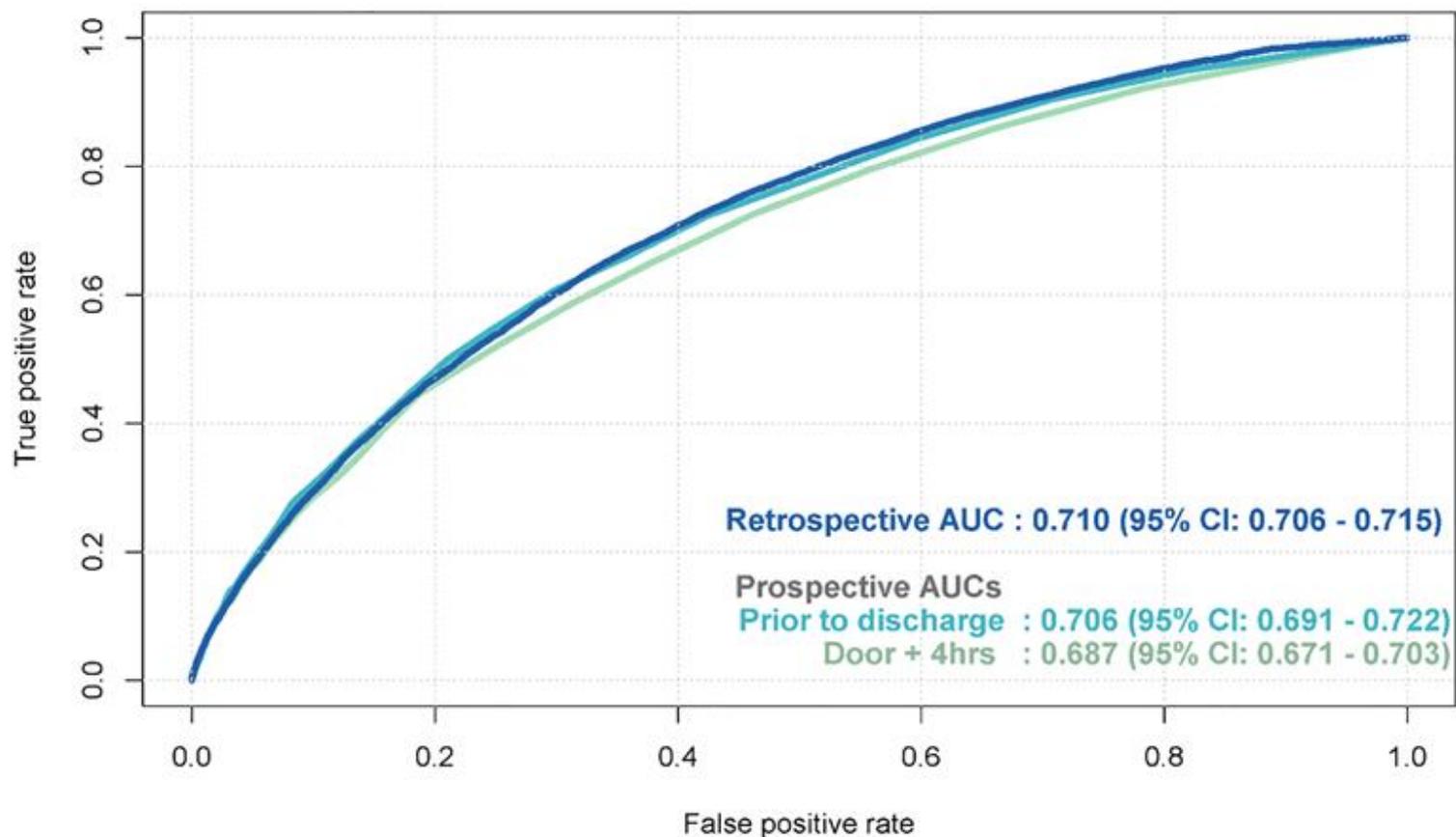
Prospective Vs. Retrospective Hospital Mortality AUC



Shah N, et al. Plos One 2020.

