

2020

Investigating Preventable Hospitalizations and Potentially Related Factors in Ohio

Seth Guillozet

Wright State University - Main Campus, guillozet.5@wright.edu

Follow this and additional works at: https://corescholar.libraries.wright.edu/scholarship_medicine_all



Part of the [Patient Safety Commons](#)

Repository Citation

Guillozet, S. (2020). Investigating Preventable Hospitalizations and Potentially Related Factors in Ohio. Wright State University. Dayton, Ohio.

This Article is brought to you for free and open access by the Scholarship in Medicine at CORE Scholar. It has been accepted for inclusion in Scholarship in Medicine - All Papers by an authorized administrator of CORE Scholar. For more information, please contact library-corescholar@wright.edu.

Investigating Preventable Hospitalizations and Potentially Related Factors in Ohio

Seth Guillozet

Dr. Amber Todd, Medical Education

Population Health and Public Health

Scholarship in Medicine Proposal

By checking this box, I indicate that my mentor has read and reviewed my draft proposal prior to submission (Participating in April Short Course)

Abstract

Objective: This research study aims to examine preventable hospitalization rates in Ohio and several variables that may be associated with changes in these rates. First, I will investigate how preventable hospitalization rates (PHRs) have changed in Ohio from 2016 to 2020. Additionally, Primary Care Physician (PCP) ratio will be compared from 2016 to 2020 in Ohio, looking for any change that has occurred between the years. Next, PHRs will be correlated to the percentage of population uninsured in Ohio to look for any relationship between these two variables. Finally, Ohio's PHRs will be compared to Indiana's for 2020, to look for any difference between these two geographically similar regions.

Methods: To accomplish the goals outlined above, SPSS software will be used to conduct statistical analysis on the data obtained. To compare PHRs in Ohio and then PCP ratio in Ohio and

ANOVA with a post-hoc test will be used to show any significant difference between the years described. Correlating PHRs and percent of population uninsured will be accomplished utilizing a Pearson coefficient. Finally, an unpaired t-test will be used to compare Ohio and Indiana PHRs in Ohio to test for a significant difference in these rates. All data used was taken from a publicly available dataset found at County Health Rankings.

Results: The study found a significant decrease in PHRs in Ohio from 2016 to 2020. There was no significant findings when looking at PCP ratio in Ohio from 2016 to 2020, PHR difference between Ohio and Indiana, and when examining for a correlation between PHRs and the percentage of population uninsured in Ohio in 2020.

Key Words: Preventable Hospitalization Rates, Uninsured, Primary Care Physician Ratio, Ohio

Introduction/Literature Review

The CDC defines preventable hospitalization rates as admissions to a hospital for certain acute illnesses or worsening chronic conditions that might not have required hospitalization had these conditions been managed successfully by primary care providers in outpatient settings. These preventable hospitalizations are not only common, but also costly in the American healthcare system.¹ A national cross-sectional study in 2016 found that relative hospitalization costs for a potentially preventable acute condition for a patient with 2 or 3 chronic conditions was 14% higher than a patient with 0 or 1 chronic conditions. This cost increases to 26% if the patient has 4 or 5 chronic conditions.² Essentially, having multiple medical conditions that are managed in an ambulatory care setting result in more preventable hospitalizations and higher relative costs on the American healthcare system. Thus, preventable hospitalization rates have been used as a measure to examine patient access to quality ambulatory care.

Previous studies have found an inverse relationship between preventable hospitalization rates and insurance status of the individual.³ If an individual is uninsured or under-insured, preventable hospitalization rates increase due to use of emergent care facilities for conditions that can be managed in an ambulatory setting. Additionally, aside from insurance enabling access to ambulatory care that can prevent hospitalizations, lower access to a primary care physician is also associated with an increased rate of preventable hospitalizations.⁴ Primary care ration is defined as the ratio of population to primary care physicians. A higher number of primary care physicians relative to the population can serve to show areas where individuals have an increased access to a primary care physician, which can be essential in managing chronic conditions and allowing a higher continuity of care that can reduce preventable hospitalizations.⁵

It is apparent that preventable hospitalization rates are a function of a multitude of variables that are related to patient factors such as socioeconomic factors, location, and ambulatory care access in the area.

