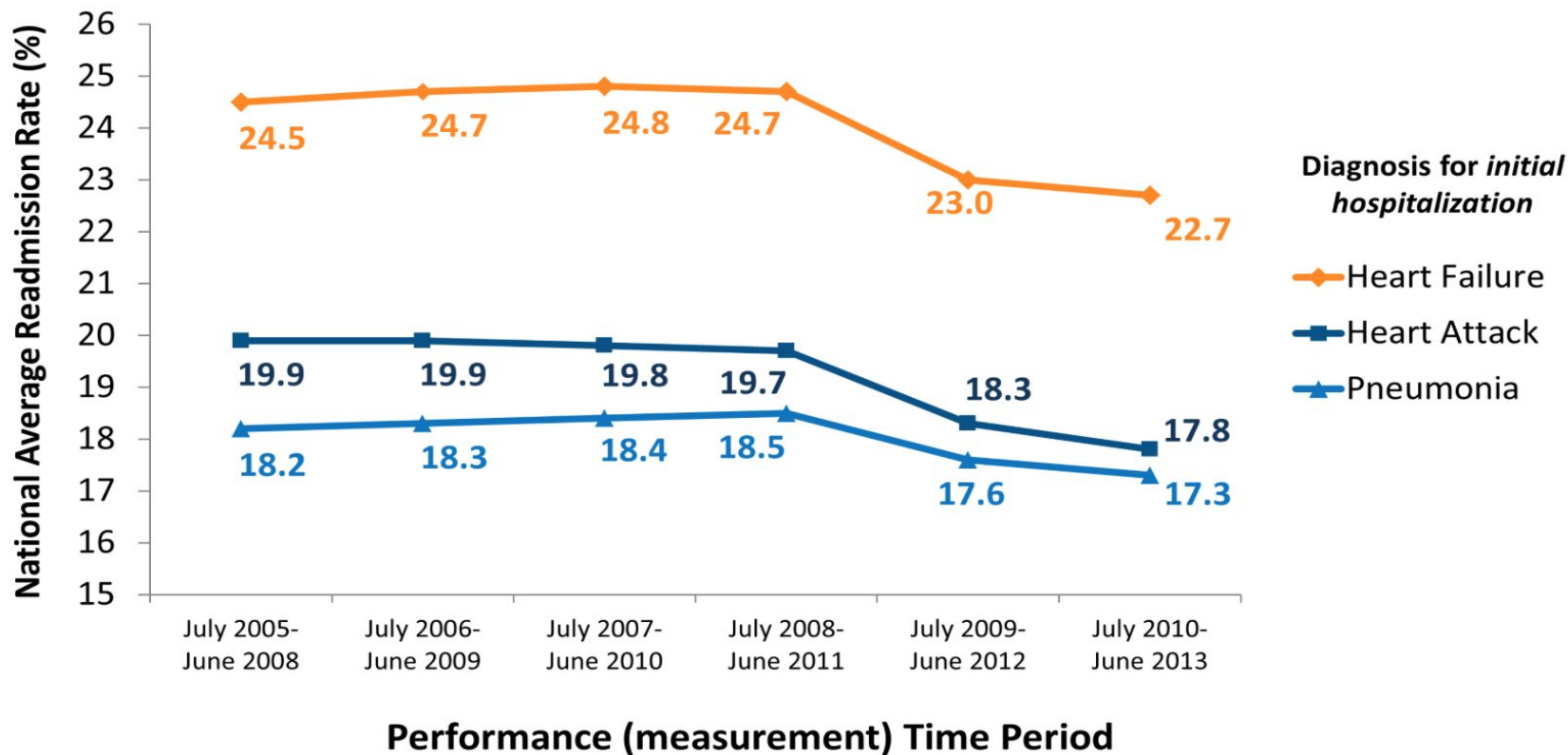# TAHOE HEALTHCARE SYSTEMS

Pranava Kaarthik . P

INTRODUCTION

- Integrated health care provider , operates 14 hospitals in the pacific northwest

