



# *DS:FINAL PROJECT*

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# LENGTH OF STAY IN THE HOSPITAL

- Most hospital diagnoses are now accompanied by a fixed estimated average length of stay
- There is pressure for hospitals to discharge patients within a set time period
- Is this related to readmissions?



Search ID: Imin49

**"I've been here so often, they  
keep a room reserved for me."**

# *OBJECTIVES*

## LENGTH OF STAY AND READMISSIONS

- Does a short length of stay result in a readmission?

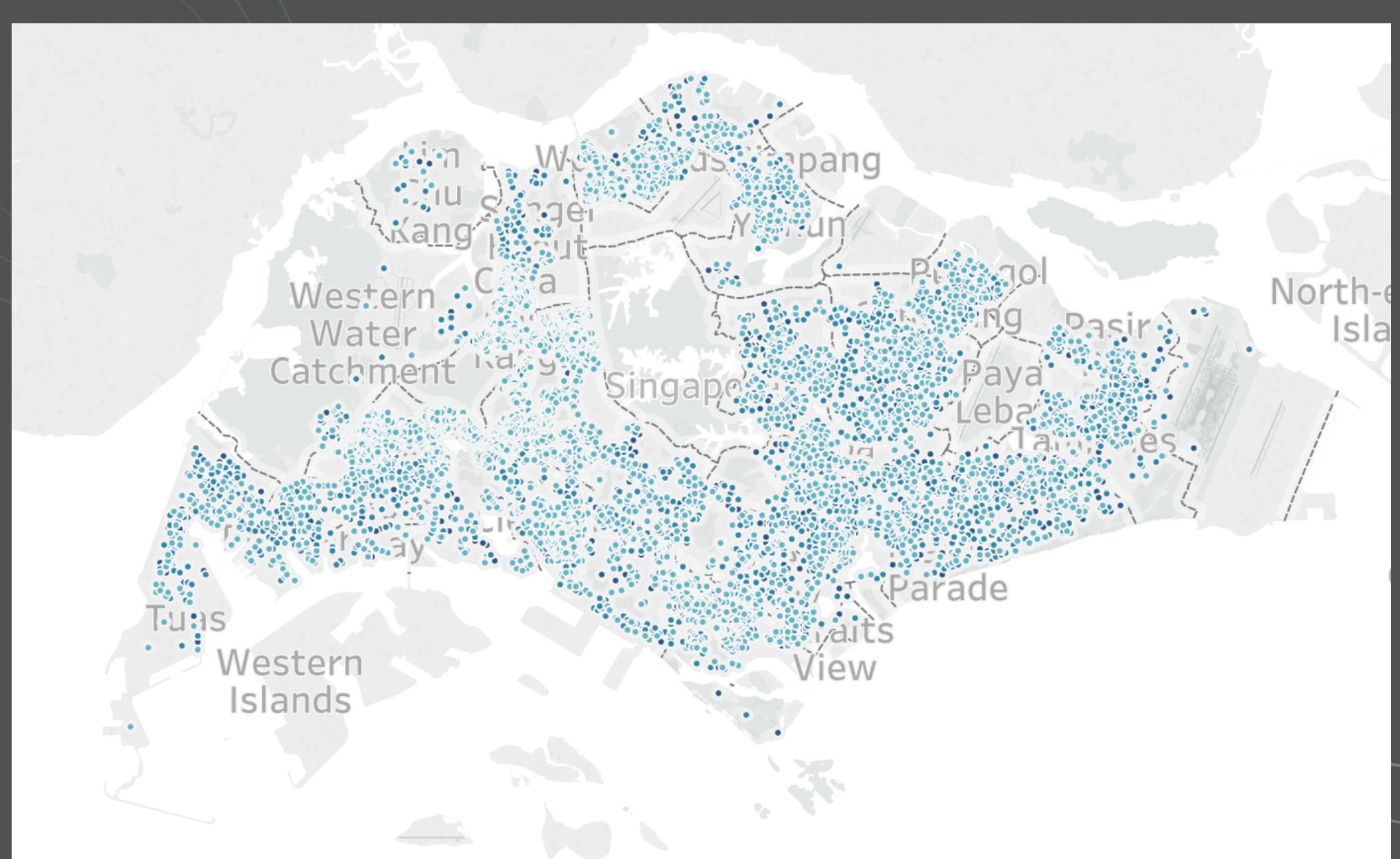
# *DATASET*

The dataset provided information about patients admitted to a public hospital in Singapore between July 2015 to July 2017.

It was a 148601 row and 30 column dataset.

