

A Survey Snapshot Measuring Insulin Underuse in a Primary Care Clinic

Tess Willcoxon¹

Rick Hess, PharmD, CDCES, BCACP²

¹Bill Gatton College of Pharmacy, East Tennessee State University, Johnson City, Tennessee

²Department of Pharmacy Practice, Bill Gatton College of Pharmacy, East Tennessee State University, Johnson City, Tennessee



ABSTRACT

The rising cost of insulin has created problems for physicians in the management of diabetes. The objective of our study was to determine the prevalence of cost-related insulin underuse in a primary care environment. We administered surveys to adult respondents diagnosed with diabetes who were prescribed insulin in the last 12 months. The primary outcome measured was the frequency of cost-related underuse of insulin within the last year. Ninety respondents completed the survey with results indicating 44% experienced cost-related suboptimal therapy. Prevalence of insulin underuse remains high in primary care and prescribers should regularly assess medication cost barriers with all patients.

Ann Fam Med 2023;21:70-72. <https://doi.org/10.1370/afm.2899>

INTRODUCTION

Insulin is a necessary, life-changing medication for all people living with Type 1 (T1D) and insulin dependent Type 2 diabetes mellitus (T2D). Current recommendations for most people with diabetes is an HbA_{1c} <7% to reduce risk of complications.¹ Yet, the rising costs of analog insulins have created access barriers and contributed to reduced insulin adherence.²⁻⁴ Human insulin is less expensive and available for as little as \$25 per vial, but analog insulins are prescribed more frequently.^{3,5} A recent study conducted at an urban-based endocrinology clinic in New England concluded 25% of respondents experienced cost-related suboptimal insulin use.⁶ It is less clear, however, what the frequency of cost-related suboptimal insulin use is among an older primary care population where the vast majority have T2D. The objective of our study was to determine the prevalence of cost-related insulin underuse in a primary care environment.

METHODS

Surveys were offered to participants diagnosed with T1D or T2D and prescribed insulin in the last 12 months. The setting was a private, primary care organization with 4 family medicine and 2 internal medicine clinics in Northeast Tennessee. The 29-item survey was used with permission from Herkert et al collecting demographic data and insulin use habits ([Supplemental Appendix](#)).⁶ Eligible participants were screened at clinic waiting rooms and completed surveys before or after their appointments from July 2019 to April 2020, prior to the start of the COVID-19 pandemic. In-person recruitment was suspended until November 2020 when a telephonic recruitment and consent process began and continued through December 2021. Individuals scheduled for a clinic visit voluntarily provided contact information for a researcher to call and recruit participation. Interested participants were mailed the survey, instructed to complete it at home, and return it using a postage-paid return envelope.

The primary outcome was the frequency of cost-related underuse of insulin within the last year. This was measured by a “yes” response in the questionnaire to at least 1 of 6 questions: Did you: (1) use less insulin than prescribed, (2) try to stretch out your insulin, (3) take smaller doses of insulin than prescribed, (4) stop using insulin, (5) not fill an insulin prescription, or (6) not start insulin... because of cost?⁶ Poor control of diabetes was defined as a previous HbA_{1c} >9% at the time of completing the survey. Descriptive analysis was conducted using SPSS software (IBM Corp). The East Tennessee State University Institutional Review Board approved the study protocol.

Conflicts of interest: authors report none.

CORRESPONDING AUTHOR

Rick Hess
Department of Pharmacy Practice
Bill Gatton College of Pharmacy
East Tennessee State University
Maple Avenue
Johnson City, TN 37604
hessr@etsu.edu

RESULTS

Ninety respondents completed the survey representing a 37% (90/243) response rate. The average age was 68 ± 9 years (SD). The majority were diagnosed with T2D (83%), Caucasian race (99%), male (59%), retired or disabled (76%), and had Medicare Part D prescription benefits (63%). Eighty five percent of respondents were prescribed at least 1 analog insulin and the average monthly out-of-pocket cost was \$84.10 (range \$0-\$566). The average HbA_{1c} was $8.6 \pm 1.3\%$ (SD). For the primary outcome, 44% (40/90) of respondents experienced cost-related suboptimal insulin therapy. Table 1 summarizes characteristics of participants who completed surveys. Respondents who reported underuse were approximately 9 times more likely to have difficulty purchasing diabetes supplies (odds ratio [OR] = 9.4; 95% CI, 2.6-34.1). However, most respondents experiencing cost-related issues (76%) reported discussing it with their prescribers which significantly increased the likelihood of changing their insulin (OR = 4.8; 95% CI, 1.6-15.0). Participants suffering poor control of diabetes were not more likely to report underuse (OR 2.9; 95% CI, 0.8-11.0).

