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Cost-effectiveness of T-DM1 versus trastuzumab for adjuvant treatment in HER2+ early breast cancer (eBC) with residual disease in Colombia

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Background

Breast cancer (BC) remains a major global health challenge as both the most frequently diagnosed cancer and the leading cause of cancer-related deaths among women[1]. In Colombia, between 2022 and 2023, around 9,484 new cases were reported, with a mortality rate of 13.3 per 100,000 women[2], reflecting the persistent burden of BC in the country and underscoring the need to advance treatment strategies that improve clinical outcomes. Residual invasive disease persists in 40–60% of patients with HER2-positive breast cancer following neoadjuvant therapy[3,4]. For patients with residual disease, trastuzumab-emtansine (T-DM1) has demonstrated a 46% reduction in the risk of recurrence compared with standard adjuvant trastuzumab[5]. Preventing recurrence through the use of T-DM1 may help reduce the economic burden associated with progression to advanced disease.

Objective

To evaluate the cost-effectiveness of adyuvant T-DM1, compared to trastuzumab in women with HER2+ early BC and residual invasive disease following neoadjuvant therapy, adopting the perspective of the Colombian General Social Security Health System.

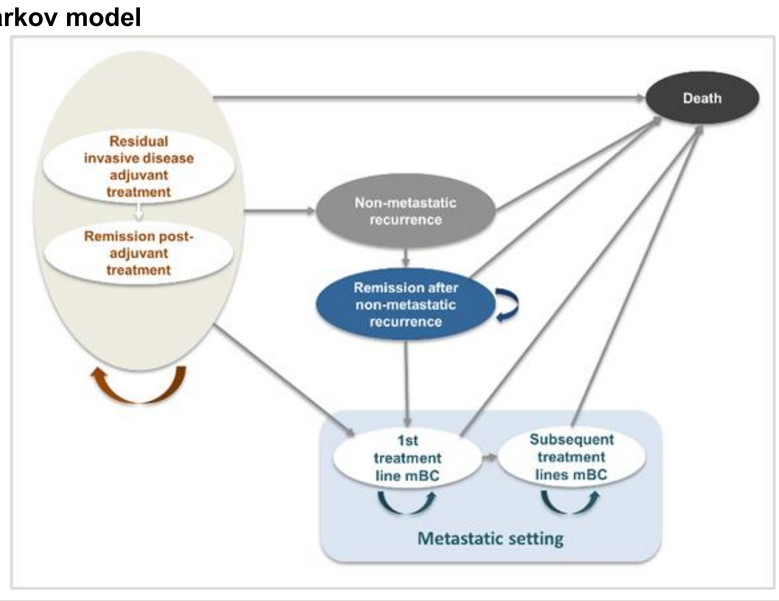
Methods

A Markov model with 1-month cycles and a 48-year (lifetime) horizon was developed to compare T-DM1 with trastuzumab (including intravenous and subcutaneous Herceptin, as well as available biosimilars) (Figure 1).

Patients entered the model in the residual invasive disease state during adjuvant therapy, starting on treatment (T-DM1 or trastuzumab) and subsequently off treatment once disease-free and under monitoring. Patients could then transition to non-metastatic recurrence (locoregional or contralateral), remission after non-metastatic recurrence, metastatic disease (first- or subsequent-line), or death (absorbing state).

Clinical inputs for T-DM1 were sourced from the KATHERINE trial (median 8.4 years follow-up). Direct medical costs for 2024 were included, using national claim databases and tariff manuals. A 5% annual discount rate was applied for cost and effects. Model assumptions and inputs were validated by local clinical experts. Deterministic (one-way) and probabilistic sensitivity analyses (PSA) were conducted to assess robustness of the model.

Figure 1. Markov model



Conclusion

From the perspective of the Colombian Health System, T-DM1 is a cost-effective and dominant strategy for the adjuvant treatment of patients with residual invasive HER2-positive early BC following neoadjuvant therapy. T-DM1 improves outcomes while reducing costs, mainly by lowering recurrence and progression. In scenarios where metastatic disease demands substantially more resources, these results emphasize the importance of adopting cost-effective innovations to ensure the sustainability of health systems.