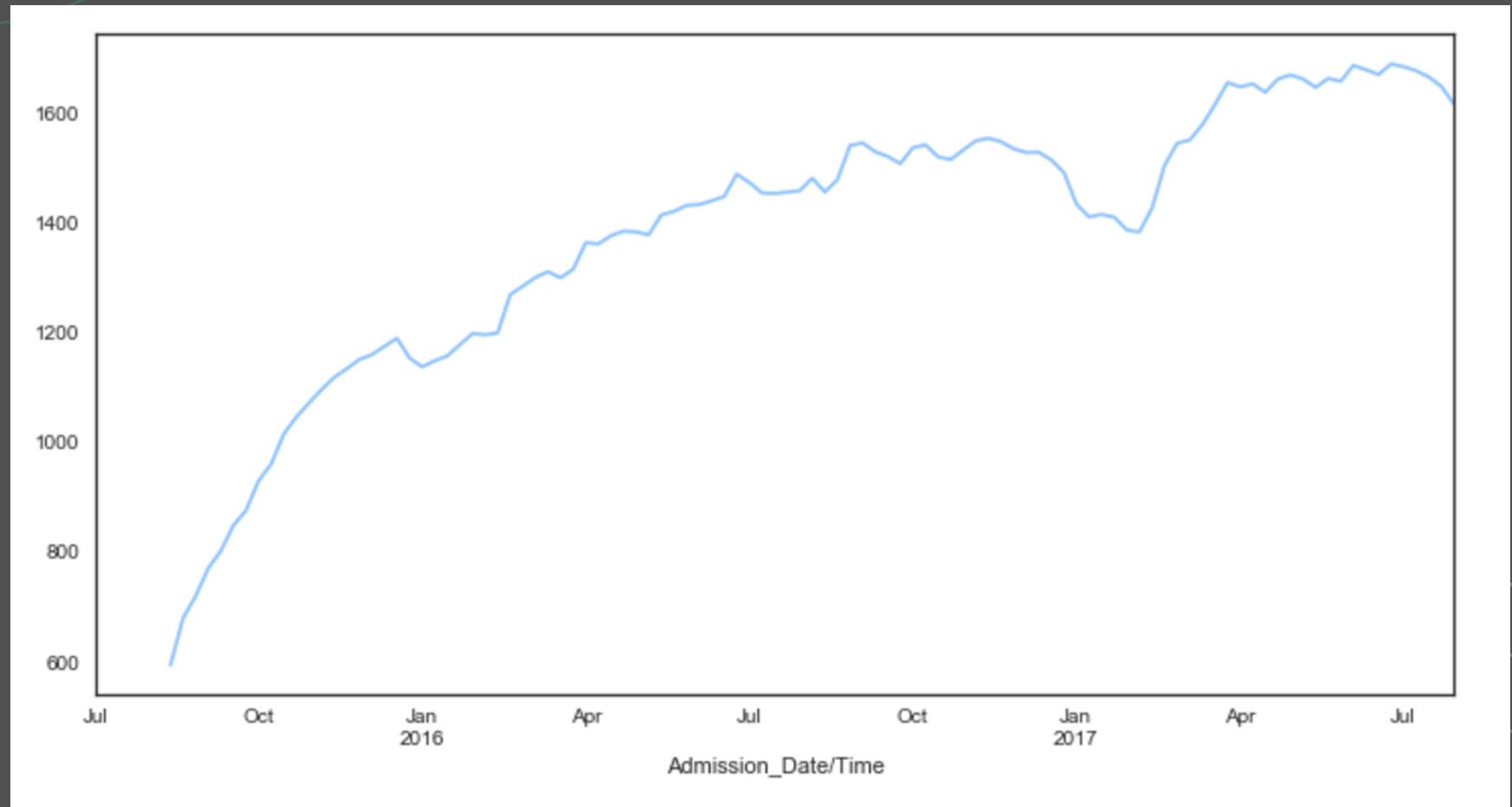
New columns have been added to create categories for some of the continuous variables, namely, for BMI, Falls Risk and MBI scores