DISCUSSION

Overall, nearly one-half of the respondents in a primary care setting reported cost-related suboptimal insulin use in the past year, which is higher compared with the frequency previously reported from an endocrinology clinic.⁶ This could be due to the differences between study populations as our respondents were older and a larger majority diagnosed T2D. Most respondent characteristics were not associated with increased insulin underuse including poor diabetes control. This finding could be a result of a smaller sample size. Importantly, while most respondents discussed insulin costs with their prescribers (76%), approximately 1 out of 4 did not have this conversation. The relationship between the patient and primary care clinician is traditionally built on trust and longevity.⁷ Therefore, primary care physicians should strive to empathetically ask about cost barriers as some may be reluctant to speak up. Governmental relief from high insulin costs is a current topic of interest with federal legislation proposals such as the Affordable Insulin Now Act capping insulin copays to \$35 per month beginning in 2023 if signed into law.⁸ In addition,

manufacturers are producing biosimilar and generic formulations of analog insulins. Additionally, the rising costs of non-insulin diabetes medications can still be problematic so prescribers should not assume those not treated with insulin are exempt.⁹

This study has several limitations. The survey response rate was low and participants were recruited from 1 primary care organization with fewer generalizability characteristics than observed with Herkert et al.⁶ Recruitment methods were alternated due to the COVID-19 pandemic and results from both time periods were pooled. Utilization of self-reported data may have led to selection bias as eligible participants who did not perceive trouble paying for their insulin may not have felt it was worth their time to fill out a survey. Alternatively, nonadherence may be underestimated if some participants failed to disclose the truth about behaviors following their insulin plan. Nevertheless, our results indicate insulin underuse remains a significant problem in the primary care setting.

 [Read or post commentaries in response to this article.](#)

Key words: diabetes; insulin underuse; insulin; cost; older adults; primary care

Submitted May 5, 2022; submitted, revised, September 8, 2022; accepted September 20, 2022.

Table 1. Characteristics of Survey Participants

Characteristic	Participants, No.	Participants With Reported Underuse, No. (%)	Odds Ratio (95% CI)
Age, y			
45-64	27	14 (52)	1 (reference)
≥ 65	63	26 (41)	1.5 (0.6-3.8)
Sex			
Male	53	25 (47)	1 (reference)
Female	37	15 (41)	1.3 (0.6-3.1)
Rx Coverage			
Commercial	14	5 (36)	1 (reference)
Medicare part D or Medicaid	55	27 (49)	0.4 (0.2-2.0)
Tricare or Veterans Administration	5	1 (20)	0.5 (0.1-2.1)
Other	11	7 (64)	0.2 (0.01-2.3)
Annual income, \$			
>50,000	29	9 (31)	1 (reference)
25,000 – 49,999	28	15 (54)	0.9 (0.3-2.8)
<25,000	28	16 (57)	0.4 (0.1-1.2)
Difficult purchasing supplies			
No	66	21 (32)	1 (reference)
Yes	22	18 (82)	9.4 (2.6-34.1)
Discussed insulin cost with prescriber			
No	29	7 (24)	1 (reference)
Yes	61	33 (54)	1.4 (0.4-5.0)
Prescriber changed insulin due to cost			
No	50	14 (28)	1 (reference)
Yes	39	26 (67)	4.8 (1.6-15.0)

Previous presentation: Appalachian Student Research Forum, East Tennessee State University; April 7, 2022; Johnson City, Tennessee.

Acknowledgments: The authors would like to acknowledge Jonathan Brewster, Payton Tipton, and Iris Kamgue for their assistance in collecting data.

 [Supplemental materials](#)

References

- American Diabetes Association. 6. Glycemic targets: standards of medical care in diabetes—2021. *Diabetes Care*. 2021;44(Suppl 1):S73–S84. [10.2337/dc21-S006](https://doi.org/10.2337/dc21-S006)
- Hua X, Carvalho N, Tew M, Huang ES, Herman WH, Clarke P. Expenditures and prices of antihyperglycemic medications in the United States: 2002-2013. *JAMA*. 2016;315(13):1400–1402. [10.1001/jama.2016.0126](https://doi.org/10.1001/jama.2016.0126)
- Sarkar S, Heyward J, Alexander GC, Kalyani RR. Trends in insulin types and devices used by adults with type 2 diabetes in the United States, 2016 to 2020. *JAMA Netw Open*. 2021 Oct 1;4(10): e2128782. [10.1001/jamanetworkopen.2021.28782](https://doi.org/10.1001/jamanetworkopen.2021.28782)
- Trish E, Kaiser K, Joyce G. Association of out-of-pocket spending with insulin adherence in Medicare Part D. *JAMA Netw Open*. 2021;4(1):e2033988. [10.1001/jamanetworkopen.2020.33988](https://doi.org/10.1001/jamanetworkopen.2020.33988)
- Lipska KJ, Hirsch IB, Riddle MC. Human insulin for type 2 diabetes: an effective, less-expensive option. *JAMA*. 2017;318(1):23–24. [10.1001/jama.2017.6939](https://doi.org/10.1001/jama.2017.6939)
- Herkert D, Vijayakumar P, Luo J, et al. Cost-related insulin underuse among patients with diabetes. *JAMA Intern Med*. 2019;179(1):112–114. [10.1001/jamainternmed.2018.5008](https://doi.org/10.1001/jamainternmed.2018.5008)
- Pearson SD, Raeke LH. Patients' trust in physicians: many theories, few measures, and little data. *J Gen Intern Med*. 2000;15(7):509-513. [10.1046/j.1525-1497.2000.11002.x](https://doi.org/10.1046/j.1525-1497.2000.11002.x)
- US Congress. H.R. 6833 Affordable Insulin Now Act. Accessed Apr 16 2022. <https://www.congress.gov/bills/117th-congress/house-bill/6833>
- Zhou X, Shrestha SS, Shao H, Zhang P. Factors contributing to the rising national cost of glucose-lowering medicines for diabetes during 2005-2007 and 2015-2017. *Diabetes Care*. 2020 Oct;43(10):2396-2402. [10.2337/dc19-2273](https://doi.org/10.2337/dc19-2273)