- 18 percent revenue from insurance reimbursements

- Reimbursements from medicare covered by HRRP(Hospital readmissions
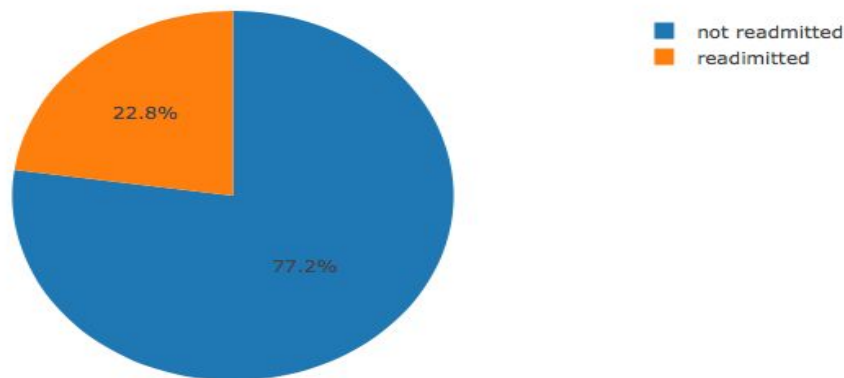
  reduction program)

National Medicare Readmission Rates Started to Fall in 2012

Data Insight

- Has Six predictors and two events

- Total of 4382 patients over the period of a year

- No missing values

readmitted vs not readmitted

not readmitted
readimitted

22.8%

77.2%

Problem

- Paid $750,000 as readmission rate exceeded risk-adjusted targets

- Current HRRP penalty rates would cost $8000 per patient

- Implementing CareTracker at $1200 per patient ?

- High rate of readmission

GOAL

- **Build a model to reduce readmission rates**

- **Identify target patients for CareTracker**

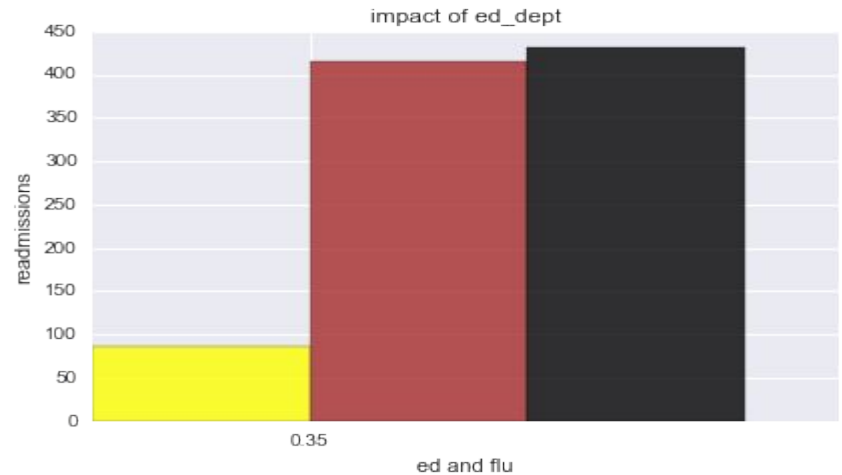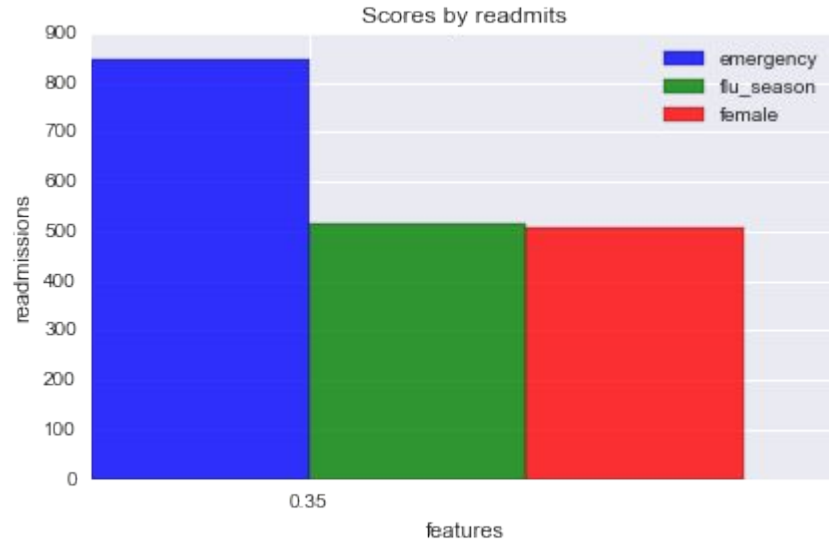- **Cost Implications of the model created**