# *PATIENT LOAD*

## ROLLING MEAN OF PATIENTS ADMITTED



MONTH/YEAR

*LENGTH OF STAY*  
MEAN LOS IN DAYS

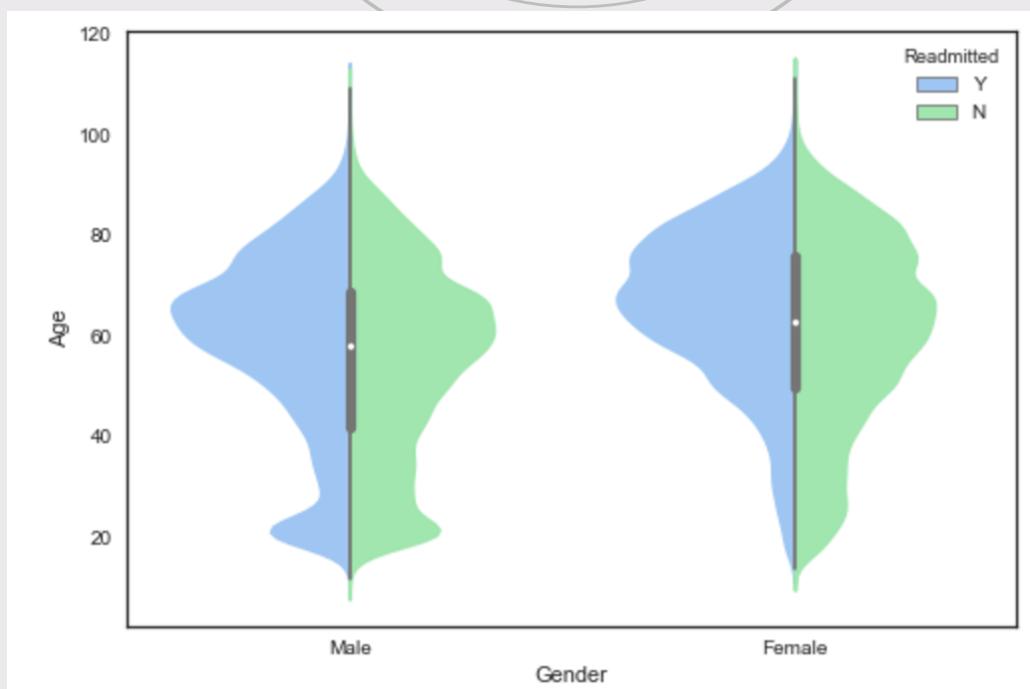
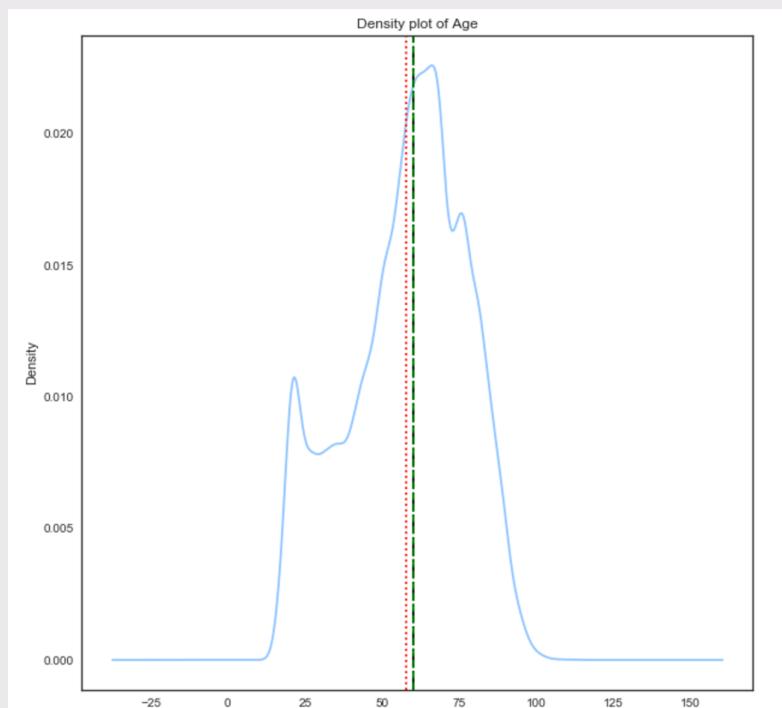
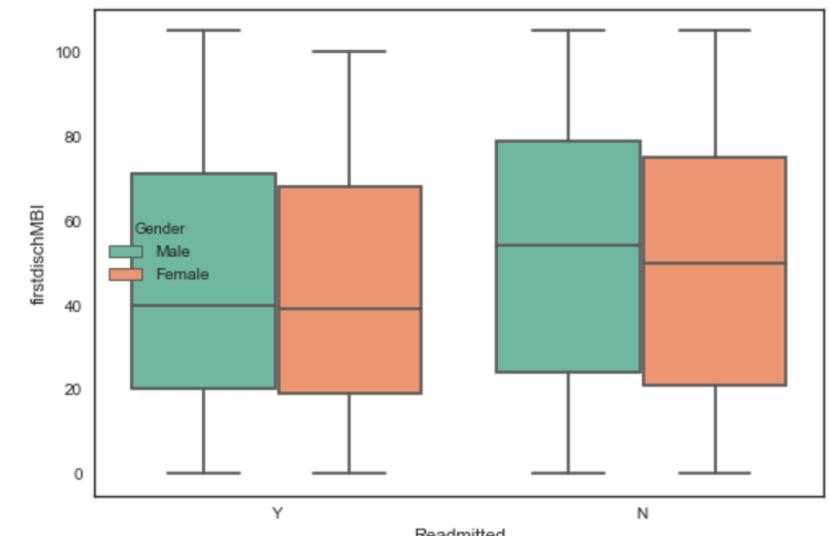
3.4

INDEX ADMISSION

READMISSION

2.9

# DEMOGRAPHICS



# THE ODDS



The OR for **longstayer** (whereby the LOS is  $>$  than the mean LOS) = 1.43, and 0.7 if the patient is not a longstayer. Hence, a patient is more likely to be readmitted if they had a longer than average length of stay in their index admission.

