Impact of Applying SDOH on Prescription Fill Rate Analysis

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Abstract: Patients requiring prescription medications, particularly for specialty pharmacy medications, may be subject to plan design and other factors in determining whether they are eligible for the medication, and if so, what the out-of-pocket cost will be to them. The patient journey has been segmented into three components, the dispensed or fill rate, the abandonment or reversal rate, and the rejection rate. Understanding the potential underlying causes of prescription rejection rates is important to mitigate them. Traditional analysis focuses only on age, gender, and/or marital status. HealthNexus™, an analytics platform, integrates medical and pharmacy claims records with Social Determinants of Health (SDOH), shedding new insights into healthcare delivery and disparities. Their impact can be seen at each portion of the journey.

This analysis looked at approximately 3.5 million Americans taking an anti-coagulant drug. The number of people having their prescriptions rejected, abandoned, or filled were evaluated. Demographic information, such as age and gender, as well as SDOH information such as race, ethnicity, marital status, and income level were evaluated independently and together to identify disparities in care delivery. Further analysis was done on the raw residuals, which were standardized to produce a common scale, an Adjusted Standardized Pearson Residual (ASPR).

In 2017, CMS found that 3.5% of Part D prescriptions were rejected[1]. For the prescription in this study, using a traditional view, 1.2% of prescriptions are denied, or approximately 43,000 people.   With deeper analytics looking at SDOH, results show that Hispanic patients are 1.25 times more likely and African Americans are 1.49 times more likely to have their prescriptions rejected compared to patients from other ethnic or racial groups. When income is factored in, low Income (<$20,000/year) Hispanic patients are 1.18 times more likely, and African American patients 1.65 times more likely to have their prescription rejected. Traditional views of rejection rates miss the discrepancies of race and ethnicity. Our findings show that African Americans are more likely to have their prescriptions rejected no matter what their income. However, this is more pronounced in the lower income African American population. Hispanics exhibit a higher rate of rejection, but income does not appear to play as big a role, suggesting that other factors may need to be considered.

Introduction

Administrative claims data are used to evaluate medical and pharmacy trends. Unlike medical claims, non-specialty pharmacy claims contain only limited amounts of patient information such as name, address, date of birth, and date written and dispensed. While this information is useful, it is limited with regards to understanding the individuals receiving the medication. With the initiation of privacy laws, such as HIPAA, even this type of information is very limited in how it can be utilized for clinical or any other type of investigation. Currently, there are new data sources available which allow for de-identified patient information to be accessed and used for analysis.

Recently, a great deal of attention has focused on other factors that can influence an individual and their ability to access

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medical and pharmacy care. According to the CDC, social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a whole range of health, functioning, and quality of life outcomes and risks. SDOH can be grouped into five domains: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and finally, social and community context.[2]

The patient journey with regards prescription medications identifies the different touchpoints encountered. A prescription is presented to the pharmacy, and it is either filled and dispensed, filled, and abandoned (not picked up), or rejected. Understanding which groups of patients fall into each of these categories enables health care policy makers, pharmaceutical companies, and others to see what issues need to be addressed to close the gaps when a valid prescription is presented, but the medication is either abandoned or the prescription is rejected. As more medical information is being evaluated, further insights into the prescriptions need to be undertaken. Through the deidentification of patient information, one can gain further insights into the prescriptions and the patient journey.

Methodology
An analysis of a national open claims medical and pharmacy database examined pharmacy claims data for an anticoagulant from 12/01/2018 and 11/06/2021. In addition, Social Determinants of Health (SDOH) data, and mastered information regarding Healthcare Provider and Organization contact addresses, financials, clinical trial experience, and more. Open

Claims data is sourced and aggregated from switch, clearing house and RCM providers. A total of 3,540,758 individuals met the criteria to be included in the study. Patient ages ranged from 18 to 85 years old. These people are all deidentified, and only the patient attributes are linked to the prescription through a series of tokenization steps using the Datavant software for linking and disaggregating patient information. Further statistical analysis was then conducted after the reports were generated.

