Cost-Effectiveness of Inhaled Technosphere Insulin in Diabetes Management: A US Healthcare Payer Perspective

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OBJECTIVE

To assess the cost-effectiveness of Technosphere Insulin (TI) compared to insulin aspart (injectable rapid-acting insulin) from a U.S. healthcare payer perspective using changes in HbA1c and hypoglycemia risk as key outcomes

BACKGROUND

Effective glycemic control remains a cornerstone of **type 1 diabetes management**. While injectable rapid-acting insulins, such as insulin aspart, have been widely used, inhaled insulin formulations offer a non-invasive alternative that may improve patient adherence, quality of life, time-in-range and efficacy.[1-3]

Inhaled Technosphere Insulin (TI), tradename Afrezza®, delivers **ultra-rapid-acting insulin via inhalation**, mimicking physiologic insulin secretion more closely than traditional injectables. However, despite its clinical promise, its uptake in the US was impacted by patient out of pocket cost and payer coverage.[4]

Given the rising **burden of diabetes** and the growing emphasis on value-based care, it is essential to evaluate whether TI offers a cost-effective option for glycemic control compared to standard therapies.[5]

METHODS

Clinical effectiveness data, such as HbA1c reductions and hypoglycemia event rates, were primarily derived from the MKC-TI-171 trial, a registrational study in patients with type 1 diabetes.[6] These results were used to estimate long-term health outcomes, linking improved glycemic control and lower hypoglycemia rates to reduced diabetes-related complications and healthcare events.

Cost data, including treatment, monitoring, and adverse event management, were sourced from
Micromedex®, CMS databases, and relevant literature.[7, 8] These cost parameters were incorporated into an economic model to calculate overall healthcare costs and assess cost-effectiveness, demonstrating how clinical benefits from the trial could lead to improved health outcomes and cost savings in real-world clinical practice.

A three-state Markov model was developed using Excel and R Shiny to simulate the lifetime costs and health outcomes associated with TI and insulin aspart.

Health outcomes were measured in terms of quality-adjusted life years (QALYs), and the cost-effectiveness was evaluated using incremental cost-effectiveness ratios (ICERs). To assess uncertainty and the robustness of the model, both one-way and probabilistic sensitivity analyses were conducted.

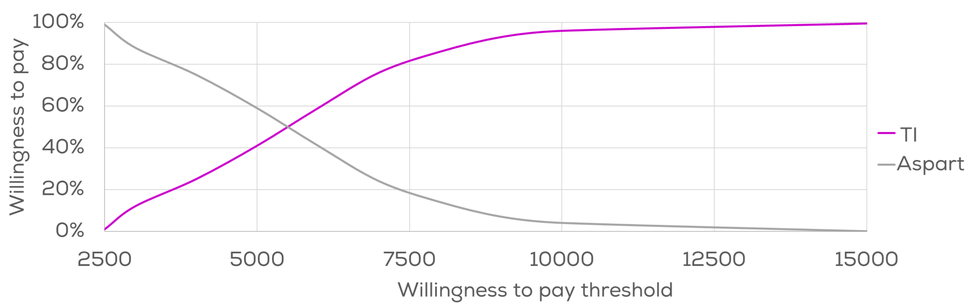
RESULTS

TI was associated with slightly higher total costs ($8,932) compared to insulin aspart ($7,459). TI offered improved health outcomes, yielding 1.94 QALYs versus 1.66 for insulin aspart. The resulting ICER was $5,261 per QALY gained. Sensitivity analyses confirmed the robustness of these findings, with ICERs consistently remaining below widely accepted willingness-to-pay thresholds.

Table 1. Base Case Analyses (BCA)

Treatment	Cost ($)	Outcome (QALY)	Incremental Cost ($)	Incremental Outcome (QALY)	ICER ($/QALY)
Aspart	$7,459	1.66	-	-	-
Afrezza	$8,932	1.94	$1,473	0.28	$ (5,261)

Figure 1. Cost-Effectiveness Acceptability Curve (CEAC)



CONCLUSIONS

- Based on clinical data from the MKC-TI-171 trial and economic modeling, TI appears to be a cost-effective alternative to insulin aspart
- Despite higher upfront costs, TI offers improved quality-adjusted life outcomes, potentially driven by reductions in hypoglycemic events
- These findings support the value of TI in optimizing long-term diabetes management from a U.S. healthcare payer perspective

[1]American Diabetes Association. Standards of medical care in diabetes–2025. *Diabetes Care*. 2024;48(Suppl 1):S1-S178. [2]Hirsch, Irl B et al. *Diabetes Care* vol 48,00 (2025):1-8. [3]Akturk HK, Snell-bergeon JK, Rewers A, et al. *Diabetes Technol Ther.* 018;20(10):639-647. [4]Janež, A., Guja, C., Mitrakou, A., et al. (2020). *Diabetes Therapy*, 11(2), 387-409. [5]Henriksson M, Jindal R, Sternhufvud C, Bergenheim K, Sörstadius E, Willis M. *Pharmacoeconomics 2016;34(6):569-85*. [6]Bode BW, McGill JB, Lorber DL, et al. *Diabetes Care*. 2015;38(12):2266-2273. doi:10.2337/dc15-0075. [7]https://www.micromedexsolutions.com [8]https://www.cms.gov/medicare/regulations-guidance/fee-for-service-payment-regulations

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