CAPE – 30 day Readmission

Prospective Vs. Retrospective 30-day Readmission AUC



CAPE – Visualizations

Patient has been identified as High Risk of Mortality and/or Readmission from index admission through 90 days post discharge

The following interventions may be done over this time period to prevent adverse outcomes

- Med to Bed enrollment
- Post-discharge phone call
- Follow-up appointment within 14 days
- Care Navigation through 90 day episode of care (future)

Cape IP Mortality
29%

Cape Mort 180
20%

Cape Readmit Risk
21%

Factors Contributing to Score

23% Patient Age is 81

14% Evidence of Respiratory Failure is 1

10% DX of Respiratory Failure is 1

8% Evidence of Shock is 1

7% Last Platelet count is 576

6% Last BUN value is 52

5% Last Hemoglobin value is 9.2

5% Surgery performed is 1

4% DX of Sepsis is 1

3% Last Sodium value is 143

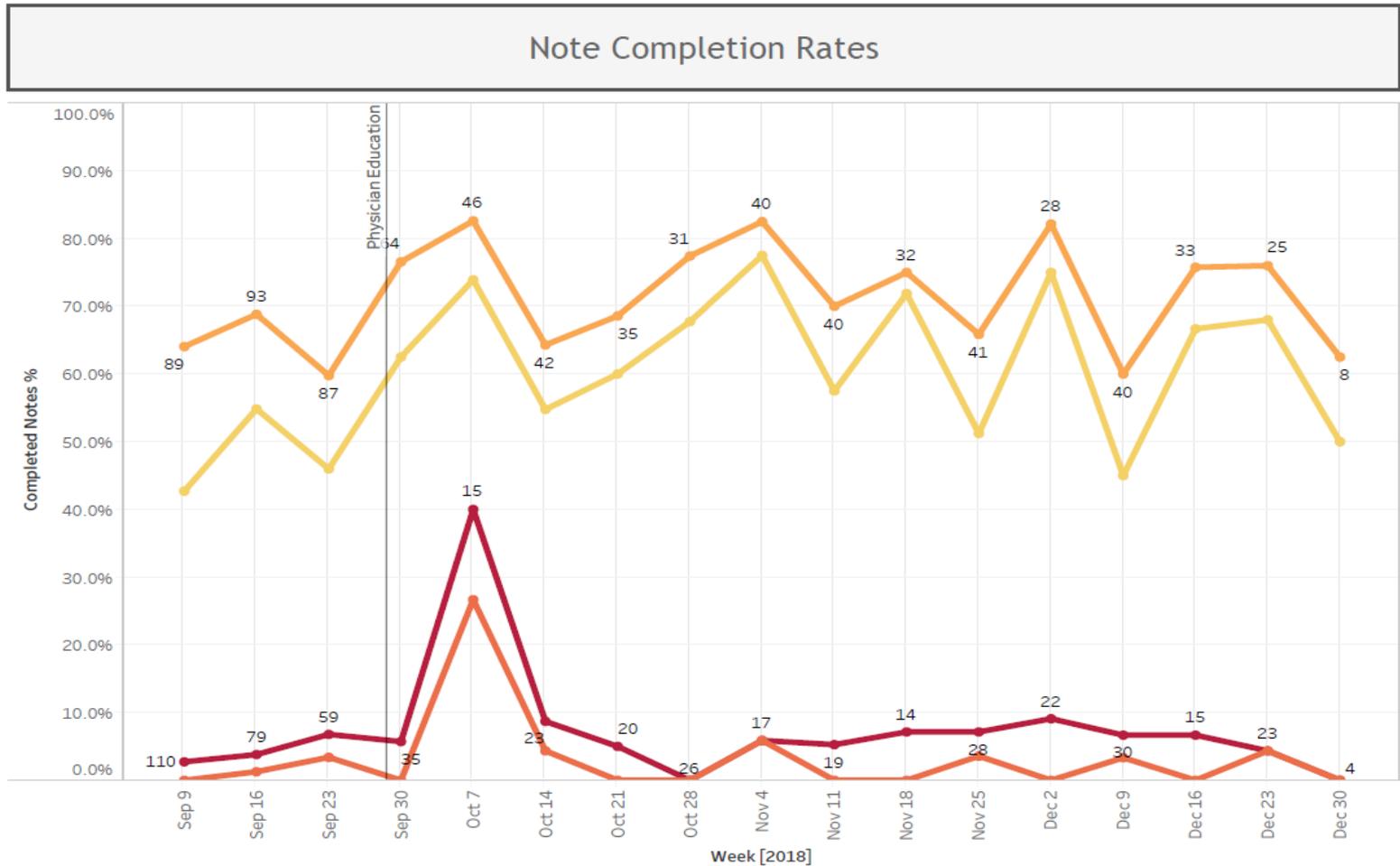
3% DX of Shock is 1

3% Evidence of Other Neurological Conditions is 1

eCART – Implementation

- Cardiac Arrest Model (eCart)
- Scores >95th percentile were flagged red or highest risk. Scores between 85-95th percentile were flagged yellow, or intermediate risk
- ICU transfer was strongly urged for new red scores, *but the discretion of the treating physician could overrule*. Yellow score patients had increased frequency of vital signs on the floor.