Interestingly, being **married** makes a patient **1.21** times more likely to have a readmission.

OR for readmission if patient is **overweight** is 0.54, and 0.95 if patient is **underweight**. So, ***underweight patients are more likely to be readmitted.***

Being **functionally dependent** results in a patient being 4 times more likely to be readmitted compared to functionally independent.

## Logit Regression Results

<b>Dep. Variable:</b>	Readmitted_Bin	<b>No. Observations:</b>	8179
<b>Model:</b>	Logit	<b>Df Residuals:</b>	8173
<b>Method:</b>	MLE	<b>Df Model:</b>	5
<b>Date:</b>	Sat, 05 Aug 2017	<b>Pseudo R-squ.:</b>	0.01872
<b>Time:</b>	01:00:12	<b>Log-Likelihood:</b>	-3070.6
<b>converged:</b>	True	<b>LL-Null:</b>	-3129.2
		<b>LLR p-value:</b>	1.271e-23

	coef	std err	z	P> z	[0.025	0.975]
<b>Intercept</b>	-2.2544	0.282	-7.985	0.000	-2.808	-1.701
<b>Age</b>	0.0095	0.003	3.667	0.000	0.004	0.015
<b>firstdischMBI</b>	-0.0083	0.001	-7.344	0.000	-0.011	-0.006
<b>first_BMI</b>	0.0025	0.006	0.445	0.656	-0.009	0.014
<b>LongStayer_1</b>	0.2350	0.099	2.377	0.017	0.041	0.429
<b>LOS</b>	-0.0141	0.003	-5.173	0.000	-0.019	-0.009



# Using K-NN

Mean Accuracy (K-folds): 0.77 with 6 n-neighbours

Mean AUC: 0.6

# Random Forest Classifier

Mean AUC: 0.6

# Logistic Regression

Mean Accuracy: 0.82

Mean AUC: 0.58

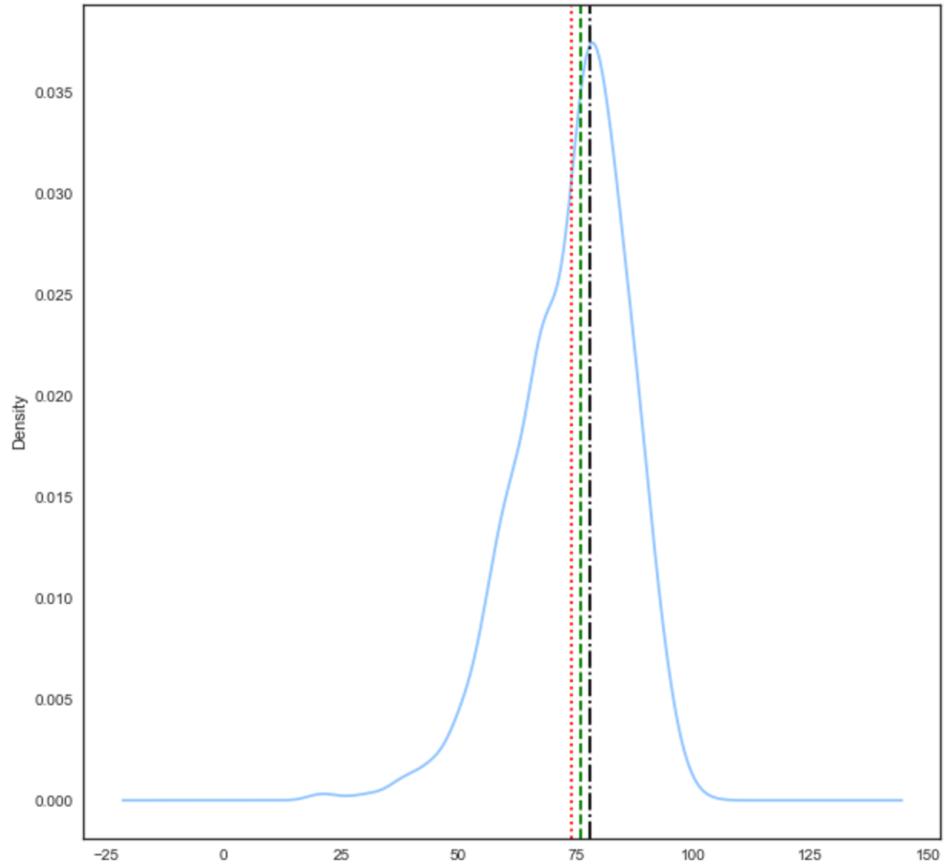
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	Prediction Positive	Prediction Negative
Condition Positive (P)	True Positive (TP) <b>122208</b>	False Negative (FN) 0
Condition Negative (N)	False Positive (FP) <b>26393</b>	True Negative (TN) 0



