Real-Time Patient Volume Predictor Instrument

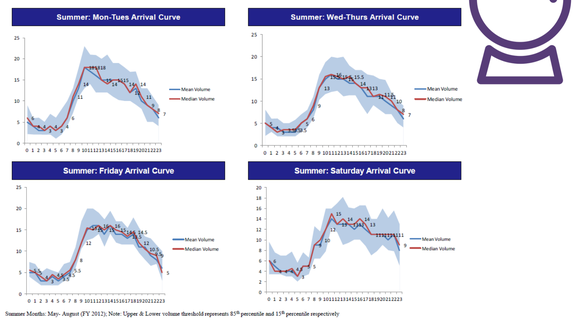
for real-time clinical operation decision making and staffing

Northwestern Medicine®

Northwestern University Feinberg School of Medicine
Department of Emergency Medicine

What are our goals?

Patient arrivals are **predictable**

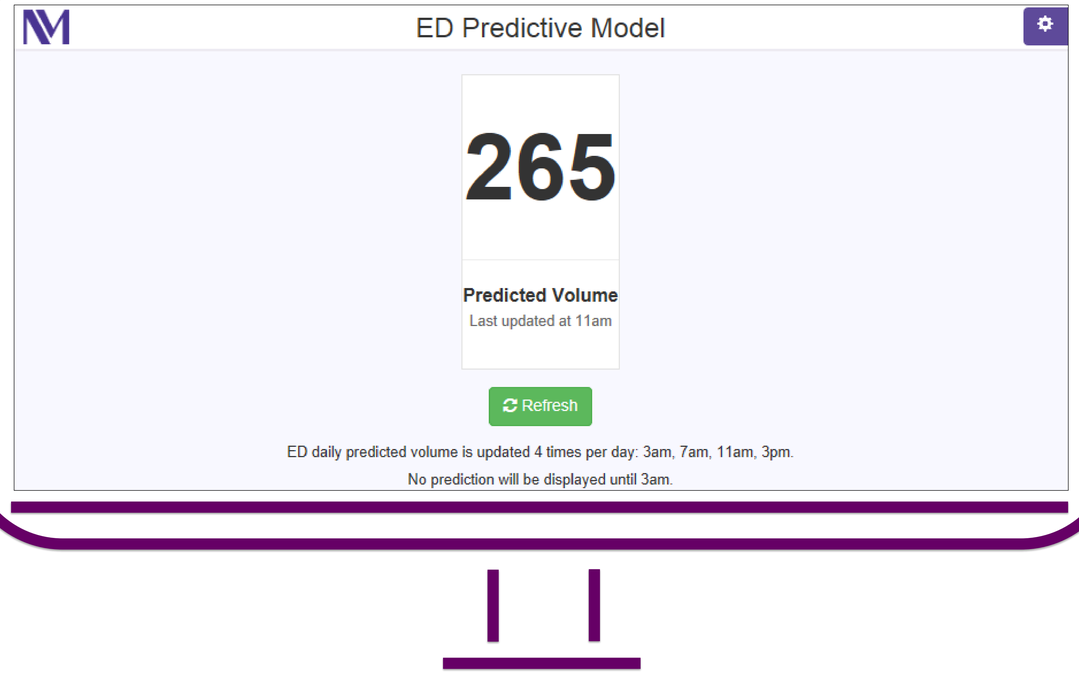


Predicting arrivals allows managers to optimally **match resources to patients**

What data did we use?

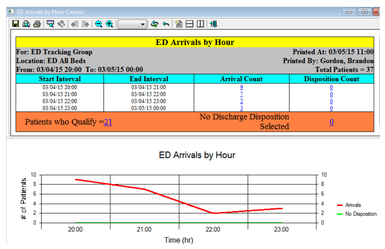
Independent variables included in the model were screened and selected by consulting with clinical experts, literature research, and data exploration:

- **Hourly volume** (continuous)
- **Day of week** (flagged)
- **Month of year** (flagged)
- **Holidays** (flagged)

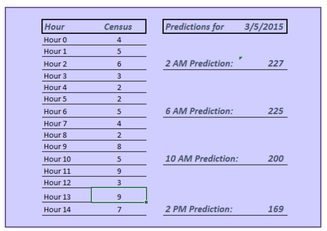


How do we build this?

Hourly Arrival Count from the EMR



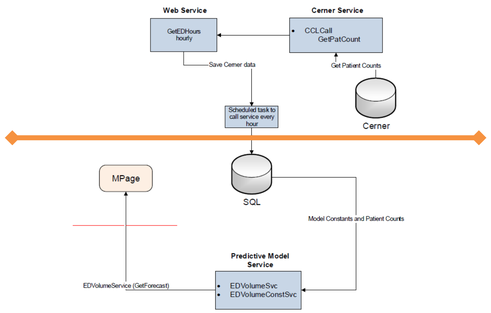
Initial Mockup



How do we integrate to EMR?

Backend Service Process

Hourly data gather and storage

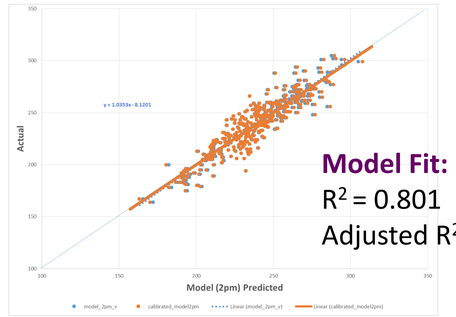


Frontend Service Process

On demand data retrieval & calculation of model value on web page launch

How do we define success?

Multivariate linear regression was used to predict ED daily volumes



Model Fit:
$R^2 = 0.801$
Adjusted $R^2 = 0.797$

Prediction	90% CI	95% CI	99% CI
3pm	+/- 13	+/- 17	+/- 21
11am	+/- 16	+/- 22	+/- 27
7am	+/- 20	+/- 27	+/- 33
3am	+/- 21	+/- 29	+/- 34

The linear regression prediction model became more **powerful and accurate** throughout the day, with **97% of 3p** predictions falling **within 10%** of the actual daily volume.

Authors:

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This technology (algorithm / process) is Patent Pending, # 62/293,243