

Cost-Effectiveness Analysis of Cefiderocol Versus Imipenem/Cilastatin for Treatment of Complicated Urinary Tract Infection in Hospitalized Patients Using ChatGPT and TreeAge

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Objectives

Cefiderocol is a siderophore cephalosporin antibiotic approved by the FDA in 2019 for treating complicated urinary tract infections (cUTI) in patients 18 or older with limited or no alternative treatment options. Artificial intelligence (AI) is a new tool for conducting health economic evaluations.

We conducted a cost-effectiveness analysis of Cefiderocol versus imipenem/cilastatin in treating cUTI in hospitalized patients using ChatGPT and TreeAge.

Methods

We conducted the CEA from the payer's perspective. We extracted clinical cure outcomes from the FDA Review, drug costs from average sales price published by the Centers for Medicare and Medicaid Services, life expectancy data from the Centers for Disease Control and Prevention, hospital costs from the Healthcare Cost and Utilization Project, and quality of life data from published literature.

The analysis included direct health care costs and clinical outcomes, including clinical cure rate and quality-adjusted life years (QALYs).

Costs were converted to 2023 constant dollars. The costs and outcomes were not discounted. A multivariate sensitivity analysis using Monte Carlo simulation was also performed.

Analyses were performed with ChatGTP 4 and the software program TreeAge.

Results

Table 1. Incremental Cost-Effectiveness Results by TreeAge

Strategy	Cost	Incremental Cost	Efficacy	Incremental Efficacy	ICER	NMB
Imipenem/cilastatin	\$4,014		9.34			\$696,228
Cefiderocol	\$14,518	\$10,504	9.41	0.08	\$134,680	\$691,574

Table 2. Incremental Cost-Effectiveness Results by ChatGPT4

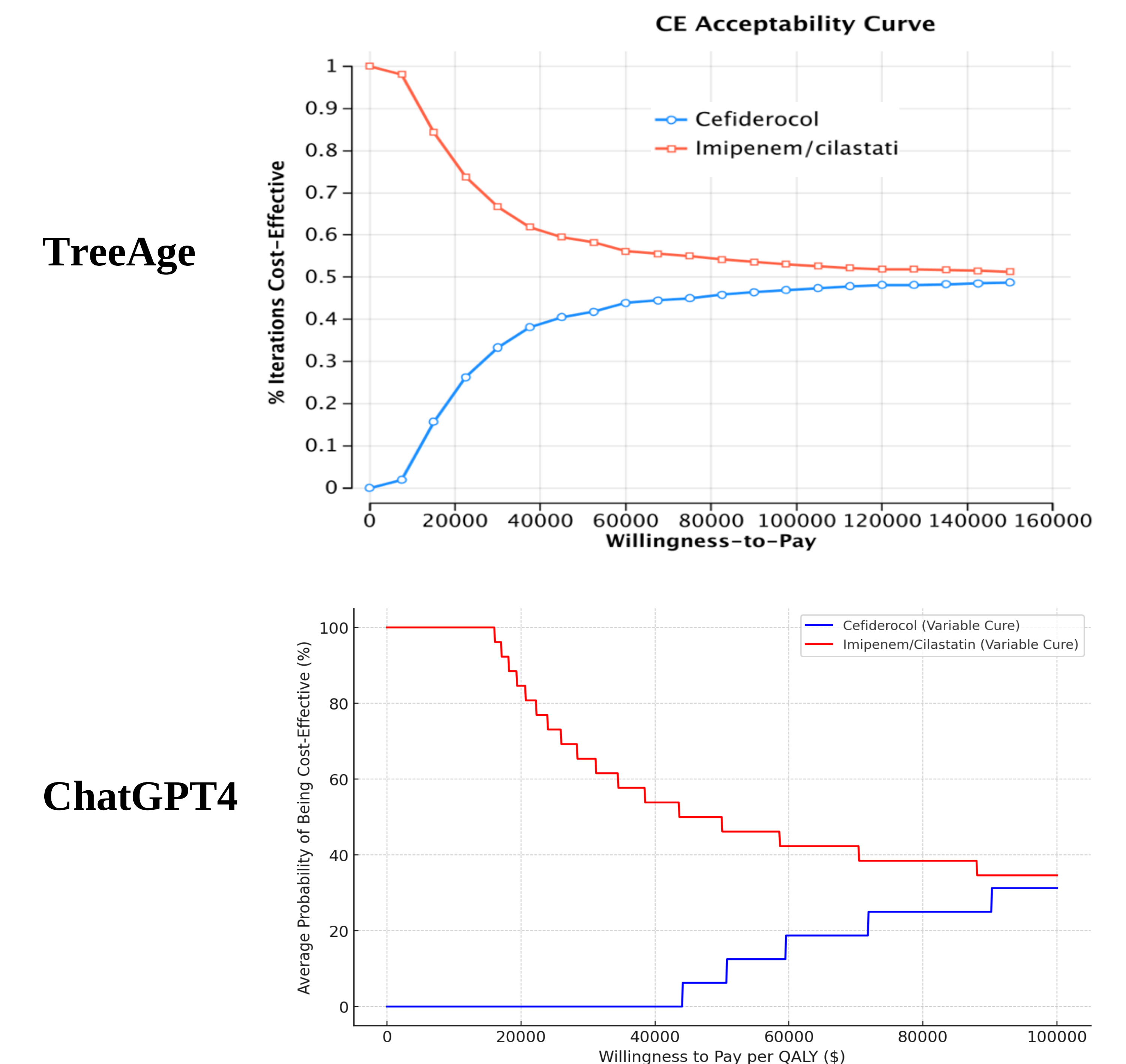
Treatment	Expected Cost	Incremental Cost	Expected QALY	Incremental QALY	ICER per QALY	NMB
Imipenem/cilastatin	\$4,014		9.337			\$696,261
Cefiderocol	\$14,518	\$10,504	9.415	0.078	\$134,350	\$691,607

Cefiderecol has higher costs (\$14,518 vs. \$4,014) and higher efficacy (9.41 vs. 9.34 QALY) (Tables 1 and 2). The incremental cost-effectiveness ratio (ICER) per QALY was \$134,350 for ChatGPT, and \$134,680 for TreeAge (Tables 1 and 2). The results of the analysis were not sensitive to changes in the parameters used in the model.

ChatGPT and TreeAge produced similar results and cost-effectiveness acceptability curves (Figure 1). The small differences in results were likely due to rounding in the calculation.

The graphs generated by ChatGPT were not obtained on the first attempt; instead, several repeated questions and adjustments were necessary, demonstrating the need for clear and precise questions to achieve the desired outputs from ChatGPT.

Figure 1. CE Acceptability Curves by TreeAge and ChatGPT4



Conclusions

The ICER of Cefiderocol exceeded the threshold of \$100,000 often cited as the maximum willingness to pay for commonly used drugs. ChatGPT provided similar results to TreeAge. In addition, ChatGPT can interpret analysis results and explain its calculations.