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Results

Under a willingness-to-pay threshold of 86% of 1 Gross Domestic Product (GDP) per capita 2024 (USD 6,831), T-DM1 was dominant and cost-effective over trastuzumab, yielding a net monetary benefit (NMB) of USD 10,130 per modeled patient (Table 1). Cost savings were driven by reduced locoregional and metastatic recurrences, particularly in costly settings: first-line metastatic BC (USD -30,510), and subsequent metastatic BC treatment lines (USD -6,317).

At 3 years, T-DM1 achieved reductions of 64% in locoregional events, 49% in metastatic events, and 46.9% in mortality. The prevention of these events remained consistently high and stable over the time horizon.

Table 1. Cost-effectiveness analysis results of trastuzumab-emtansine (T-DM1) compared to trastuzumab in Colombia

Treatment	Cost (2024 USD)	Incremental Cost	QALYs	Incremental QALYs	ICER	Net Monetary Benefit
Base case						
Trastuzumab	113,288	-	9.93	-	-	-
T-DM1	110,096	- 3,191	10.95	1.02	Dominant	10,130
Probabilistic sensitivity analysis						
Trastuzumab	114,347	-	9.84	-	-	-
T-DM1	110,649	- 3,698	10.86	1.02	Dominant	10,651

QALY: Quality-adjusted life years; ICER: incremental cost-effectiveness ratio. 1 USD = 4071.35

T-DM1 maintained dominance in most univariate analyses, with a positive NMB across scenarios, including variations in patient weight and when higher T-DM1 prices or lower trastuzumab prices were simulated (Figure 2). PSA found T-DM1 was dominant in 81.2% of the Montecarlo simulations, showing robustness with the main results (Figure 3).

Figure 2. Tornado diagram

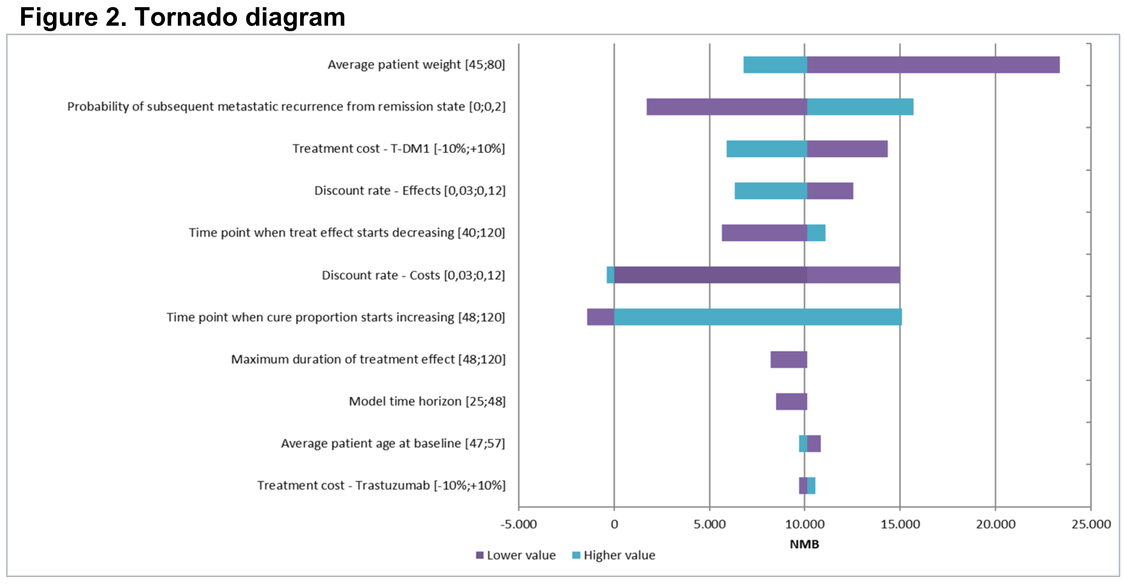

Figure 3. Cost-effectiveness plane (Probabilistic Sensitivity Analysis)