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Cost-Utility Analysis of Add-on Vericiguat to Standard Treatment in Thai Patients with Heart Failure and Reduced Ejection Fraction

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INTRODUCTION

Vericiguat has shown promising results in reducing cardiovascular (CV) mortality and heart failure (HF) hospitalizations in patients with HF with reduced ejection fraction (HFrEF) with worsening HF event. However, its cost-effectiveness remains uncertain in the context of Thailand's healthcare system.

OBJECTIVE

To evaluate the cost-utility of adding vericiguat to standard-of-care therapy compared with standard-of-care alone for patients with HFrEF in Thailand, using a lifetime Markov model incorporating real-world Thai cost and utility data, and to determine whether vericiguat is cost-effective under the Thai willingness-to-pay threshold.

METHOD

A lifetime Markov model (*Figure 1*) using Microsoft Excel was conducted to simulate the lifetime economic outcomes of adding vericiguat to standard-of-care therapy (SoCT) compared to SoCT alone for Thai patients with HFrEF. Model parameters were derived from the VICTORIA trial[1] and supplemented with local data on healthcare costs and utilities. Sensitivity, subgroup and threshold analyses were also performed.

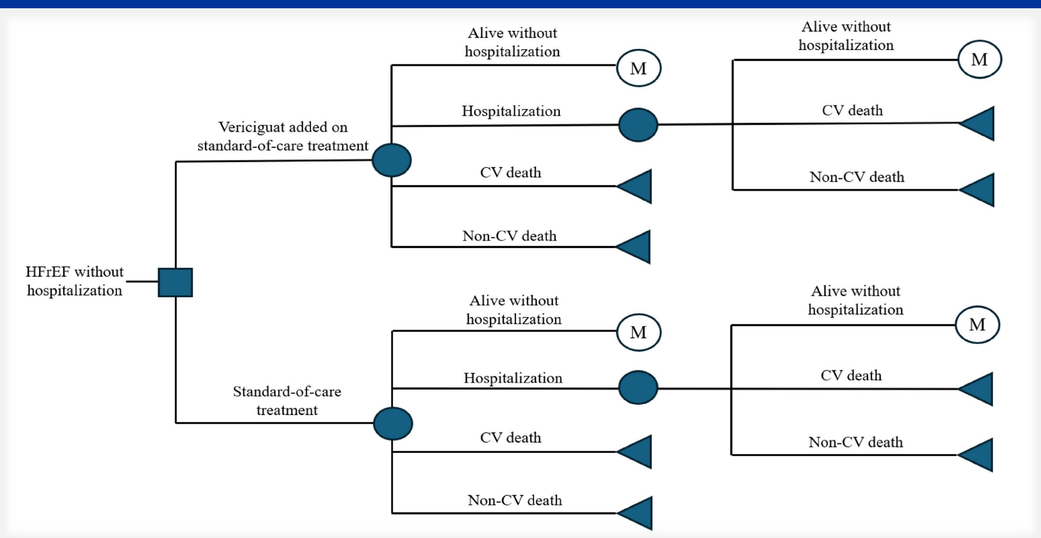

Figure 1. A Markov model simulates the economic outcomes for patients with HFrEF who receive either vericiguat added SoCT or SoCT alone, using a lifetime horizon and one-month cycle length.

RESULTS

Adding vericiguat to SoCT increased total life years (LYs) from 5.80 to 5.98 and quality-adjusted life years (QALYs) from 2.74 to 2.85. However, it also increased total lifetime costs by $3,114 per patient compared to SoCT alone (*Table 1*), resulting in an incremental cost-effectiveness ratio (ICER) of $28,857 per QALY gained. Subgroup analysis based on NT-proBNP levels demonstrated that vericiguat had a more favorable ICER of $15,127 per QALY gained in patients with NT-proBNP ≤ 4,000 pg/mL (*Table 2*). Considering the current willingness-to-pay (WTP) threshold of $4,342 per QALY gained in Thailand, vericiguat did not meet the cost-effectiveness criteria. One-way sensitivity analysis showing ICER most influenced by CV mortality risk, HF hospitalization rates, and drug cost assumptions (*Figure 2*). Cost-effectiveness acceptability curve indicated that probability of cost-effectiveness <10% at Thai WTP threshold (*Figure 3*).

Table 1. Base-case analysis (societal perspective).

	Vericiguat + SoCT	SoCT alone	Difference (Vericiguat-SoCT)
Incidence of HFH per 1000 patient-years	58.95	59.53	-0.58
Number of CV death per 1000 patient-years	16.33	16.52	-0.19
Total cost	$16,461	$13,347	$3,114
Total LYs per patient	5.98	5.80	0.18
Total QALYs per patient	2.85	2.74	0.11
ICER per LY		$17,727	
ICER per QALYs		$28,857	

