

Using Updated Health Care Data to Build Predictive Model on Hospital Readmission Rate

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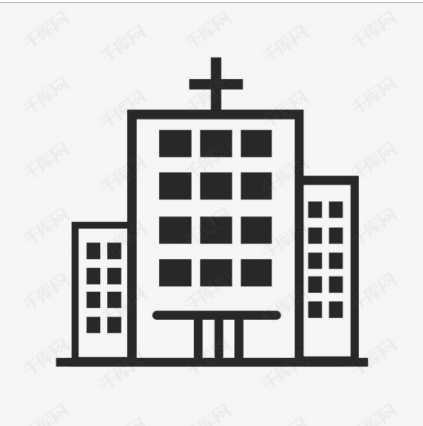
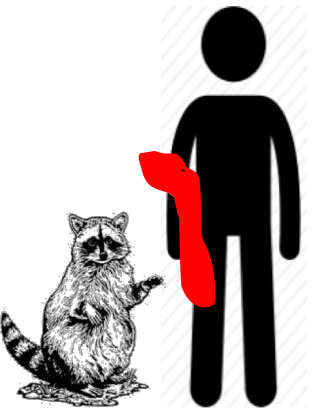
Professor Ian Duncan

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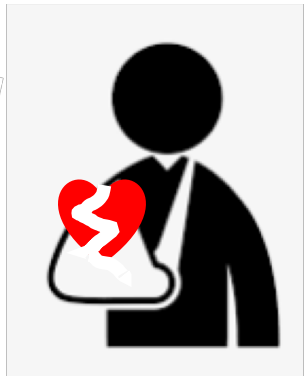
PSTAT Department



Readmission Is Wasting Money and Time for Patients and Hospitals



20 Days Later...



What Indicators Have Significant Relation to Readmission Rate and How are They Related

Hierarchical Condition Category (HCC) Risk Score

HCC No.	Factor	Platinum	Gold	Silver
HCC001	HIV/AIDS	0.626	0.505	0.379
HCC002	Systemic Inflammatory Response Syndrome/Shock	0.626	0.529	0.434
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Demographic Characteristic



Length of Stay




Health Status



Use HCC Risk Score to Categorize Patients into Four Disease Groups

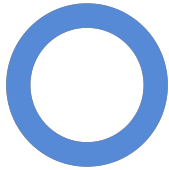
Each Group Contains Multiple HCC Risk Scores



**Total Patient
Number:
110,000**



Cancer Group
10.2% Patients



Diabetes Group
30.6% Patients



Cardiac Group
21.2% Patients



Congestive Heart Failure
8.4% Patients

Use Markov Chain Transitional Matrix to Model Large Dataset

Member ID	2014 Cost Level	2015 Cost Level
001	High	Moderate
002	Low	High
003	Moderate	High
004	High	Moderate

Cost Levels:

Cost < \$5,000	Low
\$5,000 <= Cost < \$70,000	Moderate
\$70,000 < Cost	High

2014\2015	Low	Moderate	High
Low			
Moderate			
High			

Use Markov Chain Transitional Matrix to Model Large Dataset

Member ID	2014 Cost Level	2015 Cost Level
001	High	Moderate
002	Low	High
003	Moderate	High
004	High	Moderate

Cost Levels:

Cost < \$5,000	Low
\$5,000 <= Cost < \$70,000	Moderate
\$70,000 < Cost	High

2014\2015	Low	Moderate	High	
Low	0	0	1	1/4
Moderate	0	0	1	1/4
High	0	2	0	
		2/4		

Count the number of patients for each cost level transition.

Find the percentage of each transition among the entire population.

Use Markov Chain Transitional Matrix to Model Large Dataset

Member ID	2014 Cost Level	2015 Cost Level
001	High	Moderate
002	Low	High
003	Moderate	High
004	High	Moderate

Cost Levels:

Cost < \$5,000	Low
\$5,000 <= Cost < \$70,000	Moderate
\$70,000 < Cost	High

2014\2015	Low	Moderate	High	
Low	0	0	1	25%
Moderate	0	0	1	25%
High	0	2	0	
		50%		

Count the number of patients for each cost level transition.

Find the percentage of each transition among the entire population.

Higher Probability of High Cost Transitions for Each Disease Groups

▮ All Patients

2014\2015	Low	Moderate	High
Low	53.97%	14.26%	0.55%
Moderate	11.47%	16.72%	1.31%
High	0.25%	0.98%	0.49%

Cost Levels:		
Cost < \$5,000	Low	
\$5,000 <= Cost < \$70,000	Moderate	
\$70,000 < Cost	High	

2014-2015 Cost Level Transition	All Patients	Cancer Group	Diabetes Group	Cardiac Group	Congestive Heart Failure
Low-High	0.55%	0.64%	0.64%	0.79%	1.01%
Moderate-High	1.31%	2.61%	2.22%	3.45%	5.83%
High-High	0.49%	1.18%	1.02%	1.53%	3.16%