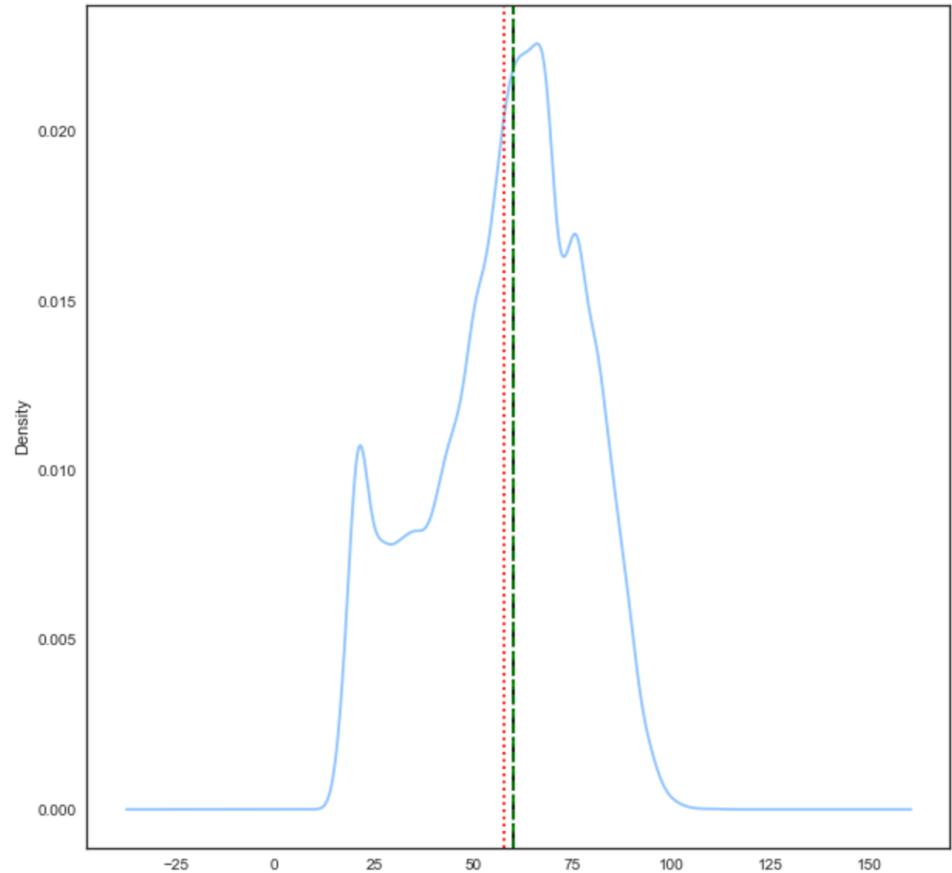
# *REHABILITATION*

Density plot of Age



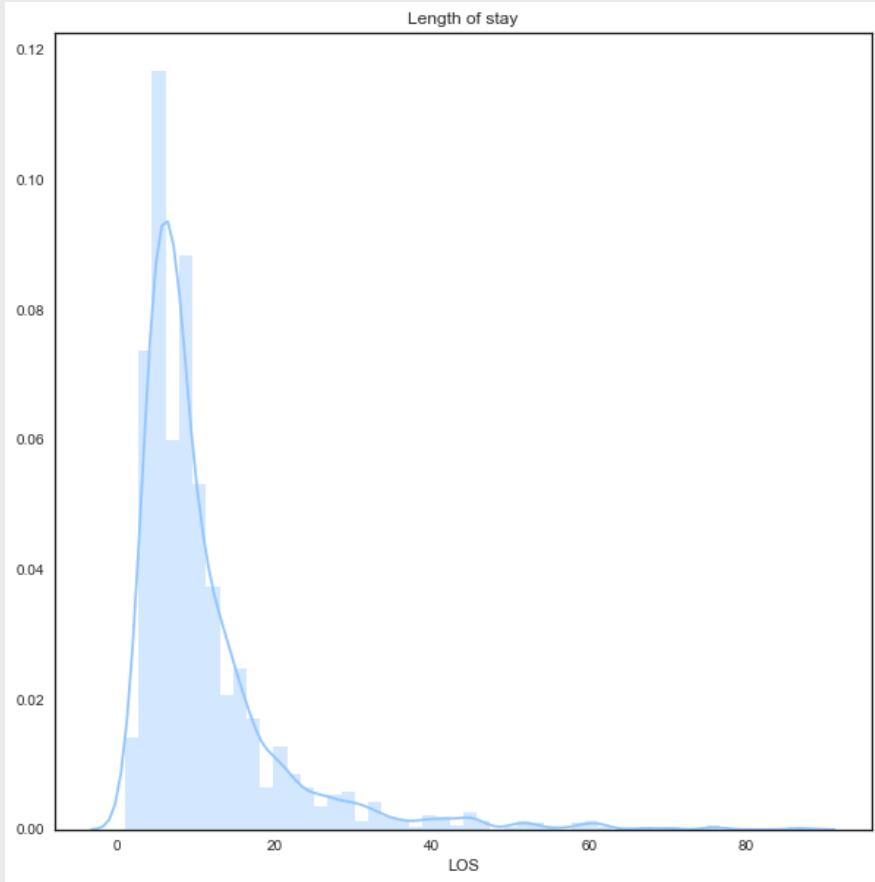
