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Impacts of Annual Wage on Insulin Adherence in Diabetes

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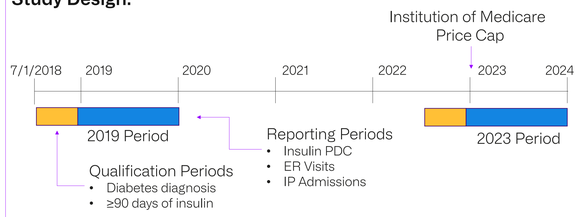
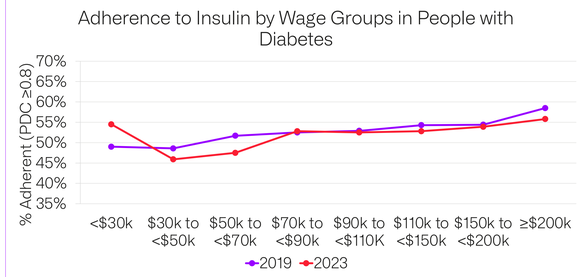
Study Summary

Study Questions: How does a patient's economic status influence insulin adherence in people with diabetes, and have insulin access programs had an impact?

Study Design:



Study Results:



Conclusion: There are links between insulin adherence and annual wage, with higher wage associated with increased adherence. Among people with T1D adherence improved following institution of insulin access programs. Results highlight the importance of medication accessibility in diabetes management.

Background

- Approximately 11% of the US population is diagnosed with diabetes.[1]
  - Estimates that include both diagnosed and undiagnosed diabetes put the prevalence rate closer to 15%.[1]
- Insulin is required in type 1 diabetes (T1D) and is also used by a subset of patients with type 2 diabetes (T2D) resulting in approximately 12% of people with diabetes using insulin to manage blood glucose levels.[1]
- Over the past decades insulin prices in the US have risen at a rate outpacing inflation.[2,3]
- High insulin prices have reduced insulin access and led to insulin rationing and even deaths.[2,3]
- Institution of both legislation and programs from insulin producers have helped to increase insulin accessibility:[2,4]
  - The Inflation Reduction Act capped insulin prices for Medicare patients at $35/month starting in 2023.
  - Several states have passed legislation capping monthly insulin prices.
  - Pharmaceutical companies have instituted a variety of programs for both commercially insured and uninsured patients.

Objective

- To evaluate the potential influence of annual wage on insulin adherence in the US prior and following the institution of insulin access programs.

Methods

- The Merative™ MarketScan® Commercial and Medicare Databases
  - The MarketScan administrative claims databases contain data on the full healthcare experience (inpatient, outpatient, and outpatient pharmacy) and associated costs for individuals and their dependents with employer sponsored commercial or Medicare insurance in the United States.
- Pre- (2019) and post-insulin access program (2023) reporting periods were included.
  - The qualification period for each was the prior 6-months.
- Adult patients with continuous eligibility for ≥1 reporting period, and evidence of T1D or T2D with an insulin supply ≥90 days in the qualification period were eligible.
- The final study sample was also required to have annual wage data available.
  - Wage information for the primary beneficiary is provided by employers for a subset of individuals in the MarketScan Databases.
- Insulin adherence, calculated by proportion of days covered (PDC), and the presence of diabetes-related emergency room (ER) visits or inpatient (IP) admissions were assessed over the reporting period.
  - Patient demographics, on January 1, and baseline clinical characteristics, were assessed over the qualification period.
- A sensitivity analysis that reported adherence by annual wage quartiles while adjusting for the total number of covered family members was also conducted.
  - Annual wage was adjusted by dividing the annual wage by the total number of family members; this approach does not account for two income households.

