Semaglutide Weight Loss: Oral vs Injectable Cost Model

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INTRODUCTION

GLP-1–based medications have become a major option for medical weight loss, but use is shaped not only by effectiveness, but also by tolerability. Many patients experience gastrointestinal side effects, and these adverse events can affect quality of life, healthcare utilization, and overall treatment value. At the same time, new dosage forms (including non-injectable options) raise an important question for pharmacoeconomics: how much do differences in safety profiles influence the cost-effectiveness of these therapies over a typical treatment period?

This project evaluates the cost-effectiveness of GLP-1 weight-loss therapies by route of administration over a one-year horizon using published secondary data. Because adverse event rates are consistently reported in FDA labeling, this study focuses on adverse events as a key driver of costs and outcomes. The primary objective is to compare strategies using a decision-tree model and test how results change when adverse event rates vary, clarifying whether tolerability differences meaningfully shift cost-effectiveness conclusions.

DISCUSSION, ANALYSIS, AND EVALUATION

Across both coverage scenarios, the model shows a consistent pattern wherein oral semaglutide has a lower expected cost than subcutaneous injection. In the insured tree, expected costs are $5,279 (oral) vs $6,161 (injection); in the uninsured tree they rise to $6,530 (oral).
The probability structure indicates that outcomes first split into success vs failure (oral: 76%/24%, injection: 84%/16%) and then into AE vs no AE within each branch. AE frequencies differ by strategy: oral's success branch has 28% AE and failure branch 46% AE, while injection shows higher AE fractions (74% in success; 70% in failure). vs $7,616 (injection).
Cost patterns are uniform across both trees: AE paths are more expensive than no-AE paths for the same outcome, so placing more probability on AE paths increases expected cost.
In the AE-distribution sensitivity analysis (holding success/failure and total AE rate constant), shifting where AEs occur changes expected cost only slightly and does not eliminate the cost gap between oral and injection in either insured or uninsured scenarios.

RESEARCH METHODOLOGIES

This project uses a secondary-data, 68-week cost-effectiveness design comparing semaglutide weight-loss therapies by route of administration (injectable vs oral). Clinical inputs, including rates of common adverse events and meaningful weight loss are extracted from FDA and Novo Nordisk. These published inputs populate a decision-tree model that estimates expected annual cost and outcomes for each route. A one-way sensitivity analysis is performed by varying adverse event rates across plausible published ranges to test how sensitive the model's results are to differences in tolerability. Results are presented in a concise input table and in charts comparing base-case outcomes and the impact of adverse-event-rate changes.

DATA AND FINDINGS

Figure 1: Oral Semaglutide Decision-Tree

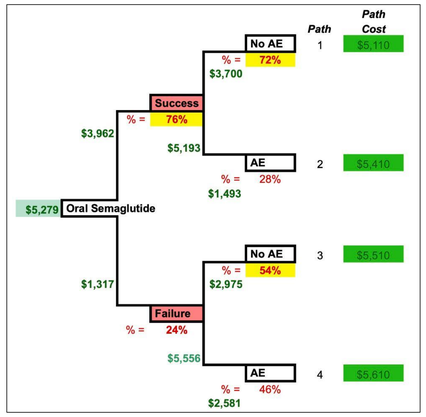

Figure 2: Subcutaneous Injection Decision-Tree

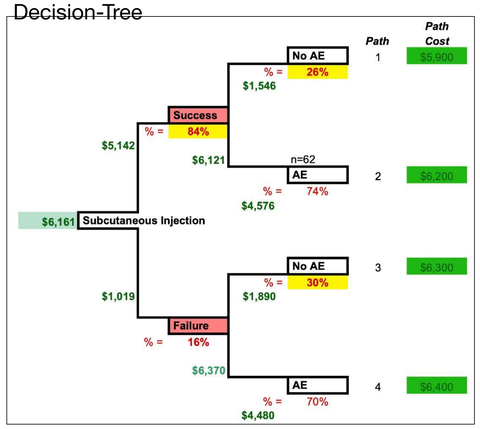

Figure 1: Model of a daily oral regimen, branching from success/failure into AE vs no-AE outcomes, with terminal path costs combined to calculate the expected cost for uninsured patients.

Figure 2: Model of a subcutaneous injection regimen, branching from success/failure into AE vs no-AE outcomes, with terminal path costs probability-weighted to estimate expected cost for uninsured patients.

Table 1: Does Expected Cost Ever Overlap?

Coverage Scenario	Dosage Form	Expected Cost Range	Overlap	Cost Gap (Injection − Oral)
Insured	Oral semaglutide	$5,254.96 – $5,302.96		
	Subcutaneous injection	$6,152.08 – $6,184.08	No	+$849.12 to +$929.12
Uninsured	Oral semaglutide	$6,453.87 – $6,607.47		
	Subcutaneous injection	$7,586.66 – $7,689.06	No	+$979.19 to +$1,235.19

Table 1: Sensitivity analysis varies only the distribution of adverse events across Success vs Failure while holding Success/Failure rates and total AE probability constant; path costs unchanged.

ACKNOWLEDGEMENTS / REFERENCES

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CONCLUSIONS, IMPLICATIONS, AND NEXT STEPS

The analysis supports the claim that differences in adverse-event (AE) burden can influence expected cost, because AEs shift patients into higher-cost paths. However, in this model, changing only how AEs are distributed across success vs failure (while holding total AE rate and success/failure constant) is not enough to eliminate the cost gap between dosage forms. Oral semaglutide remains lower expected cost than subcutaneous injection in both insured and uninsured scenarios. This suggests that AE patterns matter, but they are not the dominant driver of cost differences under the current assumptions. The model suggests that reversal between dosage forms would require changes in other inputs, such as overall effectiveness outcomes, total adverse event rates, or major cost shifts.