**Nursing Home Quality in Oklahoma**

*How nursing home “quality measure ratings” are affected by staffing, ownership, and physical environments of the nursing home?*

The purpose of this analysis was to establish whether a correlation exists between some perceived important measures of care in nursing home facilities and official quality mean ratings used by (CMS) Centers for Medicare and Medicaid Services. We pulled the data from their dataset called provider-data <https://data.cms.gov/provider-data/dataset/4pq5-n9py>. The provider-data is for the entire United States and was published and released by CMS on Jun 28, 2023 and includes approximately 97 columns of information including basic provider contact information, staffing data, facility safety, and various health measures.

We chose to focus on 5 measures of interest in our exploration: (QM) Quality means rating, RN staffed hours per day, RN staff turnover, number of fines, dollar amount of fines, and ownership types. The QM rating is very similar to an overall reflection of care. According to the CMS, “The Nursing Home [Care Compare](https://www.medicare.gov/care-compare/) web site features a quality rating system that gives each nursing home a [QM] rating of between 1 and 5 stars.  Nursing homes with 5 stars are considered to have much above average quality and nursing homes with 1 star are considered to have quality much below average.”

During our exploratory analysis we decided to focus more on Oklahoma as opposed to Tulsa. Although our notebook does contain a few analyses on the city of Tulsa out of personal interest and as well to confirm whether it was reflective of the state. After cleaning empty columns and narrowing our analysis to Oklahoma and in some cases Tulsa we decided to use only 18 columns which included the basic provider data, our measures of interest and the columns closely related to our measures of interest.

**Staff Turnover**

It’s natural to assume that consistencies in staffing would positively affect quality measures because high staff turnover implies a lack of continuity in care. In the case of staffing turnover though it seems less obvious. Staffing hours and turnover don’t have much if any correlation to the QM rating. We calculated linear regression in this case and the p value. The p value for a linear trend is .34 so there is no linear trend. One could hypothesize that facilities likely have systems in place to prevent the negative impact of staff turnover on patients.

**Staff Hours & Fines**

Average time per patient per hour is between 18-25 minutes in all cases according to our Staff Hours & QM Rating bar graph which plots this. On the box and whisker plot of QM rating vs RN Staffed hours per day analysis the box for 1 is relatively small compared to the other boxes on the chart, which shows that the number of hours a nurse spends with a patient is relatively consistent at a 1 QM Rated nursing home.

Bar graph Staffed Nursing Hours vs Total Fines in Oklahoma Nursing Homes Analysis:

We thought that the fewer average hours spent with a patient would mean that there would be a higher number of fines for the nursing home. This graph shows that homes that have 20 - 30 fines spend about the same amount of time with the patients as a home that has 0 - 6 fines. This shows us that the number of hours spent with a patient doesn't affect the total number of fines received by a nursing home.

Scatter with regression Staffed Nursing Hours vs Total Fines in Tulsa Analysis:

This graph is specific to Tulsa. We wanted to see if there was a a correlation between the number of the staffed Nursing hours to the number of fines a home would get. The correlation between the total fines and the reported RN staffed hours per day is -0.18. This means that there is a weak, negative correlation. The total number of fines is affected negatively based on the total number of hours staffed, but not by a lot. This can be seen by the relatively horizontal linear regression. The p-value of linear trend is 0.54, therefor we can confidently say there is no trend.

Bar Average Fines per Quality Measure analysis:

We wanted to know if the average number of fines was relevant to the quality measure rating of the nursing homes. This graph seems skewed to the right a bit, with a large jump at the beginning and then a slower slope down as we progress to the right. This means we have a positive skew. This shows us that yes, the average number of fines do go down as the quality measure of the home goes up, but there is an odd phenomenon of the lowest rated homes having about the same average fines as homes rated a 4.

**Ownership**

We want to know the association between the different types of nursing home ownership and the quality measure rating.

For profit on the left, government in the middle of the graph and non profit on the right.

The variance between for-profit subtypes: Corp, individual and LLC is minimal, with partnership sub-type nearly 1 point above the others. Similarly, there is also a minimal variance between non-profit sub types church related” and “other” while Corp is nearly 1 point higher.

Interestingly, the two government owned subtypes: City and County, had the biggest disparity. What created such a large gap between quality measures? One hypothesis could be the higher amount of fines the lower the qm rating, so a smaller data frame was created to show the ownership type and the amount of fines each had.

We then calculated correlation between the quality measure rating and the total amount of fines which came to -0.11; an extremely small negative correlation as the scatter plot shows. Normally, one would expect the amount of fines to decrease as the qm rating increases, but there are many outliers that do not follow the trend. The hypothesis could not be proven.

If p value is less than 5% you can reject the null hypothesis and conclusion is there is no linear trend. The p value for a linear trend is .34 so there is no linear trend.

We wanted to see how number of hours the nurses spent with patients would affect the quality measure. What we found is that there is no real correlation between the quality measures of the times spent.

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