Figure 1. Insulin Adherence by Wage in T1D

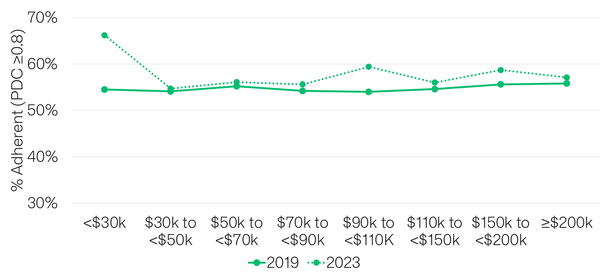


Figure 2. Insulin Adherence by Wage in T2D

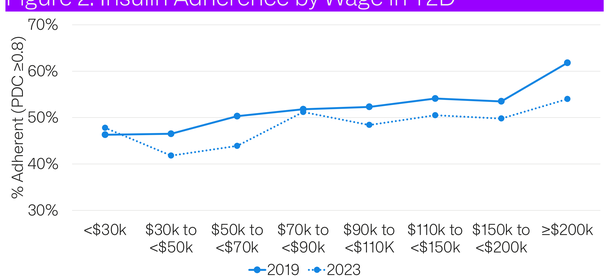


Table 1. Demographic and Clinical Characteristics

	<$30k	$30k to <$50k	$50k to <$70k	$70k to <$90k	$90k to <$110K	$110k to <$150k	$150k to <$200k	≥$200k
2019 Sample, N	829	3,258	3,759	2,558	1,745	1,665	687	386
Age, mean ±SD	48.6 ±10.7	49.0 ±10.5	51.0 ±9.4	51.7 ±9.2	51.7 ±8.9	52.4 ±8.4	52.8 ±7.5	53.7 ±7.0
Male, N (%)	491 (59.2)	1,733 (53.2)	2,424 (64.5)	1,863 (72.8)	1,294 (74.2)	1,271 (76.3)	542 (78.9)	327 (84.7)
Covered family members, mean ±SD	1.9 ±1.2	1.9 ±1.2	2.2 ±1.3	2.3 ±1.3	2.4 ±1.4	2.4 ±1.4	2.7 ±1.4	2.9 ±1.4
T1D, N (%)	268 (32.3)	924 (28.4)	1,099 (29.2)	827 (32.3)	628 (36.0)	645 (38.7)	302 (44.0)	208 (53.9)
T2D, N (%)	561 (67.7)	2,334 (76.1)	2,660 (70.8)	1,731 (67.7)	1,117 (64.0)	1,020 (61.3)	385 (56.0)	178 (46.1)
CCI, mean ±SD	1.9 ±1.3	2.0 ±1.4	2.0 ±1.4	2.0 ±1.4	1.9 ±1.4	1.9 ±1.4	1.8 ±1.2	1.8 ±1.3
DCSI, mean ±SD	0.9 ±1.3	1.0 ±1.3	1.0 ±1.4	1.0 ±1.3	0.9 ±1.2	0.9 ±1.3	0.8 ±1.2	0.8 ±1.2
2023 Sample, N	178	1,489	2,871	1,977	1,580	1,668	839	507
Age, mean ±SD	48.8 ±11.0	48.8 ±11.0	50.5 ±10.0	50.5 ±10.4	51.2 ±9.9	51.5 ±9.1	51.9 ±8.5	52.4 ±7.9
Male, N (%)	104 (58.4)	690 (46.3)	1,777 (61.9)	1,291 (65.3)	1,157 (73.2)	1,235 (74.0)	624 (74.4)	398 (78.5)
Covered family members, mean ±SD	2.1 ±1.4	1.7 ±1.1	2.1 ±1.3	2.1 ±1.3	2.3 ±1.3	2.4 ±1.4	2.6 ±1.4	2.9 ±1.4
T1D, N (%)	65 (36.5)	475 (31.9)	854 (29.7)	720 (36.4)	589 (37.3)	705 (42.3)	387 (46.1)	296 (58.4)
T2D, N (%)	113 (63.5)	1,014 (68.1)	2017 (70.3)	1257 (63.6)	991 (62.7)	963 (57.7)	452 (53.9)	211 (41.6)
CCI, mean ±SD	1.9 ±1.3	2.1 ±1.5	2.1 ±1.4	2.0 ±1.4	2.0 ±1.4	1.9 ±1.3	1.8 ±1.3	1.8 ±1.3
DCSI, mean ±SD	1.0 ±1.3	1.0 ±1.4	1.1 ±1.4	1.0 ±1.3	1.0 ±1.3	0.9 ±1.3	0.8 ±1.2	0.8 ±1.1

