Predicting Patient Readmissions

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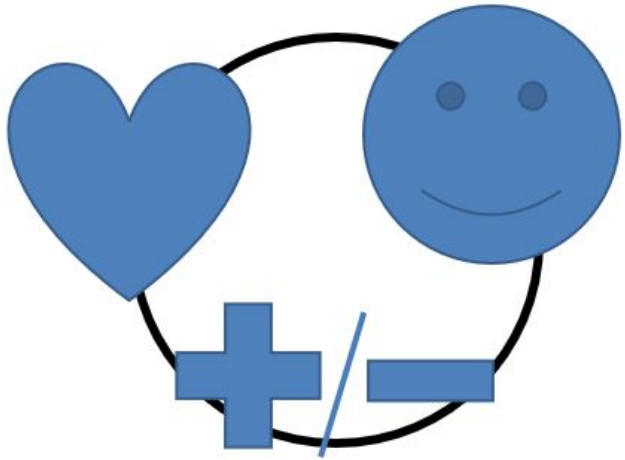
Background

Today's Goal

Better understand impact of readmissions on our company and how we can reduce them to improve patient health, decrease cost, and increase customer satisfaction.



Today's Plan

- Present the case for change
- The solution: LACE
- Explain the preliminary model
- Looking forward

Why do we need to change?

Currently...

- 30-Day Readmissions: a one-two punch
  - **1%** average Medicare penalty over the last 3 years

- Physicians use professional judgment to classify readmission risk
  - “Low”, “Medium”, “High”
  - Intervene in “High” risk cases

- Without intervention in high-risk cases, patients are readmitted in poorer health and report low satisfaction

$11,000

Average Cost per Readmission

Created by Adrien Coquet from Noun Project

Impact of no change

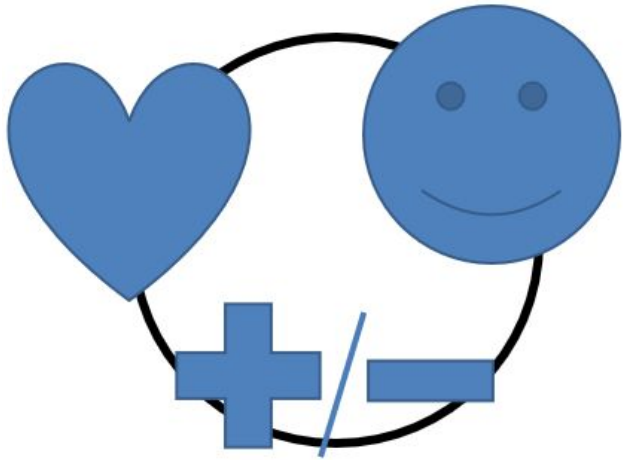
Future costs of status quo

- Expecting penalty increase
  - Every year, more health conditions are added to the Medicare penalty

- ~ 10,000 readmissions / year (over our 54 hospitals)

We need to do a better job at targeting patients with a high-risk of readmission

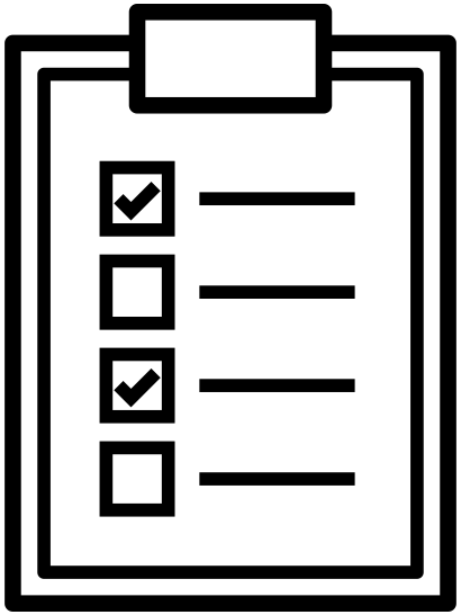
- Use low-cost interventions at/after discharge to prevent readmission



The solution!