Initial evaluation of the data was conducted looking at three main components of the prescription journey, Dispensed, Abandoned, and Rejected. All claims information for each of these three phases is provided in the data sets obtained by the clearing houses based on determinations by the plans receiving the claims. In addition, further analysis within each component looked at age, gender, race, ethnicity, and income. focuses on the following characteristics for race: White, African American, Asian American, and other. For ethnicity, Hispanic and Non-Hispanic are the two variables considered. For any table cell, a raw residual is estimated as a function of the difference between observed and expected values. Of particular interest are those cells with the largest residuals. However, raw residuals are not immediately comparable. They first need to be standardized to produce a common scale. A type of such residual is termed an Adjusted Standardized Pearson Residual (ASPR). The ASPR that in absolute value exceeds 2 indicates a significant discrepancy between observed and expected values that cannot be explained by randomness alone.[2] This methodology was applied to each cell being analyzed.
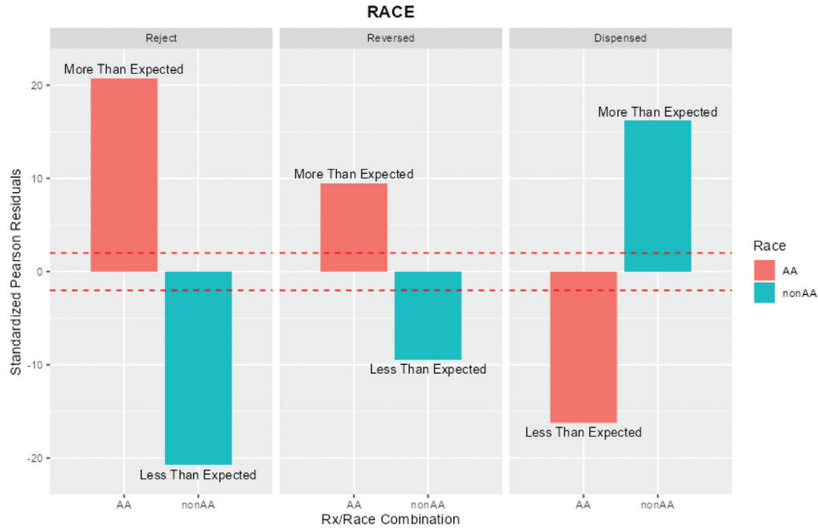
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[2] https://health.gov/healthypeople/priority-areas/social-determinants-health

Figure 1: Outcome by Gender

	Reject	Abandoned	Dispensed	Total
Female	1.23%	8.51%	90.26%	100%
Male	1.34%	8.84%	89.82%	100%
Total	**1.29%**	**8.68%**	**90.04%**	

Figure 2: Impact of Race on Prescription Fill Rates

Each variable was compared to the outcomes for dispensed and rejected. Any incidents of statistical significance were noted. In each of the graphs in this article, the dashed lines represent the barriers for statistical significance. Any bar extending beyond this line is considered statistically significant.

This paper focuses on several main areas of observation period, the first being the impact of age, gender, race, ethnicity, and income values. The last variables were combined so that race and income and ethnicity and income were also evaluated to determine if there was any change in statistical significance for individuals earning less than $20,000 per year.

Results

Overall, the rate the rates for prescription being filled, abandoned, or rejected were 90.04%, 8.68%, and 1.29%, respectively. We observe that males exhibit a significantly higher rate of having their prescriptions abandoned (Chi-Square Goodness of Fit p-value < 2.2e-16) or rejected (Chi-Square Goodness of Fit p-value < 2.2e-16) when compared to female patients. (Figure 1.)

With the introduction of the SDOH variables to the data, new trends begin to emerge. For example, when comparing Dispensed vs Rejected outcomes by Race, an exact test yields a p-value < 2.2E-16 with an Odds Ratio of 1.49 with a confidence interval (CI) of (1.42, 1.54). This means that the odds of having a prescription rejected is 1.49 times more likely in African American

Figure 3: Impact of Ethnicity on Prescription Fill Rates
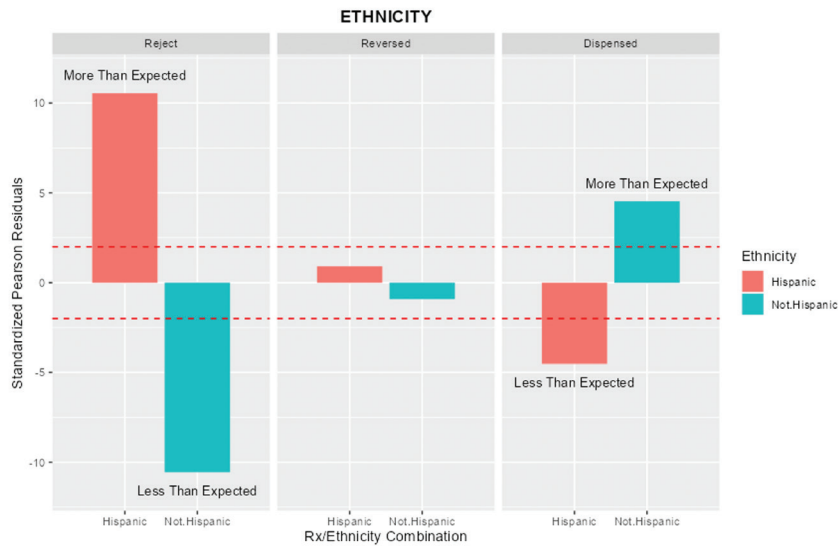
**Figure 4: Impact of Ethnicity & Income on Fill Rates**

patients than in non-African American patients (Figure 2.)

When looking at Ethnicity, for Hispanic patients, comparing Dispensed vs Reject outcomes, an exact test yields a p-value < 2.2E-16 with an OR of 1.25 CI (1.20, 1.31). This means that the odds of having a prescription rejected is 1.25 times more likely in Hispanic patients compared to

patients from other ethnic groups (Figure 3.)