Results

- A total of 14,887 patients qualified for the 2019 sample, while 11,109 qualified for the 2023 sample.
- In both periods, age, the percentage of males, and the number of family members increased across the age groups (Table 1).
- Clinically, there was a slight trend towards decreasing proportions of T2D patients, CCI, and DSCI scores with increased wage (Table 1).
- The proportion of adherent patients (PDC ≥0.8) tended to increase across wage groups and slightly declined from 2019 to 2023 (Summary Figure).
- In people with T1D there was less variation in adherence across wage groups, and adherence increased from 2019 to 2023 (Figure 1).
- Trends for increasing adherence with increased wage and decreasing adherence from 2019 to 2023 were driven by people with T2D (Figure 2).
- Decreasing rates of diabetes-related acute care (ER or IP) visits were observed with increasing wage; rates decreased from 2019 to 2023 (Figure 3).
  - The T1D and T2D groups showed similar trends in acute care visits (not shown).
- Among all patients, adjustment of wage for family size generally demonstrated similar trends of higher adherence with increasing wage (Figure 4).

Figure 3. Diabetes-related Acute Care Utilization

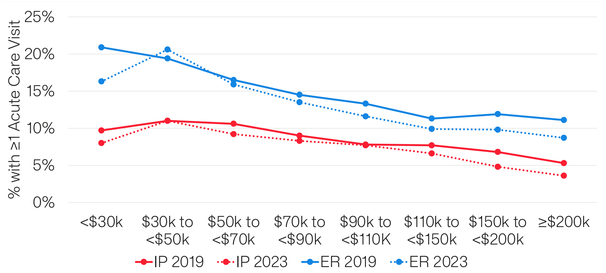
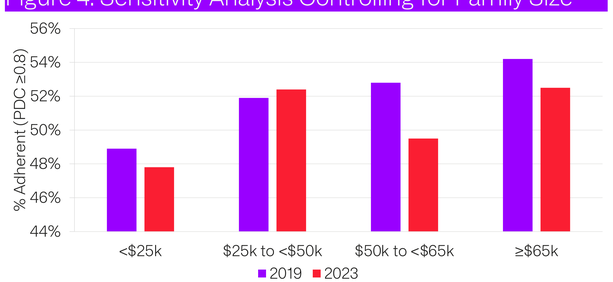


Figure 4. Sensitivity Analysis Controlling for Family Size



Limitations

- Descriptive analyses assessed the impact of wage on insulin adherence within a population of commercially ensured employees.
  - Results may not generalize to uninsured or unemployed populations.
  - The study was not able to control for other financial factors like multiple household incomes or other financial obligations. However, sensitivity analyses adjusting for the size of the family unit led to similar findings.

Conclusions

- This study identified correlations between patient wage and diabetes outcomes including insulin adherence and utilization of acute care.
  - Associations between adherence and wage were more notable for patients with T2D who may be less dependent on insulin than patients with T1D.
  - Increased adherence was observed following the institution of insulin access programs for the T1D but not the T2D sample.
- Results of this study indicate a role for medication affordability in diabetes management and suggest a positive impact of medication cost containment programs, especially within the T1D population.

References

1. Centers for Disease Control. National Diabetes Statistics Report. 2024 May 15. https://www.cdc.gov/diabetes/php/data-research/index.html; 2. Hirsch IB. *Lancet Diabetes Endocrinol.* 2022;10(10):695. 3. Rajkumar SV. *Mayo Clin Proc.* 2020;95(1):22-28. 4. American Diabetes Association. Leading the fight for insulin affordability: https://diabetes.org/tools-resources/affordable-insulin.

Disclosure

All authors are employees of Merative. This study was funded by Merative.

Presented at ISPOR 2025, May 13-16, 2025, Montreal, Quebec, Canada

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