Associations between Social Determinants of Health (SDOH) and Second-Line Type 2 Diabetes Medication Prescribing

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Background

- Type II diabetes (T2D) has been well documented as one of the most common chronic diseases in the United States. It has a notably high prevalence in the Medicare population, affecting an estimated 27.5% of beneficiaries in comparison to 11.3% in the general population. [1]
- Recent T2D guidelines increasingly encourage use of second-line medications, including but not limited to sodium-glucose cotransporter-2 inhibitors (SGLT2i), glucagon-like peptide-1 receptor agonists (GLP-1 A), dipeptidyl peptidase 4 inhibitors (DPP-4i), and sulfonylureas (SU) especially in patients with comorbidities such as heart failure and obesity. [2] Use of these agents in comparison to insulin has demonstrated comparable glycemic control and A1c reduction while having potential benefits found in adherence and decreased risk for adverse events such as hypoglycemia. [3]
- Existing literature demonstrates that health disparities exist in healthcare today and are exacerbated by the social determinants of health (SDOH) resulting in a direct impact on clinical outcomes. Claims analyses have shown that racial and ethnic minority patients are less likely to receive guideline-directed medical therapy (GDMT) and that SDOH have an influence on clinical outcomes for persons with diabetes. [4,5]

Objectives

- Conduct a cross-sectional claims analysis to identify notable associations between demographical variables, healthcare utilization, and social determinants of health (SDOH) and the likelihood of filling a T2D second-line agent.

Methods

- A cross-sectional study design utilizing medical and pharmacy claims data from a large Medicare insurer was used.
- Medicare Advantage Prescription Drug Plan (MA-PD) members were included if continually enrolled within both the prior year (January 1st, 2021 – December 31st, 2021) and the study year (January 1st, 2022 – December 31st, 2022).
- Inclusion criteria included members with at least two paid claims for metformin in the study year and diagnosis of T2D within the study year and prior year.
- To assess SDOH of members, a proprietary index covering associated domains (economy, education, food access, health coverage, and language) at the census level was utilized, with a low score corresponding with low exposure to social conditions that could hinder optimal health, and a high score corresponding with high exposure.
- Exclusion criteria included diagnosis of end-stage renal disease (ESRD) or hospice care within the study year or prior year.
- Chi-Square tests were used to determine the differences in proportions for categorical variables between the customers that either filled or did not fill a second-line agent.
- The probability of having a second-line agent filled or not filled was assessed using a multivariable linear regression.
- Statistical significance was defined as $p < 0.05$.

Results

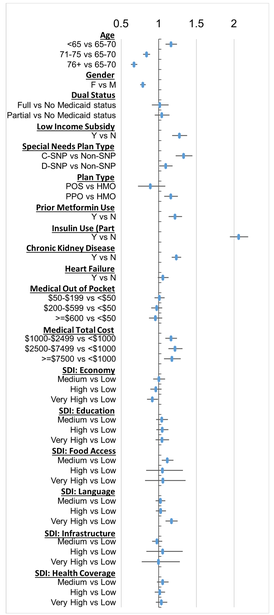
Table 1: Member Baseline Characteristics

	Second Line Therapy				
	No		Yes		
	n	%	n	%	P-Value
Age					
<65	2,916	13.4	4,236	19.2	<0.001
65-70	7,315	33.6	8,011	36.4	
71-75	6,006	27.6	5,568	25.3	
76+	5,550	25.5	4,216	19.1	
Gender					
F	12,061	55.4	11,087	50.3	<0.001
M	9,726	44.6	10,944	49.7	
Dual Status					
No Medicaid	16,102	73.9	14,685	66.7	<0.001
Full	2,360	10.8	2,952	13.4	
Partial	3,325	15.3	4,394	19.9	
Low Income Subsidy					
N	14,518	66.6	12,756	57.9	<0.001
Y	7,269	33.4	9,275	42.1	
Special Needs Plan Type					
C-SNP	1,456	6.7	1,794	8.1	<0.001
D-SNP	3,272	15.0	4,331	19.7	
Non-SNP	17,059	78.3	15,906	72.2	
Plan Type					
HMO	19,839	91.1	20,034	90.9	0.023
POS	240	1.1	192	0.9	
PPO	1,708	7.8	1,805	8.2	
Prior Metformin Use					
N	1,999	9.2	1,728	7.8	<0.001
Y	19,788	90.8	20,303	92.2	
Insulin Use (Part D)					
N	19,555	89.8	17,452	79.2	<0.001
Y	2,232	10.2	4,579	20.8	
Chronic Kidney Disease					
N	16,510	75.8	15,969	72.5	<0.001
Y	5,277	24.2	6,062	27.5	
Heart Failure					
N	19,516	89.6	19,396	88.0	<0.001
Y	2,271	10.4	2,635	12.0	
Medical Out of Pocket Cost					
<$50	8,700	39.9	8,408	38.2	0.0002
$50-$199	3,935	18.1	3,976	18.1	
$200-$599	4,477	20.6	4,612	20.9	
>=$600	4,675	21.5	5,035	22.9	
Medical Total Cost					
<$1000	8,176	37.5	7,454	33.8	<0.001
$1000-$2499	4,777	21.9	4,872	22.1	
$2500-$7499	4,740	21.8	5,183	23.5	
>=$7500	4,094	18.8	4,522	20.5	