Future Goal Is to Build the Predictive Model for Hospital Readmission Rate



Indicator:
HCC



Transitional
Matrix



4 Disease
Groups



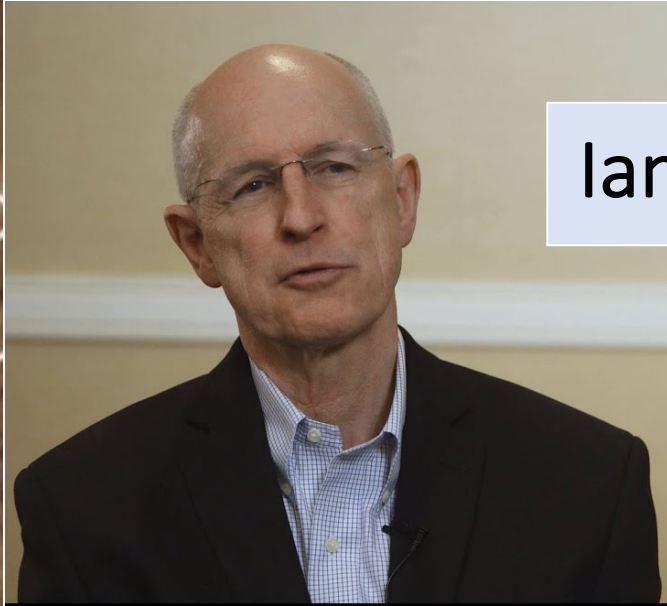
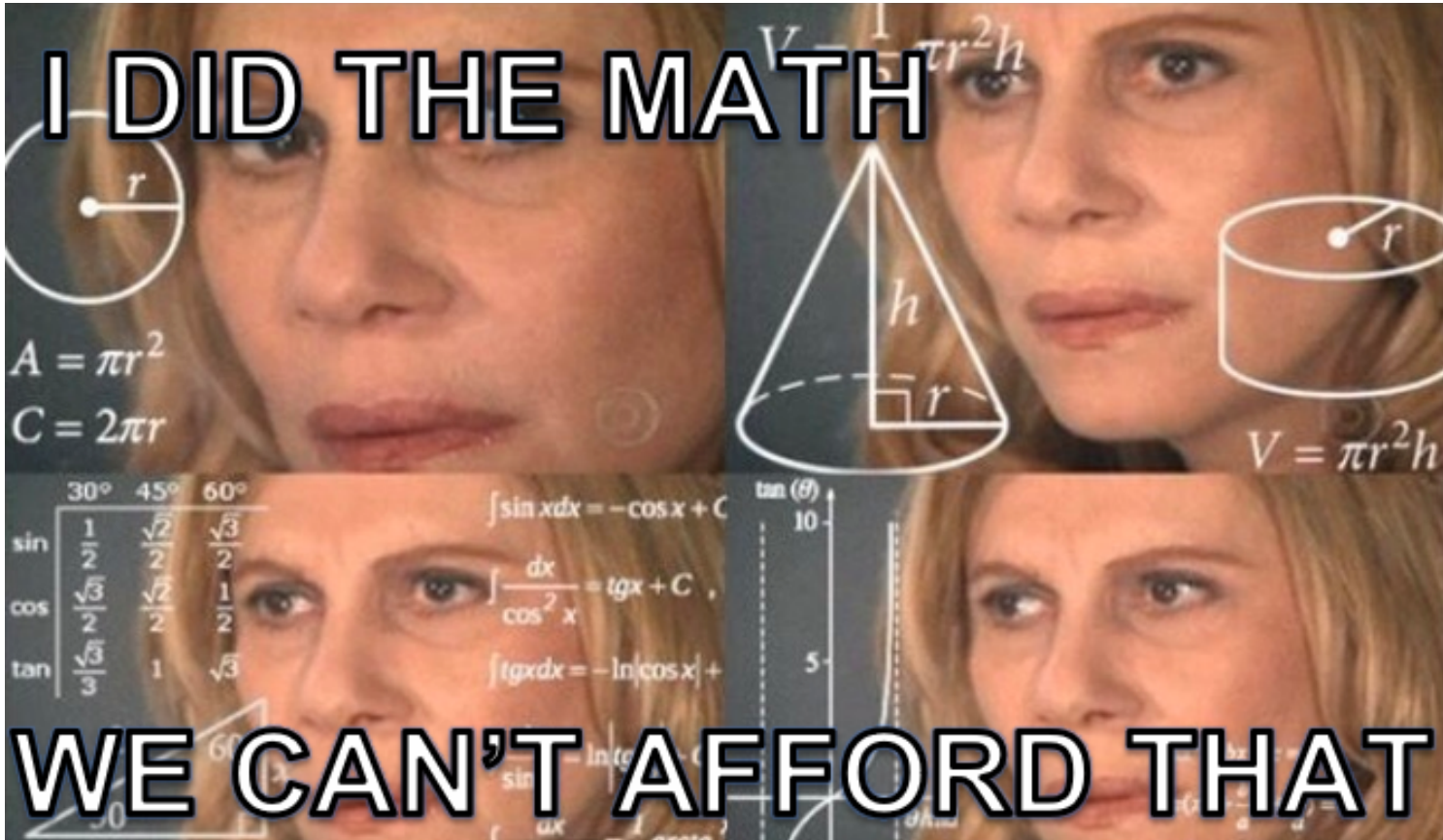
Predictive
Model

Logistic Regression Model

Readmission

Non-Readmission





Ian Duncan



Samantha Davis

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S
Mentor: Doris Padilla
Ming Yi