When looking at low-income groups, defined as those earning under $20,000 per year, we observed no significant difference in terms of rejection of prescriptions. We did observe a significant difference when comparing Dispensed vs Reversed outcomes. An exact test yielded a p-value = 1.94E-08 with an OR of 1.03 CI (1.02, 1.04). This means that patients who earn less than $20,000 per year are 1.03 more

Figure 5: Impact of Race & Income on Fill Rates
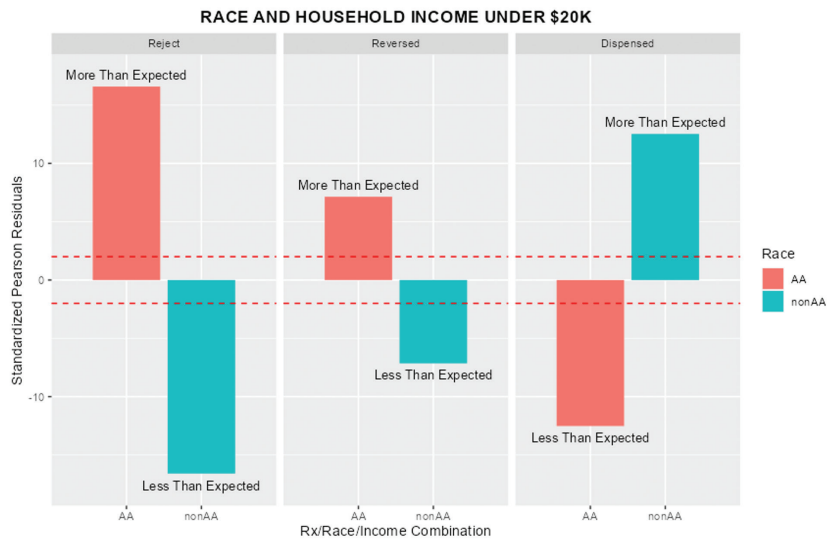
likely to have their prescriptions abandoned compared to patients making more than $20,000 per year.

When (low) income and ethnicity are considered together, the results shift. For Household Incomes of less than $20,000 a year, comparing Rejected vs Dispensed outcomes among Hispanics vs. patients from other ethnicities, an exact test yields a p-value of 1.67E-05 with an OR of 1.18 CI (1.09, 1.28). This means that, Hispanic patients who earn less than $20,000 per year, are 1.18 times more likely to have a prescription rejected than non-Hispanic patients who also make less than $20,000 per year (Figure 4.)

African American patients exhibit a larger change when income is also factored in. For Household Incomes of less than $20,000 per year, comparing Dispensed vs Rejected outcomes, an exact test yields a p-value < 2.2E-16 with an OR of 1.65 CI (1.55, 1.75). This means that African American patients who earn less than $20,000 per year are 1.65 times more likely to have a prescription rejected than non-African American

patients who also make less than $20,000 per year (Figure 5.)

Discussion & Conclusions

The traditional approaches to evaluating the patient journey show that 1.2% of all prescriptions are rejected. While this percentage may appear to be small, it represents almost 43,000 individuals. There are many reasons why prescriptions may be rejected. Plan design, prior authorization, step therapy, generic substitution, drug/drug interactions, as well as other factors may indicate reasons why the prescription presented would not be accepted for fulfillment. The reasons for each of these rejections were provided as a part of the data file obtained from the clearinghouse. Other factors outside of the plan design must also be considered. For example, patient education about the medication, information in other languages, rebates, and other variables need to be considered. When using medical and pharmacy claims alone, many of these factors are not known. Rather knowing that

these barriers exist is often enough to start the remediation process.

In recent years, great advances with regards to claims attribution and linking of individuals to their SDOH determinants enable deeper analysis into the patient journey. Traditional views of the patient journey miss the discrepancies related to face and ethnicity. In this study, we observed that African Americans have a statistically significant rate of rejection, regardless of their income level. Also, in Hispanic population we observed a statistically significant rejection rate compared to other ethnicities. Hispanic patients are 1.25 times more likely, and African American patients are 1.49 times more likely to have their prescriptions rejected compared to other ethnic or racial groups. When low income is factored in (<$20,000/year), Hispanic patients are 1.18 times more likely to have their prescription rejected. Lower income African American patients have an even more marked increase to 1.67 times more likely for having the prescription rejected than non-African American patients. The reasons for the poorer segment of the African American population to have greater rejection rates needs to be evaluated further.

By understanding inequities and disparities in prescription fill rates utilizing SDOH determinants, the healthcare industry can implement changes for the patients and the physicians treating them with programs such as better education, rebates, or understanding why the barriers exist. The use of an analytic platform highlights the importance for moving beyond the traditional view of age and gender alone. Further work will need to be done to understand practice patterns, prior authorization policies and other factors to address to rectify the inequities in dispensing this medication.

References

1   Murrin, S. (2019) Some Medicare Part D Beneficiaries Face Avoidable Extra Steps That Can Delay or Prevent Access to Prescribed Drugs. https://oig.hhs.gov/oei/reports/oei-09-16-00411.pdf

2   Agresti, A. (2013) Categorical Data Analysis. 3rd Edition, John Wiley & Sons Inc., Hoboken.