Readmitted for rehab

Density plot of Age

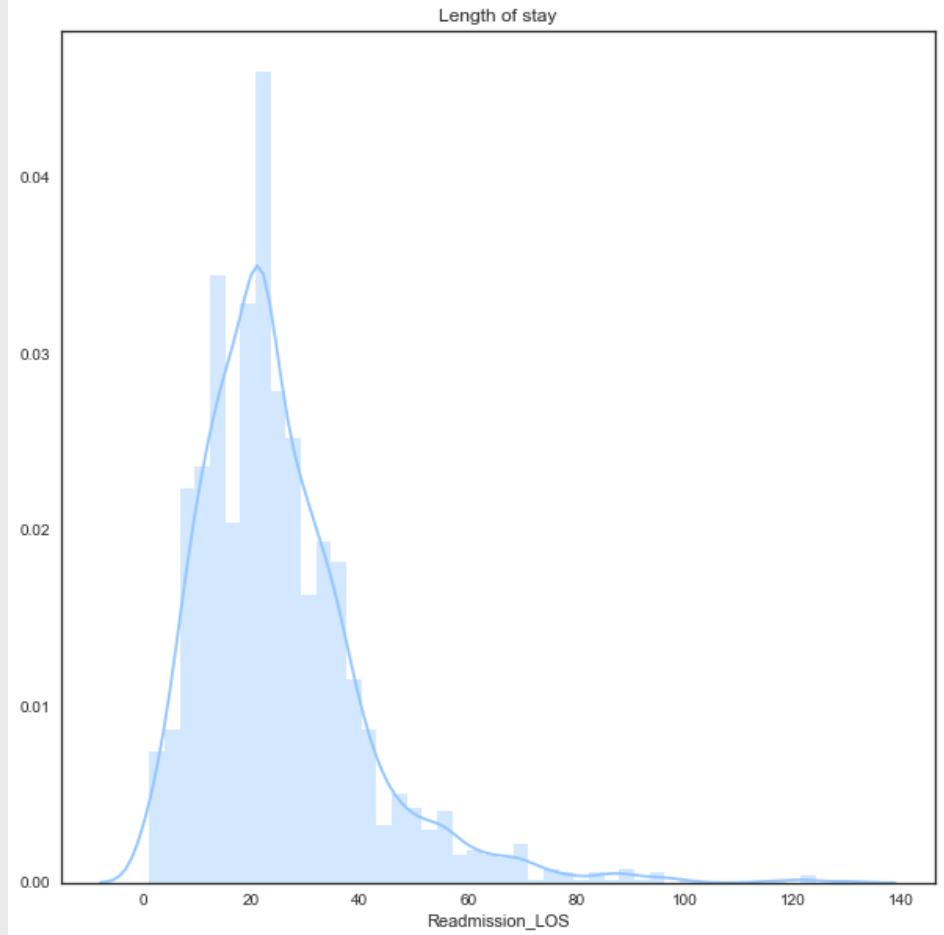


Readmitted (all causes)