When examining the preventable hospitalization rates in patient populations, there has been no direct studies focusing on the population in Ohio. This study aims to fill this void by examining PHRs and several related factors in Ohio. Specifically, we will compare how PHRs and primary care ratios have changed in Ohio over the past 5 years. In addition, this study will compare Ohio PHRs to the PHRs in Indiana to examine any potential differences between these two geographically similar locations. Finally, this study will attempt to correlate the percentage of population insured with PHR in Ohio.

Hypothesis/Specific Aims/Research Questions

When examining how PHRs and PCP ratio have changed in Ohio from 2016 to 2020, it is expected that PHRs and PCP ratio have decreased over this period of time, due to various advancements in healthcare and outpatient care. In addition, PHRs are likely to increase as the percentage of population uninsured increases, due to patients utilizing emergency and urgent care for diseases that can be managed on an outpatient basis and decreased follow-up with primary care providers. Finally, Ohio's PHRs are likely to not be significantly different from that of Indiana, as the two are similar in location and population.

Methods

Context/Protocol

Project will be completed in retrospective fashion using data gathered previously by County Health Rankings.⁶ Data collected by County Health Rankings is aggregated data found through various publicly available data banks, as detailed in the *Data Collection* section.

Data Collection

Preventable Hospitalization Rates: Data for PHRs collected via County Health Rankings. This data was sourced primarily from The Centers of Medicare and Medicaid Services Office of Minority Health's Mapping Medicare Disparities. This office collects health outcomes for multiple patient and disease characteristics, such as prevalence, costs, hospitalizations for many chronic conditions. PHRs is a measure of the number of hospital-stays for ambulatory-level care processes per 1000 Medicare participants. County Health Rankings used data from 2017 for this measure.

Primary Care Physician Ratio: PCP Ratio is defined as the ratio of the population to PCPs in that defined area. Data for this variable was collected from 2017 data from the Area Health Resource File, which is an aggregation of data from many sources, including the American Medical Association, American Hospital Association, US Census Bureau, and more.

Percent Uninsured: Data for Uninsured is defined as the percentage of individuals under 65 that do not have health insurance. This data was collected based on survey data that was subsequently modeled by the Small Area Health Insurance Estimates. Data for 2020 from this measure was taken from 2017.

Data Analysis

RQ1: How have preventable hospitalization rates changed in Ohio from 2016 to 2020?**RQ2: How has PCP ratio changed from 2016 to 2020 in Ohio?**

For RQ1, I will compare preventable hospitalization rates from 2016 to 2020 in Ohio. For RQ2, I will compare the PCP ratio from 2016 to 2020 in Ohio. To accomplish these comparisons, I will be using a paired t-test to compare the rates from these different years. All data for RQ1, RQ2, RQ3, RQ4 is going to be analyzed via SPSS, and a threshold for significance will be set at $p < 0.05$ when applicable.

RQ3: Do preventable hospitalization rates correlate with the percent of population uninsured in Ohio from 2020?

To correlate preventable hospitalization rates with the percentage of population uninsured in Ohio of 2020, I will first test for normality for the data set. If the analysis of the data set shows a normal distribution, I will use a Pearson correlation. If analysis shows a non-normal data set, then I will use a Spearman rank correlation.

RQ4: How does Ohio's preventable hospitalization rate compare to Indiana in 2020?

To compare Ohio's preventable hospitalization rate in 2020 to that of Indiana in 2020, I will use an ANOVA with a post-hoc test if applicable for rates from each state.

Results

PHRs across 88 Ohio counties were examined for the years 2016 and 2020. Statistical analysis determined a significant difference ($p < 0.01$) between PHRs between 2016 and 2020. 2020 was found to have significantly lower ($p < 0.01$) PHRs, as evidenced in Table 1 below.