LACE

- L = Length of stay
- A = Acuity of admission
- C = Cormorbidities
- E = Emergency department visits



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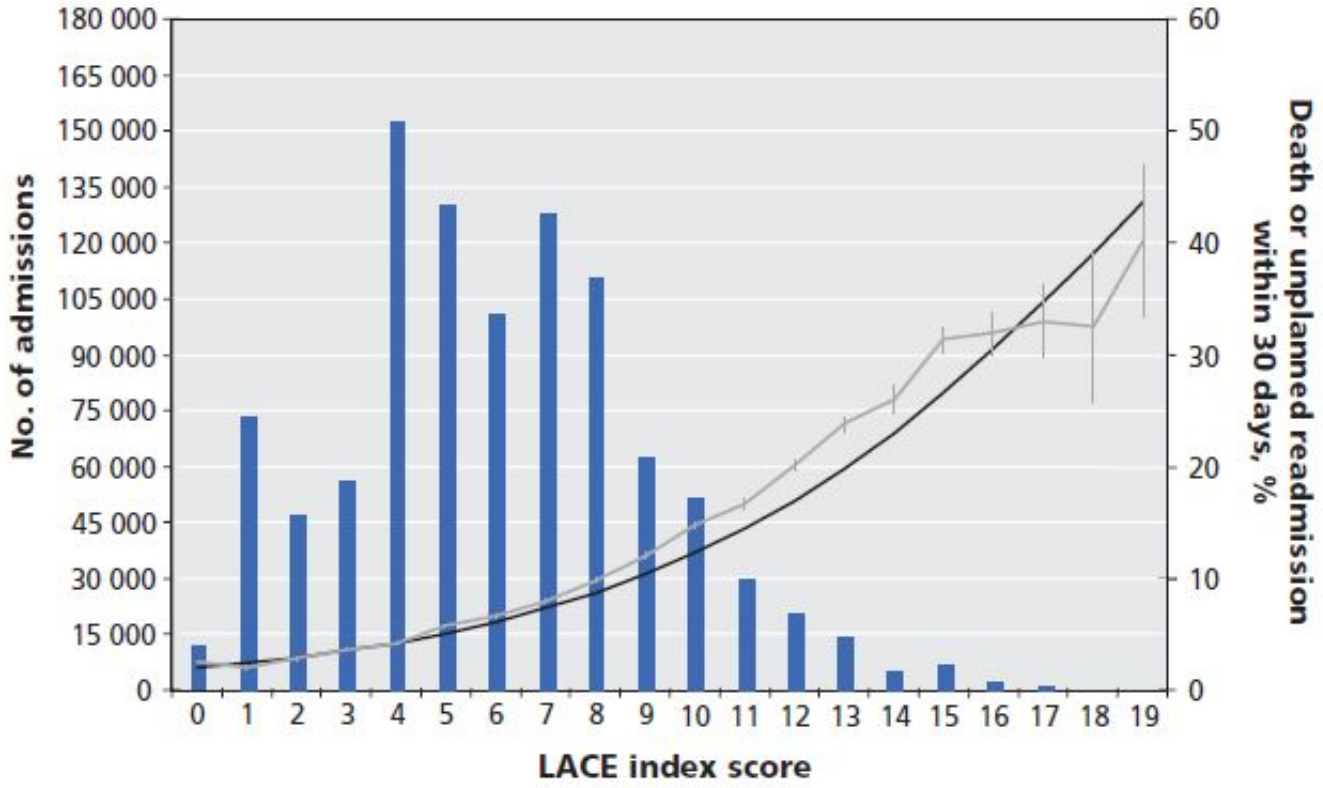
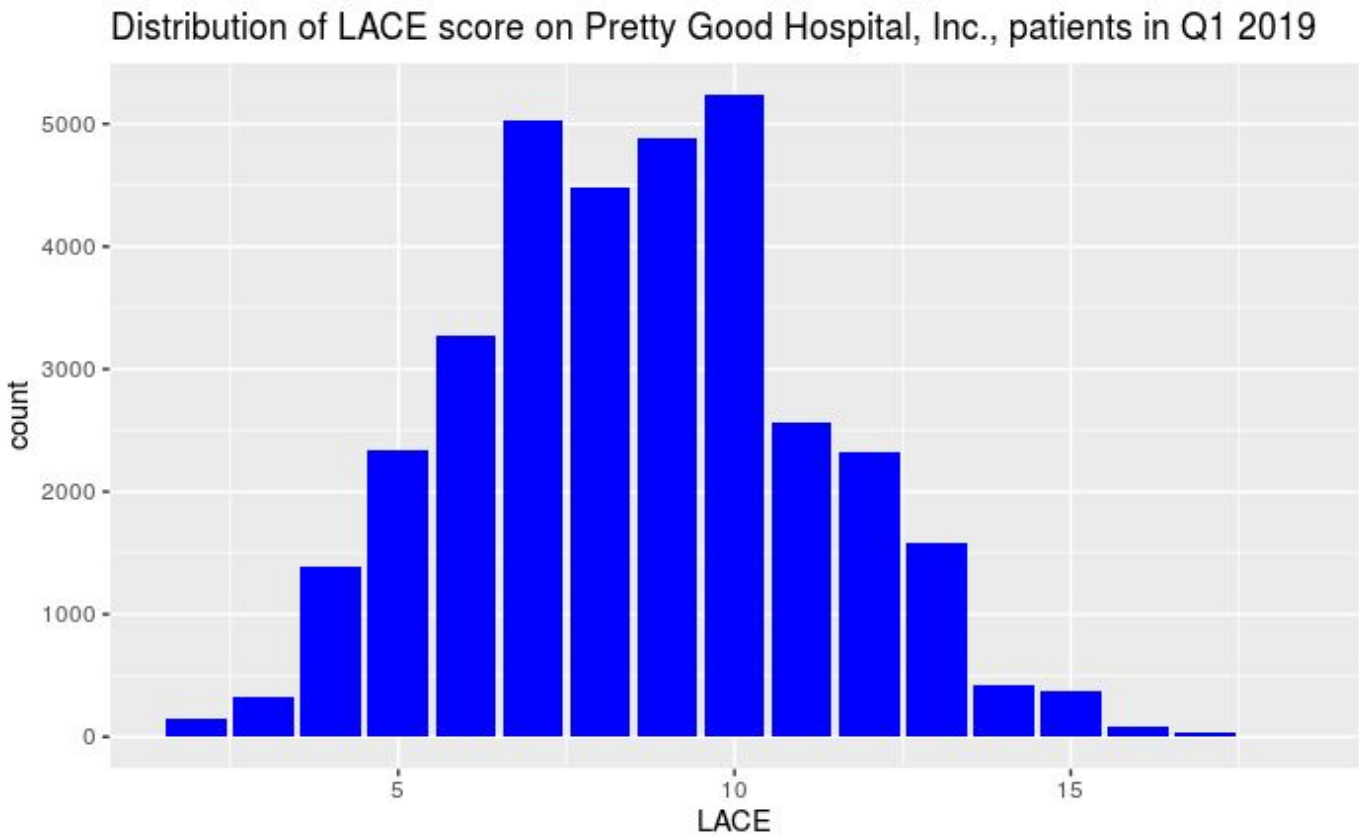
LACE