eCART - Compliance



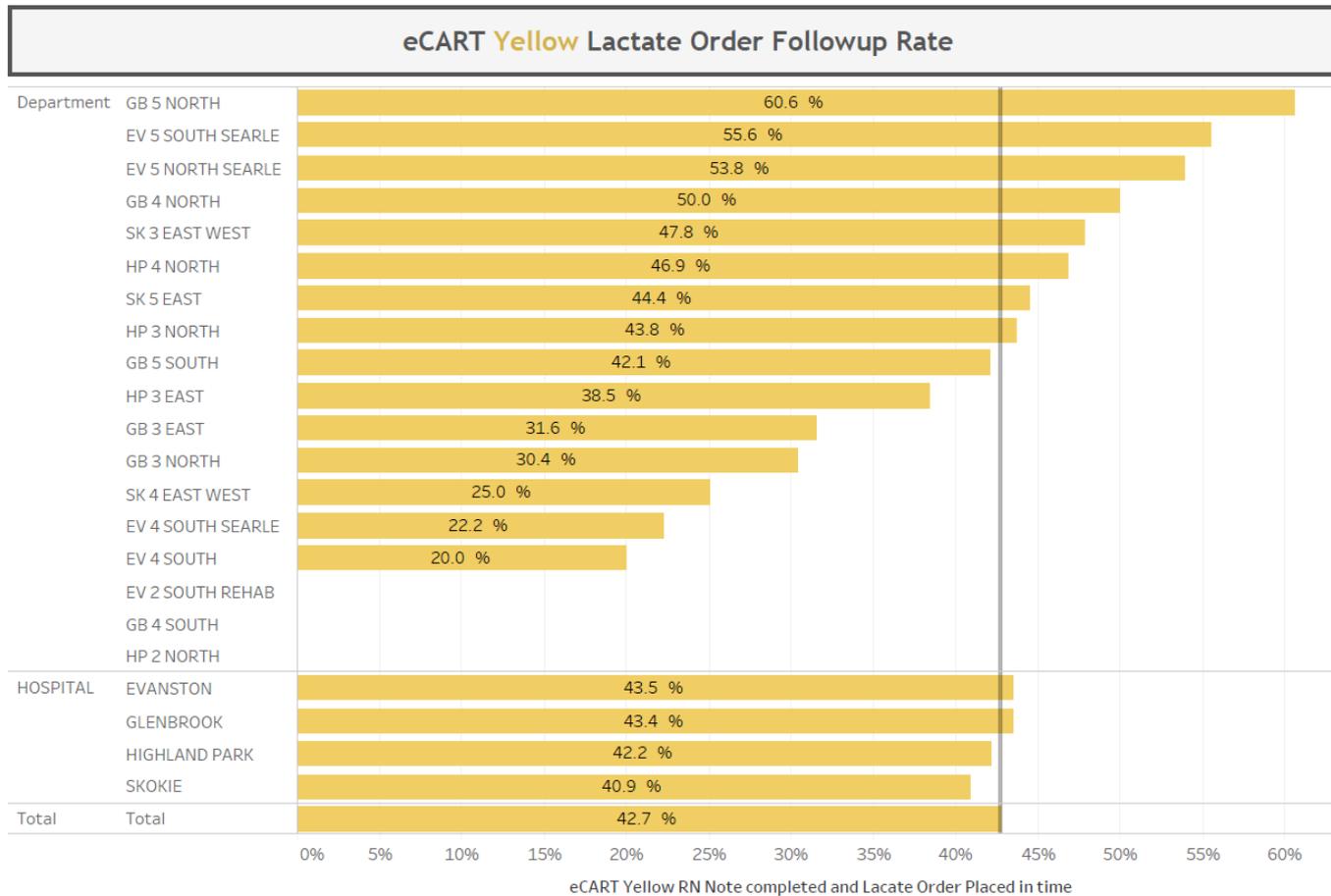
Numerator 1: Notes Written
 Numerator 2: Notes Written within target time of 2 Hrs of BPA
 Denominator: Admissions with at least one eCART BPA

Number labels are count of Admissions for that week, assigned to the first day of the week.

eCART Note Completion Rates

- Yellow, Note Completion
- Yellow, Note Completion w/in 2Hrs
- Red, Note Completion
- Red, Note Completion w/in 2Hrs

eCART – Compliance



Numerator: Lactate orders placed within 2 hrs of complete "Acknowledge Yes" RN Note written, or an order has already been in place 24 hours prior to the note being written

Denominator: eCART Yellow RN Note written with "Acknowledge YES" selected

Compliance – Lessons Learned

1. Understand key process metrics
2. Resistance to change and standardization
MD >> RN
3. Thoughtful about workflows and user interface
4. Steady and continuous messaging and education
5. Data driven process employing mixed methods
6. Quick and direct feedback loop

Thank you
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