# DEMOGRAPHICS

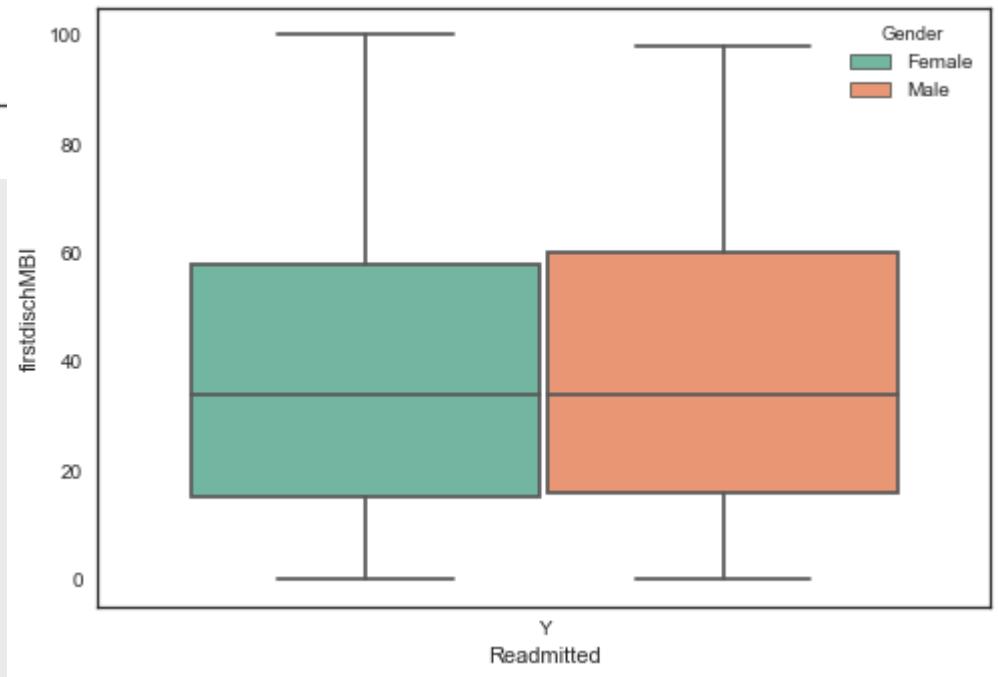
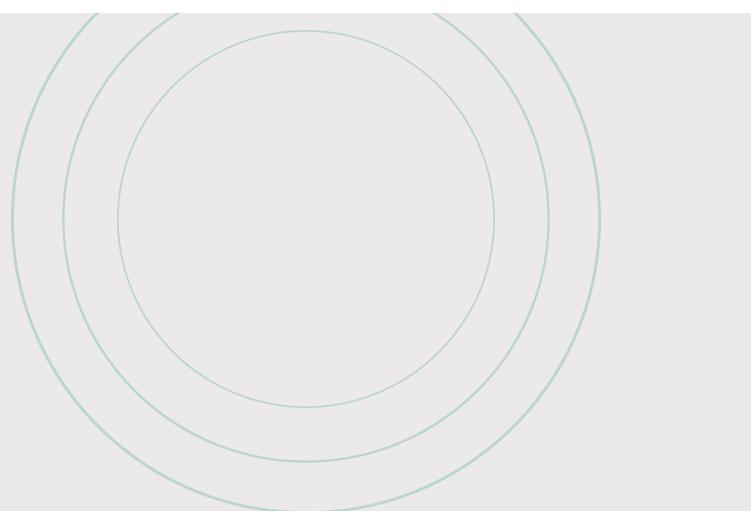
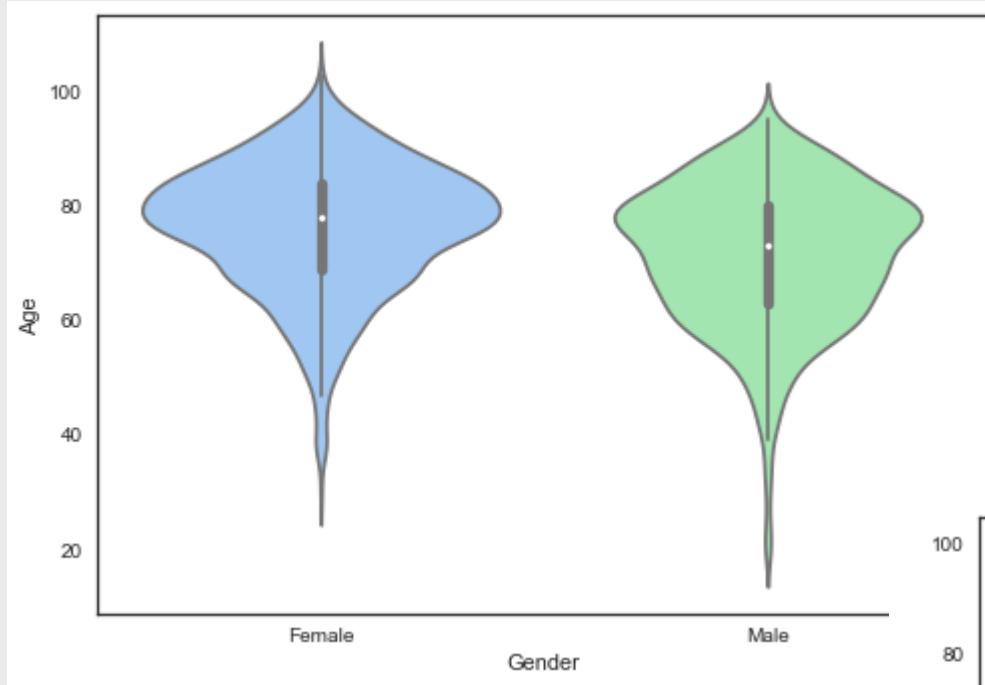