Table 1

Preventable Hospitalization Rates		
Year	2016	2020
N	88	88
Mean	69.454	50.65
Std Dev	15.359	13.558

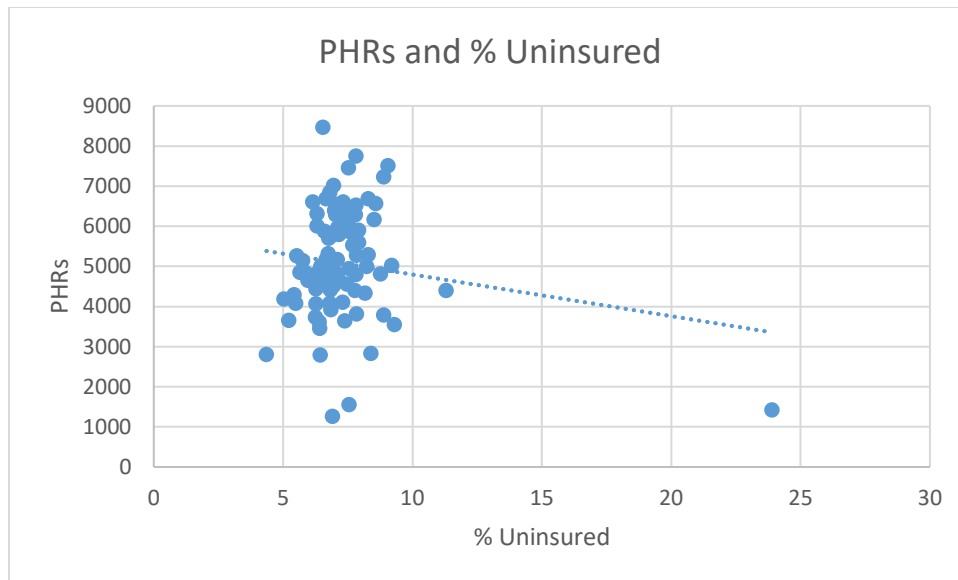
PCP ratio was examined across Ohio counties for 2016 and 2020. Ohio in 2020 had, on average, a higher PCP ratio across all counties than in 2016. However, there was not a significant difference between PCP ratio between these years ($p > 0.01$), as seen in Table 2.

Table 2

Ohio PCP Ratio		
Year	2016	2020
N	88	88
Mean	2521.52	2672.81
Std Dev	2121.054	2070.477

PHRs were correlated to the percent of population uninsured via a Pearson Correlation. There was no significant correlation found between % uninsured and PHRs ($p > 0.01$). *Figure 1* showcases a lack of true linear relationship between the two variables, with a slight downward trend in the data.

Figure 1



PHRs were compared between Ohio and Indiana for the year 2020 using a oneway ANOVA with a post-hoc test. Ohio had, on average, more PHRs than Indiana. However, there was no significant findings between the two PHRs in each state ($p > 0.01$).

Table 4

PHRs Between States		
State	Ohio	Indiana
N	88	92
Mean	5073.05	4888.86
Std Dev	1354.449	1158.008

Discussion

This study looked to examine how PHRs have changed in Ohio, and to investigate for potentially related factors surrounding these rates. The first research question looked at examining if PHRs have significantly changed in Ohio from 2016 compared to 2020. As expected, PHRs have decreased across this period, with lower PHRs in 2020 compared to 2016. This change was expected and predicted, as general improvements in healthcare and medical knowledge have increased over the years. However, recent literature has shown that preventable

hospital stays display variation over time in specific counties, there is a tendency of the measures that are used to determine PHRs to remain stable in a population over time.⁷ This study shows a contrasting result, with PHRs actually decreasing over time.

The purpose of the subsequent research questions was to then explore whether various healthcare factors were related to this decrease in PHRs over time in Ohio. PCP ratio was compared in Ohio from 2016 to 2020, and unexpectedly there was no significant change in this ratio. This variable, which examines how many primary care doctors are available in an area related to the population, was seen as potentially being able to relate to PHRs as primary care physicians in an outpatient setting are responsible for caring for these ambulatory care conditions that can then reduce unnecessary hospital stays. Recent literature found that continuity of care reduced preventable hospital stays in Medicare recipients, and the ratio of primary care physicians available in an area can certainly influence continuity of care in that area.⁵ Additionally, the primary care physician density was found to be negatively associated with avoidable hospital stays.⁸ So recent data is conflicting with the results of this study, but it is worth noting that this study fails to take into consideration geographical weight when examining the data.