Assumptions

- **Treatment cost per patient is $16000**

- **Managerial segregation of readmission ERA risk groups**

- **Selecting important features**

METHODOLOGY

- **Feature Importance**

- **Deploy best fit Model**

- **Medical Acumen**
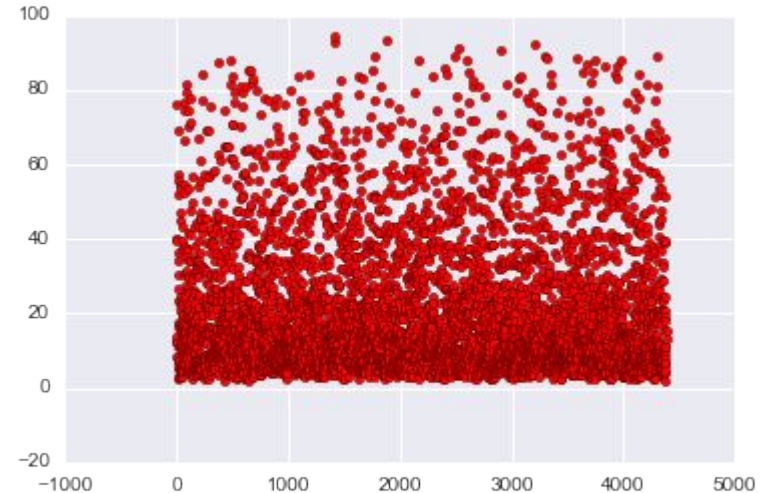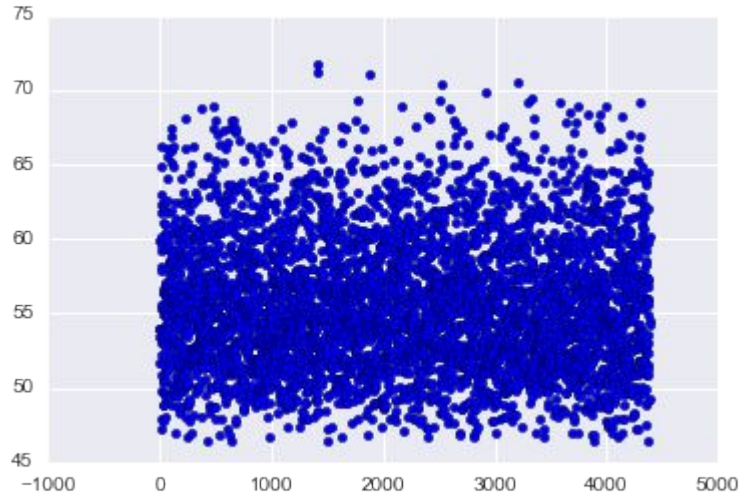
- **ERA - AMI risk group segregation**

Feature Importance

Model

- ElasticNetCV(ridge) vs Penalized Logistic regression(ridge)

- Scatter plot of patients and their readmission risk percentage

MEDICAL ACUMEN

- Patient's ERA Percentage risk of readmission(AMI) = (exp(patient's risk score) ÷ (1+exp(patient's risk score))) * 100

- Where patient's risk score = intercept + (b ed_admit × ed_admit) + (bseverity_score × severity score) + (bcomorbidity_score × comorbidity score)

- ERA (Elders Risk Assessment) percentage risk groups

- Low risk less than 50 (Green)

- Moderate risk 50 to 60 (Orange)

- High risk above 60 (Red)

ERA-AMI based segregation

	patient risk score	ERA-AMI(percentage)	readmission risk groups
0	-0.39936	40.1466	C
1	-1.94362	12.5251	C
2	-1.84902	13.5988	C
3	-2.40481	8.2807	C
4	-1.97185	12.219	C
5	-0.427529	39.4717	C
6	1.15488	76.0401	A
7	0.794662	68.8832	A
8	0.28429	57.0598	B
9	-1.56729	17.2603	C
10	-2.96404	4.90773	C
11	-3.58275	2.70471	C
12	-2.72175	6.17019	C
13	-1.61771	16.5521	C
14	-0.82175	30.5392	C
15	-3.40766	3.2057	C
16	-2.0655	11.2496	C
17	0.235038	55.849	B