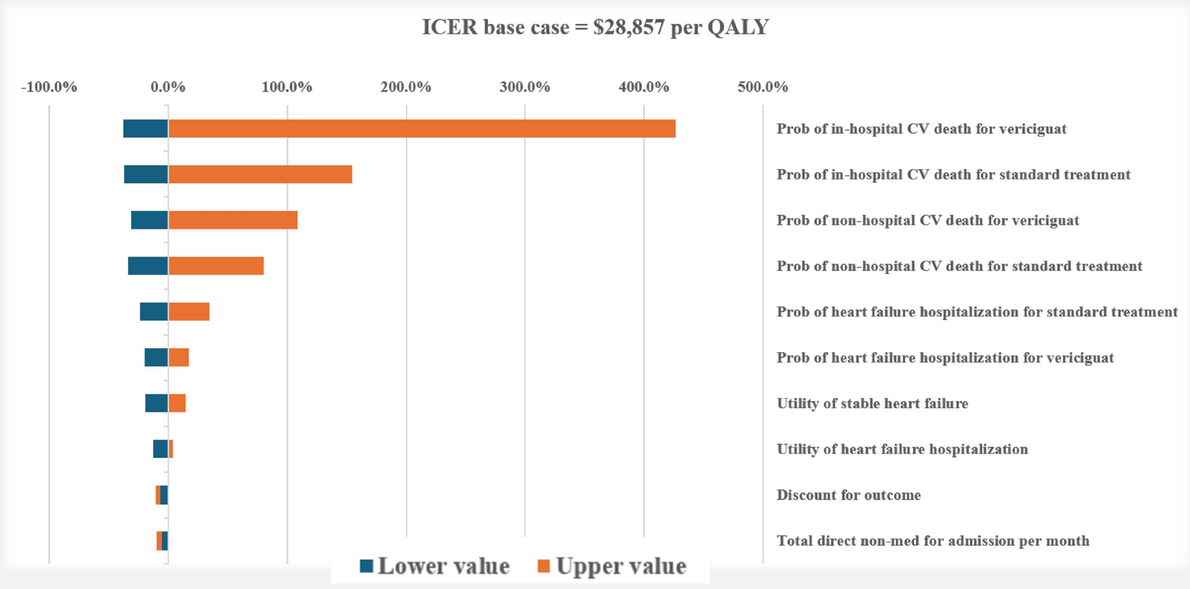

Figure 2. Tornado diagram of one-way sensitivity analysis (Prob: Probability)

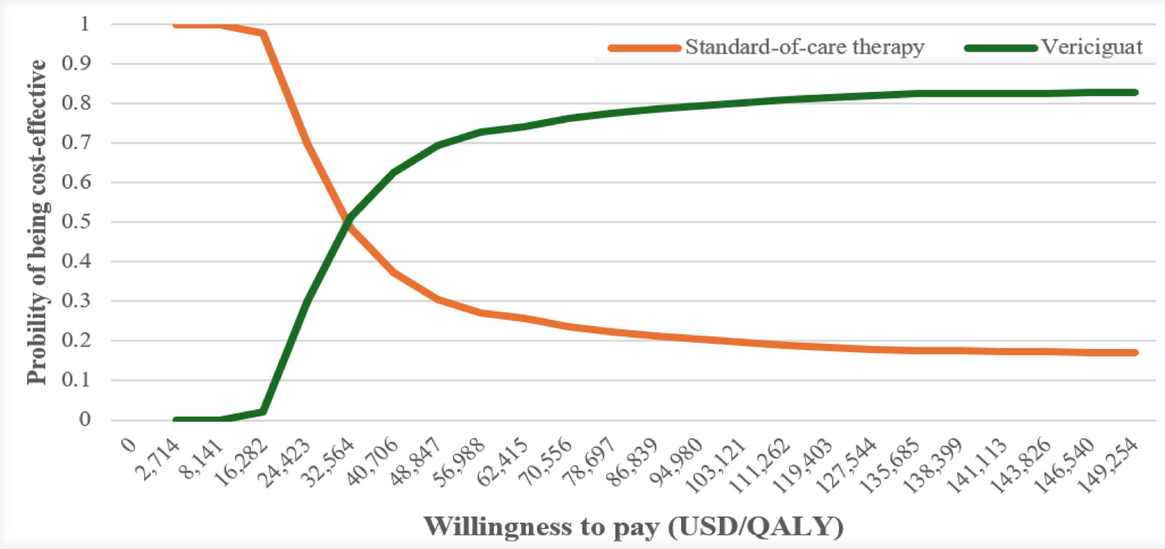

Figure 3. Cost-effectiveness acceptability curve of vericiguat add-on standard-of-care therapy compared with standard-of-care alone.

Table 2. Results of scenario analysis

Input parameters	Incremental cost	Incremental LYs	Incremental QALYs	ICER
Subgroup analysis according to NT-proBNP				
• **≤ 4,000 pg/mL**	$5,393	0.48	0.36	$15,127
• **≤ 8,000 pg/mL**	$4,315	0.26	0.20	$22,024
• **> 8,000 pg/mL**	$1,826	-0.03	-0.05	$34,881
Utility for HF patients				
• **Base case analysis**	$3,114	0.18	0.11	$28,857
• **Scenario analysis**	$3,114	0.18	0.13	$23,574
Adherence level (%)				
• **100% (Base case)**	$3,114	0.18	0.11	$28,857
• **80%**	$2,447	0.13	0.08	$30,356
• **60%**	$1,836	0.10	0.06	$30,374
• **40%**	$1,225	0.06	0.04	$30,391

CONCLUSIONS

Despite its clinical benefits in reducing HF hospitalizations and CV mortality, vericiguat as an adjunct to SoCT for HFrEF patients in Thailand exceeds the accepted cost-effectiveness threshold ($4,343 per QALY gained). A 90.2% price reduction would be required to meet the current WTP. Subgroup analysis showed improved cost-effectiveness for NT-proBNP ≤ 4,000 pg/mL ($15,127 per QALY), but it still remained above the threshold.

REFERENCES

1. Armstrong PW, Pieske B, Anstrom KJ, Ezekowitz J, Hernandez AF, Butler J, et al. Vericiguat in Patients with Heart Failure and Reduced Ejection Fraction. N Engl J Med. 2020; 382(20):1883–93.

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