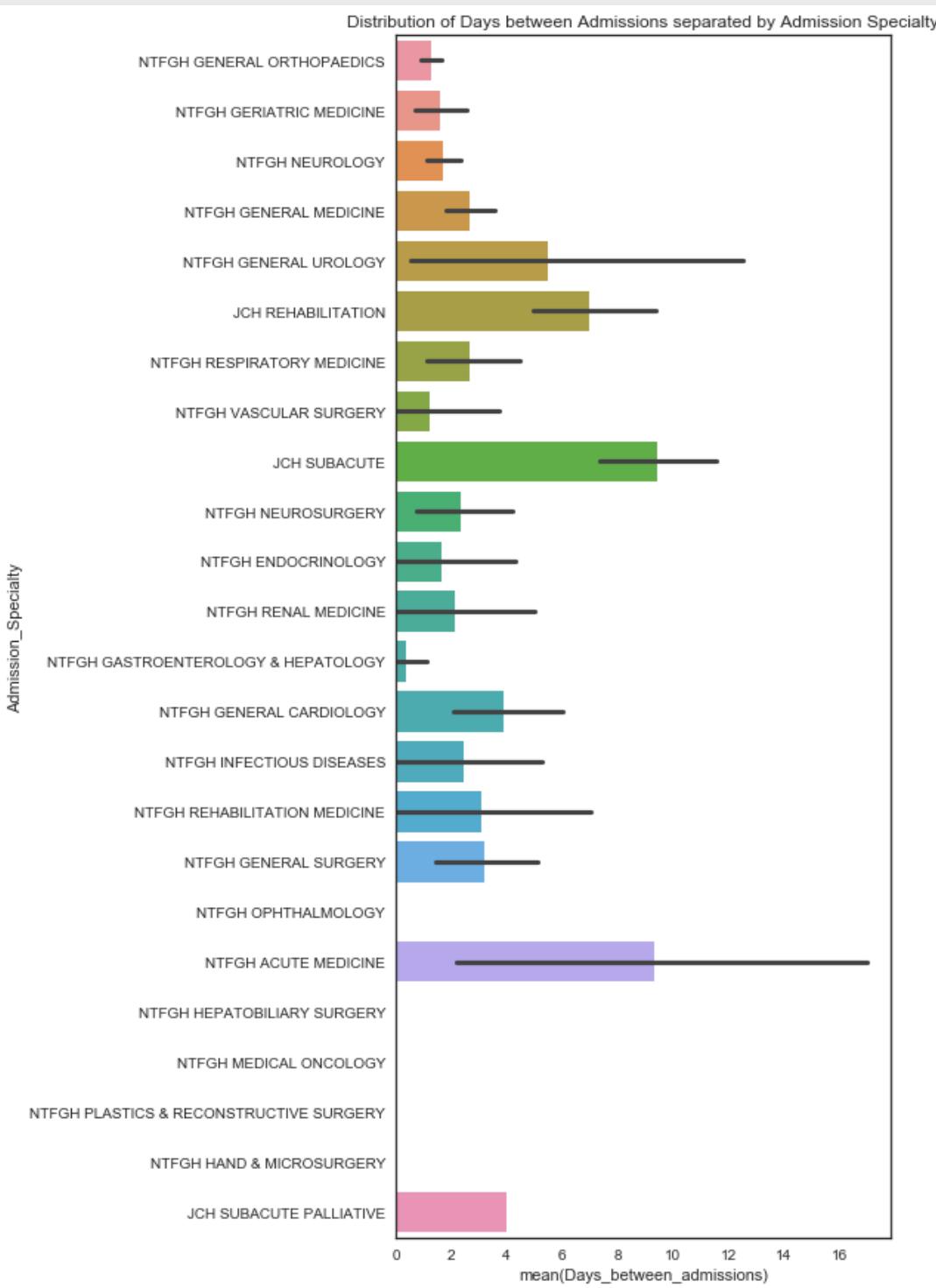
Mean Readmission Length of Stay  
**25.1 days**



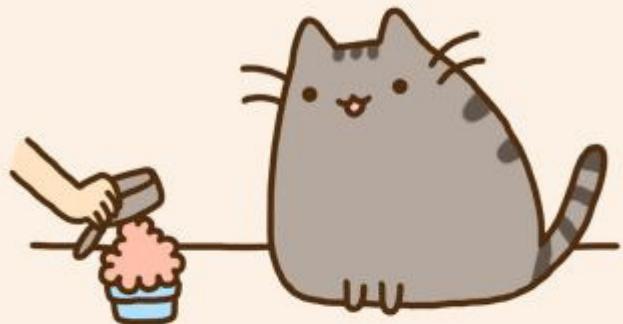
Mean Index Length of Stay  
**11 days**

# DEMOGRAPHICS

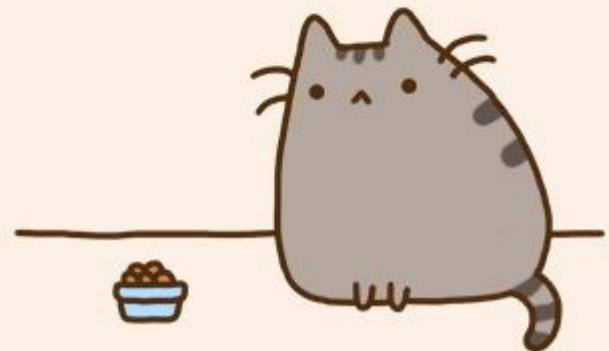




Expectation:



Reality:



Hermione

Pusheen.Tumblr

<https://github.com/littlefrolick>