Distribution of risk groups

readmission risk groups

- Low risk
- High risk
- Moderate risk

88.9%
6.37%
4.7%
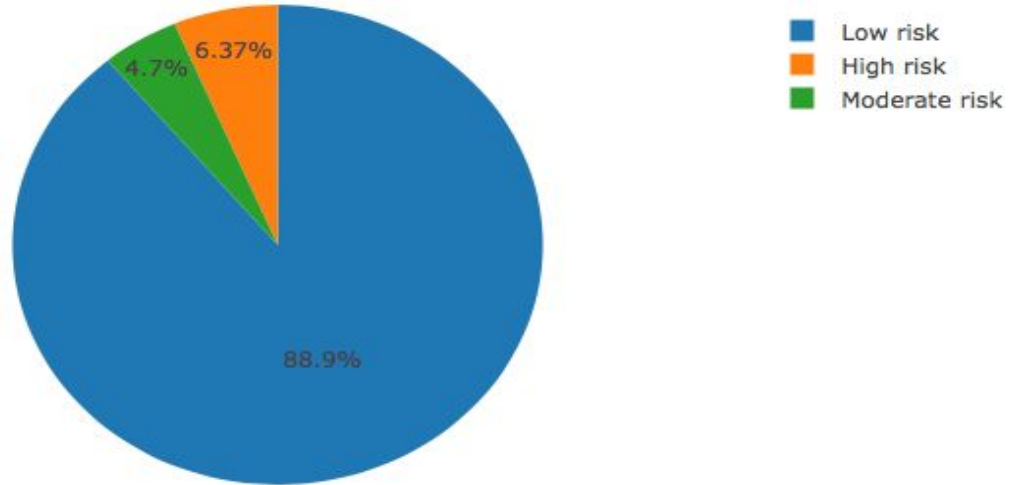
Results

- Comparison to actual readmitted patients
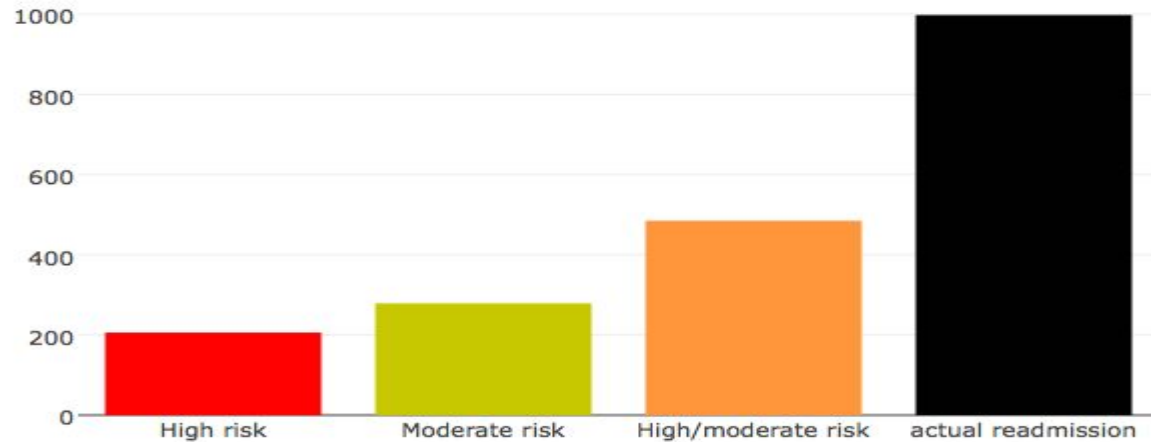
Cost Implications

	Caretracker	No Caretracker
Readmitted	76100000	78096000
High risk	71786000	72344000
high/medium risk	73022000	73992000

Conclusion

- **Model reduced the readmission rate by 70 percent (only High risk)**

- **Model reduced the readmission rate by 50 percent (High / moderate risk)**

- **Deploying CareTracker to assumed readmits from the data $76100000**

- **Deploying CareTracker to only high risk patients $71786000**

- **Cost savings = $4314000**

Future Work

- Making the model generic to all conditions(illness)

- Using natural language processing to interpret written notes and other

  documents (forms , doctor's notes , discharge summary)

Thank You