van Walraven, et al.

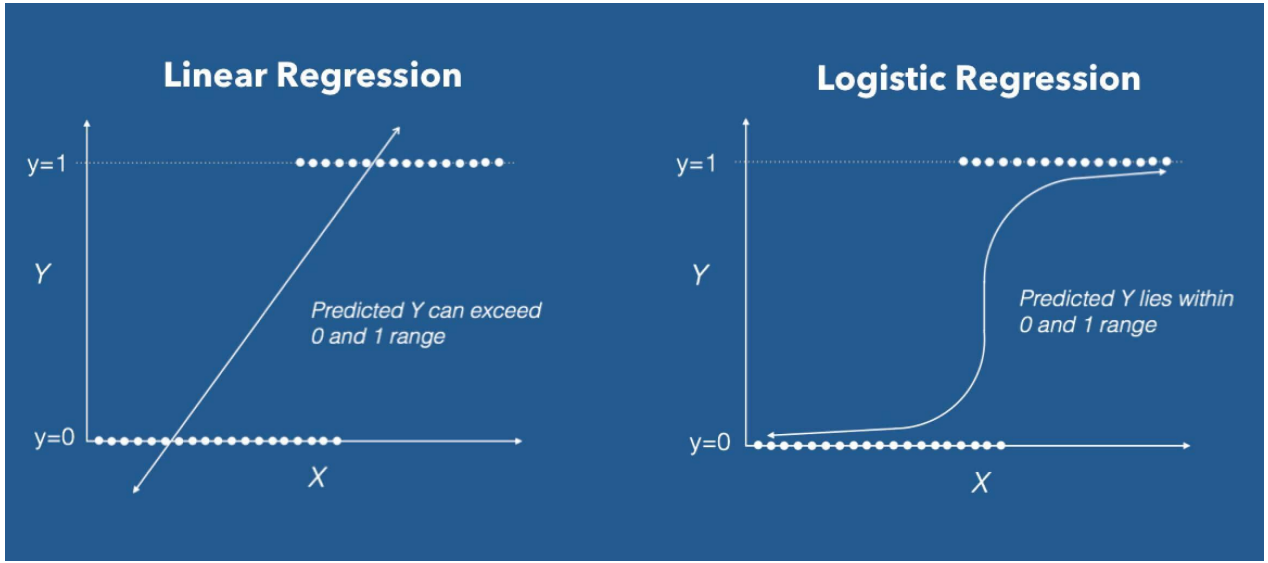
LACE


Distribution of LACE score on Pretty Good Hospital, Inc., patients in Q1 2019
count
5000
4000
3000
2000
1000
0
5
10
15
LACE

Diving deeper...

Simple Logistic regression

Logistic Regression is used for the classification problems, it is a predictive analysis algorithm and based on the concept of probability.

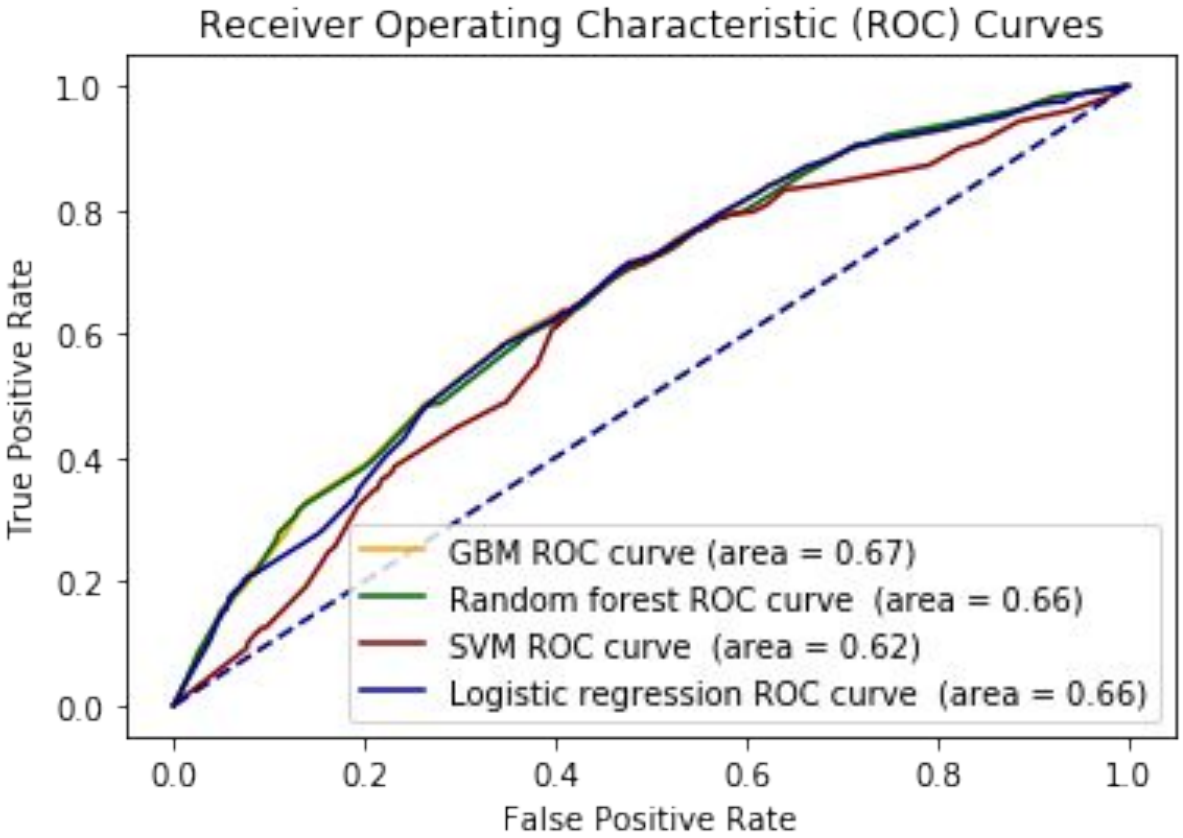


https://towardsdatascience.com/introduction-to-logistic-regression-66248243c148

Model performance on test data

N = 6901	**Actual: Readmission**	**Actual: No readmission**
Predicted: High-Risk for Readmission	608	2,274
Predicted: No readmission	421	3,598