Table 2: Member SDI Characteristics

	Second Line Therapy				
	No		Yes		p-Value
	n	%	n	%	
Social Determinants of Health Index (SDI)					
Low	3,221	14.8	3,131	14.2	0.0578
Medium	5,175	23.8	5,252	23.8	
High	5,239	24.1	5,167	23.5	
Very High	8,152	37.4	8,481	38.5	
SDI: Economy					
Low	3,002	13.8	2,875	13.1	0.1140
Medium	3,977	18.3	3,986	18.1	
High	5,839	26.8	5,945	27.0	
Very High	8,969	41.2	9,225	41.9	
SDI: Education					
Low	3,052	14.0	2,841	12.9	<0.001
Medium	4,580	21.0	4,473	20.3	
High	6,436	29.5	6,464	29.3	
Very High	7,719	35.4	8,253	37.5	
SDI: Food Access					
Low	5,128	23.5	5,144	23.4	0.4299
Medium	5,509	25.3	5,715	25.9	
High	4,624	21.2	4,673	21.2	
Very High	6,526	30.0	6,499	29.5	
SDI: Language					
Low	9,275	42.6	8,888	40.3	<0.001
Medium	3,318	15.2	3,224	14.6	
High	3,574	16.4	3,538	16.1	
Very High	5,620	25.8	6,381	29.0	
SDI: Infrastructure					
Low	4,346	20.0	4,344	19.7	0.4370
Medium	6,209	28.5	6,417	29.1	
High	4,377	20.1	4,448	20.2	
Very High	6,855	31.5	6,822	31.0	
SDI: Health Coverage					
Low	3,449	15.8	3,261	14.8	<0.001
Medium	3,751	17.2	3,733	16.9	
High	6,158	28.3	6,066	27.5	
Very High	8,429	38.7	8,971	40.7	

Figure 1: Logistic Regression Model: Odds Ratio for Second-Line Agent Filled (Y/N)



- In total, 43,818 members met the study criteria and were included in the analysis.
- Statistically significant differences existed between most demographic characteristics in both the unadjusted and multivariate analysis, such as special needs plans (SNP) enrolled members, and low income subsidy (LIS) status. In the multivariate analysis, chronic condition SNP (C-SNP) and dual eligible SNP (D-SNP) members were 33.1% and 9.2% more likely to fill a second-line agent compared to non-SNP members respectively, and LIS members were 27.4% more likely to fill a second-line agent compared to non-LIS members.
- In the multivariate analysis, a few statistically significant associations were found between the levels of the SDOH domain index scores. Members with a very high economy score were 8.5% less likely to fill a second-line agent than those with a low score, members with a medium food access score were 11.4% more likely to fill a second-line agent than those with a low score, and members with a very high language score were 16.8% more likely to fill a second-line medication than those with a low score.
- In the unadjusted analysis, both increased member medical cost share and total medical cost were associated with a greater likelihood of filling a second-line agent; however in the multivariate analysis this association was only significant for total medical cost. A member total medical cost of $1000-$2499 was associated with a 16.3% increased likelihood to fill compared to a member total medical cost of <$1000.
- Members with chronic kidney disease (CKD) were 23.4% more likely to fill a second-line medication, and members with Part D insulin use were 206.2% more likely to fill a second line agent.

Conclusions and Implications

- This analysis leveraged a large payer dataset to identify notable associations between demographics, healthcare resource utilization, and SDOH domains
- Members enrolled in LIS, as well as SNP programs, were more likely to fill a second-line agent, suggesting that such programs may increase utilization through reduction of out of pocket spend or clinical programs that more effectively identify patients that may be eligible for second-line agents.
- Members with greater overall medical spend were less likely to be prescribed a second-line agent, most likely due to higher clinical risk associated with the patient population.
- In assessing SDOH and its association with prescribing likelihood, members with medium food access scores and high economic scores were less likely to be prescribed a second-line agent, suggesting that these populations may not be benefiting from resources or outreach available to those with lower scores, thereby making them less likely to fill or afford a 2nd line agent.
- Though customers with a CKD diagnosis were more likely to fill a second-line agent, a statistically significant difference was not detected for heart failure patients, which may indicate that clinical programs are warranted to educate on heart failure- related benefits and to recommend use where appropriate.

Limitations

- Race and ethnicity were not captured as a domain of SDOH and therefore not accounted for in the analysis.
- Clinical factors such as adverse effects, A1c level, and patient adherence that would have contributed to prescriber decision making and were not accounted for.
- Information regarding fill patterns on prescriber level was not included in the analysis.
- The SDOH index utilized in the analysis incorporated data from a census level and was therefore generalized to all members in that geographic area, decreasing its accuracy on a member specific level.
- This study was conducted using members from a single payer, which may limit its ability to be generalized to a different population.

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