The percentage of the population insured was then correlated to PHRs in Ohio. It was expected that there would be a significant correlation between these two variables. However, the study found no significant correlation between percent of population insured and PHRs in Ohio. This conflicts with current data, that has demonstrated that a higher percentage of population uninsured was correlated with higher PHRs in the population.³ This conflict could be due to data only being taken from 1 year, as a 1 year sample size could disturb trends that develop over many years.

Finally, it was expected that PHRs in Ohio are statistically similar to those in Indiana due to regional similarities. There was no statistical difference in PHRs between the two states in 2020. While no significant change was found, there is importance in noting there was no difference found, as there are notable differences between the states when examining healthcare. The US Census Bureau found that Ohio has a smaller uninsured rate at 6.5% compared to 8.3% for Indiana in 2018. Additionally, Medicaid expansion occurred at different times for each state, with Ohio opting to expand prior to 2014, while Indiana did so in 2015-2016.⁹ Further studies would be needed to examine for potential causes that would lead to both states having similar PHRs.

Conclusion

Limitations to the study include using data from County Health Rankings, which is a aggregate database of healthcare information, and thus, not a primary research study from personally collected research. In addition, the percentage of the population that is uninsured was taken from survey data that was then modeled, which can cause assumptions about the data that may not hold up in all cases. PCP ratio is a measure that fails to take in physicians living at the edge of counties practicing in multiple areas and that many other healthcare providers help provide primary care.

In the future, other studies of PHRs could take advantage of some of the findings, and lack-of findings, present in this study. Data can be taken over a longer timeframe, which could potentially allow for some previously seen trends to develop that did not show here. In addition, other characteristics of a population can be viewed to check for an association with PHRs in Ohio. However, the significant decrease in PHRs from 2016 to 2020 is a positive finding, and future research could only help to identify factors that have led to this change.

References

1. Potentially Preventable Hospitalizations — United States, 2001–2009. <https://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a23.htm>. Accessed April 13, 2020.
2. Skinner HG, Coffey R, Jones J, Heslin KC, Moy E. The effects of multiple chronic conditions on hospitalization costs and utilization for ambulatory care sensitive conditions in the United States: A nationally representative cross-sectional study. *BMC Health Serv Res*. 2016;16(1):77. doi:10.1186/s12913-016-1304-y
3. Culler SD, Parchman ML, Przybylsk M. *Factors Related to Potentially Preventable Hospitalizations Among the Elderly*. Vol 36. <https://about.jstor.org/terms>. Accessed April 14, 2020.
4. Van Loenen T, Faber MJ, Westert GP, Van Den Berg MJ. The impact of primary care organization on avoidable hospital admissions for diabetes in 23 countries. *Scand J Prim Health Care*. 2016;34(1):5-12. doi:10.3109/02813432.2015.1132883
5. Nyweide DJ, Anthony DL, Bynum JPW, et al. Continuity of care and the risk of preventable hospitalization in older adults. *JAMA Intern Med*. 2013;173(20):1879-1885. doi:10.1001/jamainternmed.2013.10059
6. Ohio | County Health Rankings & Roadmaps. <https://www.countyhealthrankings.org/app/ohio/2020/overview>. Accessed April 15, 2020.
7. Sumner W, Hagen MD. Variation over time in preventable hospitalization rates across counties. *J Am Board Fam Med*. 2011;24(6):639-646. doi:10.3122/jabfm.2011.06.110028

8. Lin YH, Eberth JM, Probst JC. Ambulatory Care-Sensitive Condition Hospitalizations Among Medicare Beneficiaries. *Am J Prev Med.* 2016;51(4):493-501.

doi:10.1016/j.amepre.2016.05.005

9. Uninsured Rate by State: 2008 to 2018.

<https://www.census.gov/library/visualizations/interactive/uninsured-rate-2008-2018.html>.

Accessed April 27, 2020.