Choosing a model



Potential cost savings (test data)

Sum	Number of patients	Cost/Savings per patient	Description
+ $6.7 million	608	+ $11,100	Actual Readmissions Identified by the model (~1% Medicare penalty + hospital costs)
- $2.9 million	2882	- $1000	Patients Flagged by model for Interventions
+ $3.8 million SAVINGS (6902 patients)			

Looking Forward...

Adding readmission risk prediction to workflow

- Readmission risk flag in EHR
  - Categorize hospital patients automatically using model and EHR data
- **Triggers alerts for interventions**
    - pre-discharge processes (social work, pharmacy)
    - Post-discharge processes (PCP follow-up, phone call)
- Successful implementation depends on listening to end-users and incorporating their feedback

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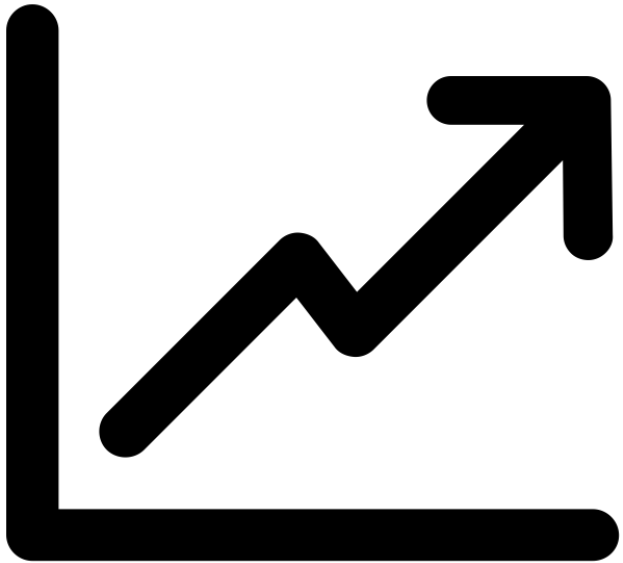
Measuring impacts

- Effects on workflow:
  - % of alerts acted upon
  - Feedback from end-users
- Measures of success:
  - # of 30-day readmissions
  - Average cost / patient
  - Patient satisfaction (post-visit survey)
- ROI seen within a few months, if interventions effective
  - Medicare penalty will gradually drop



Created by Aneeque Ahmed
from Noun Project

Team Players

Roles

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Proposed Sponsorship

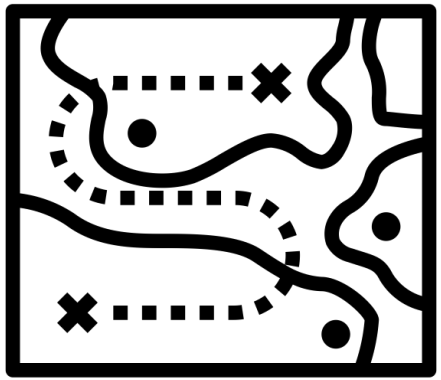
- Dr. Kathy Whatver, CTO
- Dr. Louis Shin, VP of Patient Care
- Morgan Wyatt, PharmD, Senior Hospital Analyst

Analyst Roles

- Develop work plan with Intervention work group
- Write code to calculate LACE in EMR
- Implement feedback form and assess performance metrics

Call to action - 1.5 year project roadmap

- Support from sponsors for expanded project
- Bring end-user reps, stakeholders together
  - Form Intervention workgroup
- Phase 1: Improving the model by working with end-users to tweak/add variables
  - ~ 9 months
- Phase 2: model prediction and interventions implemented at 12 locations
  - ~ 3 month set-up, 6 month trial implementation



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Questions?

Sources

- van Walraven, et al. Derivation and validation of an index to predict early death or unplanned readmission after discharge from hospital to the community. CMAJ. 6 Apr 2010. 182(6). 551 - 557.