

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

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

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.

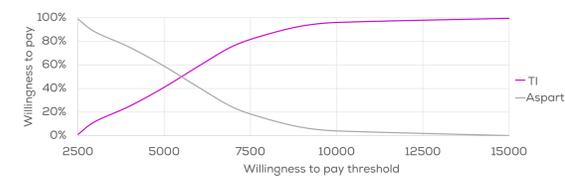
RESULTS

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)



¹American Diabetes Association. Standards of medical care in diabetes—2025. *Diabetes Care*. 2024;48(suppl 1):S1-S28. ²Hirsch, H. B. et al. *Diabetes Care*. vol 48, no 12 (2025): 1-6. ³Atsuk HK, Sreedharan J, Raveendran A, et al. *Diabetes Technol Ther*. 2018;20(10):639-647. ⁴Tamir, A., Glick, C., Miralza, A., et al. (2020). *Diabetes Therapy*. 13(2): 387-399. ⁵Trivedi, M., Joshi, R., Srinivasan, C., Bergstrom, S., Srinivasan, L., 2013. *PharmacoEconomics*. 2013;31(10):1469-1481. ⁶Yoon, B.M., McCall, J.B., Lorber, D.L., et al. *Diabetes Care*. 2015;38(12):2266-2273. doi:10.2337/d15-0075. ⁷https://www.micromedex.com ⁸https://www.cms.gov/medicare/regulatory-guidance/fee-for-service-payment-regulations

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