**Hospital Readmissions Data Analysis and Recommendations for Reduction**

**Background**

In October 2012, the US government's Center for Medicare and Medicaid Services (CMS)

began reducing Medicare payments for Inpatient Prospective Payment System hospitals

with excess readmissions. Excess readmissions are measured by a ratio, by dividing

a hospital’s number of “predicted” 30-day readmissions for heart attack, heart failure,

and pneumonia by the number that would be “expected,” based on an average hospital

with similar patients. A ratio greater than 1 indicates excess readmissions.

**Exercises**

In this exercise, you will:

* critique a preliminary analysis of readmissions data and recommendations (provided below) for reducing the readmissions rate.
* construct a statistically sound analysis and make recommendations of your own

1. Do you agree with the above analysis and recommendations? Why or why not?
2. Provide support for your arguments and your own recommendations with a statistically sound analysis:
3. Setup an appropriate hypothesis test.
4. Compute and report the observed significance value (or p-value).
5. Report statistical significance for α = .01.
6. Discuss statistical significance and practical significance. Do they differ here?

How does this change your recommendation to the client?

1. Look at the scatterplot above.

* -What are the advantages and disadvantages of using this plot to convey information?
* -Construct another plot that conveys the same information in a more direct manner.

### **Data**

Source - data.medicare.gov

**Columns**

'Hospital Name',

'Provider Number'

'State', 'Measure Name'

'Number of Discharges'

'Footnote'

'Excess Readmission Ratio',

'Predicted Readmission Rate'

'Expected Readmission Rate'

'Number of Readmissions'

'Start Date', 'End Date'

Please use the link below for code review and for the detail analysis

[Hospital\_Readmissions\_Data\_Analysis\_and\_Recommendations\_for\_Reduction.ipynb](https://github.com/rivasjmr/Springboard/blob/master/Hospital_Readmissions_Data_Analysis_and_Recommendations_for_Reduction.ipynb)

**Process**

1. Do you agree with the above analysis and recommendations? Why or why not?

*The scatter graph does show some correlation between the readmissions and increasing number of discharges. It is a downward trend.*

*However:*

*it does not provide statistical evidence by presenting the mean and*

*percentage of excess readmission rate that is greater than 1*

*The two sizes evaluated does not include the majority of the population*

*Other factors besides those initial sizes of the facilities i.e. state, should be*

*considered.*

1. Provide support for your arguments and your own recommendations with a statistically sound analysis:
   1. Setup an appropriate hypothesis test.

*H0 - There is no significant correlation between number of discharges and readmission rates*

*H1 - There is significant correlation between number of discharges and readmission rates*

* 1. Compute and report the observed significance value (or p-value).

*Correlation: -0.0973979435108 P-value: 1.22254737767e-25*

*pvalue < 0.05 so we can reject H0 and accept H1:*

*There is significant correlation between hospital capacity and excess readmission ratio.*

*The correlation coefficient (-0.0973979435108) for number of discharges and*

*excess readmission rate is statistically significant representing a negative correlation*

*Looking at the r2 (0.00948635940013) which is <1%, this means only <1% of variability in the excess readmission ratio can be explained by number of discharges.*

* 1. Report statistical significance for α = .01.

*The statistical significance for α =.01 will be the same as when α =.05*

*because p\_value (1.2224686234119185e-25) will be calculated the same way*

* 1. Discuss statistical significance and practical significance. Do they differ here?

How does this change your recommendation to the client?

*Looking at the data independently from the preliminary report,*

*divided the dataset into two sets.*

*excess readmission ration of <=1*

*excess readmission ratio >1*

*There is significant difference between "number of discharges" for hospitals with excess readmission ratio <=1 and those with excess readmission ratio >1*

*Looking at the data independently from the preliminary report,*

*divided the dataset into three sets by 'Number of Discharges'*

*size <= 100:*

*size > 100 and < 1000:*

*size >= 1000:*

*Consistent within the three groups a negative correlation between*

*number of discharges and excess readmission ratio. Both the size >100 and*

*size >= 1000 have a higher correlation then size > 100 and < 1000*

*Also look at the data by states - different states having different excess readmission rate*

* 1. Look at the scatterplot above.
* -What are the advantages and disadvantages of using this plot to convey information?

*Advantages of Scatter plots:*

*Show a relationship and a trend in the data relationship.*

*Show all data points, including minimum and maximum and outliers.*

*Can highlight correlations.*

*Retains the exact data values and sample size.*

*Shows both positive and negative type of graphical correlation.*

*Disadvantages of Scatter Plots:*

*Flat best-fit line gives inconclusive results.*

*Interpretation can be subjective.*

*Correlation does not mean and not show causation.*

* -Construct another plot that conveys the same information in a more direct manner.

*Replace the scatterplot with a joint histogram using hexagonal bins*

*sns.jointplot('Number of Discharges','Excess Readmission Ratio', data=clean\_hospital\_read\_df, kind="hex")*

**Conclusion**

There is significant correlation between Hospitals/facilities capacity and excess readmission ratio

Hospitals/facilities with small capacity (< 100) especially. Many variables can lead to low or high discharges. It should be further reviewed to recommend how to upgrade to provide quality car.

I don’t recommend consolidation. Some of these Hospitals/facilities might be located in areas that are servicing a population that does not have other options nearby.

Recommend to develop a program where the smaller ones can partner up with other Hospitals/facilities and make referrals to have a more manageable load and increase quality care.

As part of the further review, since identified that States vary in excess readmission rate, recommend that state’s practices (maybe initially focus on the 10 lowest and the 10 highest) be compared to identify the differences in Excess Readmission Ratio and find best practices.