

Economic Evaluation of Direct Oral Anticoagulants for Venous Thromboembolism in Thailand

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BACKGROUND

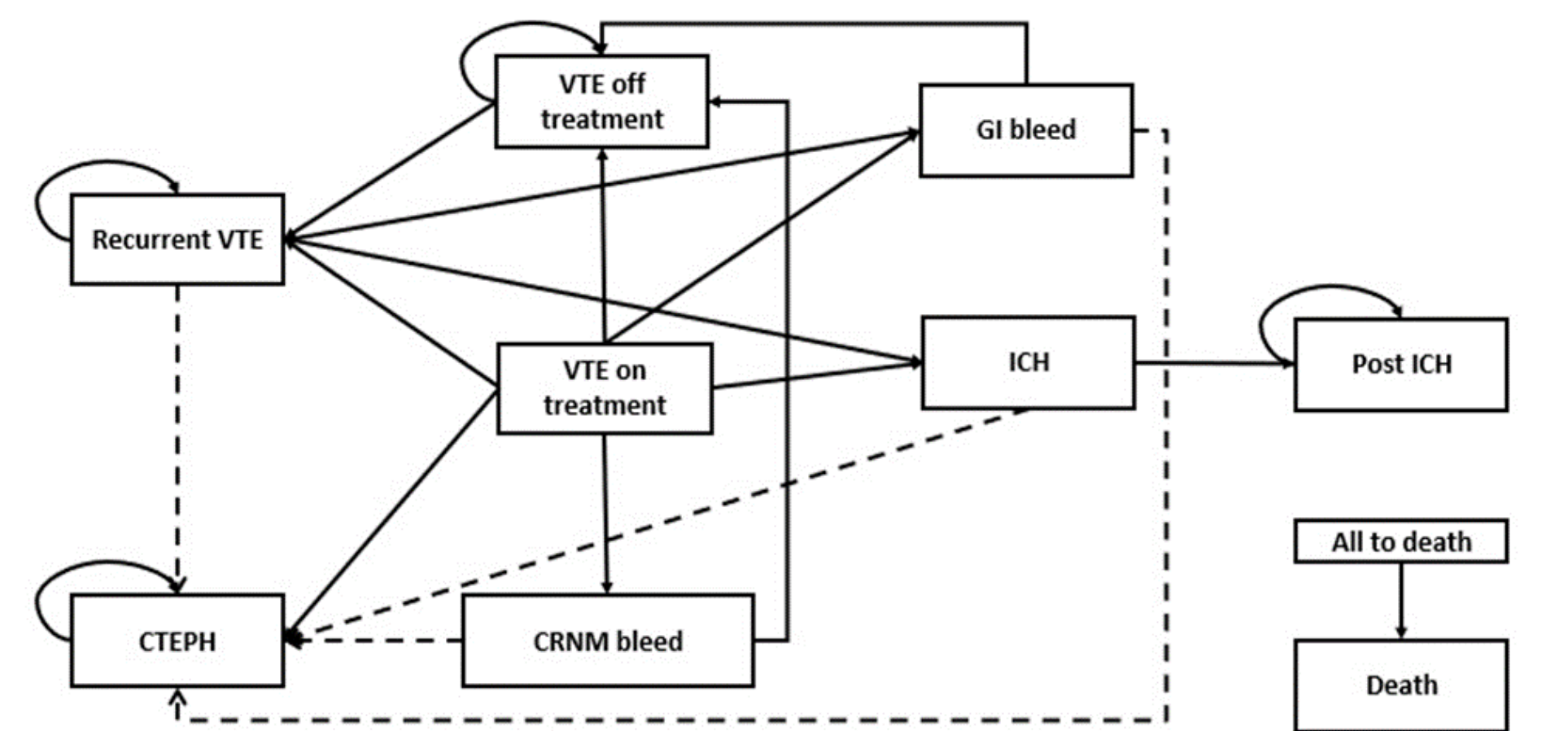
- Venous thromboembolism (VTE) is a thromboembolic event consisting of deep vein thrombosis (DVT) and pulmonary embolism (PE). It causes significant loss of life years and increases disability, especially in low-and-middle-income countries¹.
- In Thailand, the number of hospitalized patients with VTE increased from 25,199 cases in 2016 to 32,023 cases in 2020² resulting in higher cost of VTE treatment.
- Direct oral anticoagulants (DOACs) come with much higher price than warfarin, several economic evaluations indicated that DOACs are cost-effective for treating patients with VTE in high-income countries³⁻⁵. The value of DOACs in terms of cost-effectiveness for VTE treatment and prevention in resource-limited settings are scarce and unclear.

OBJECTIVE

To assess cost-effectiveness of DOACs for patients with VTE in Thailand.

METHODS

- A cohort-based state transition model was constructed under a societal perspective with a lifetime horizon.
- All available DOACs; apixaban, rivaroxaban, edoxaban, and dabigatran were compared to warfarin.
- A 6-month cycle length was used to capture all costs and health outcomes.



Abbreviations: VTE, venous thromboembolism; CTEPH, chronic thromboembolic pulmonary hypertension; CRNM bleed, clinically relevant non-major bleed; GI bleed, gastrointestinal bleed; ICH, intracranial hemorrhage

Figure 1: Economic model

- All inputs were based on a comprehensive literature review.
- The model outcomes included total cost and quality-adjusted life-years (QALYs) with a 3% annual discount rate.
- A fully incremental cost-effectiveness analysis and the incremental cost-effectiveness ratio (ICER) per QALY gained were calculated at the willingness-to-pay (WTP) of THB 160,000/QALY.
- The robustness of findings was assessed using deterministic and probabilistic sensitivity analyses.

Acknowledgement

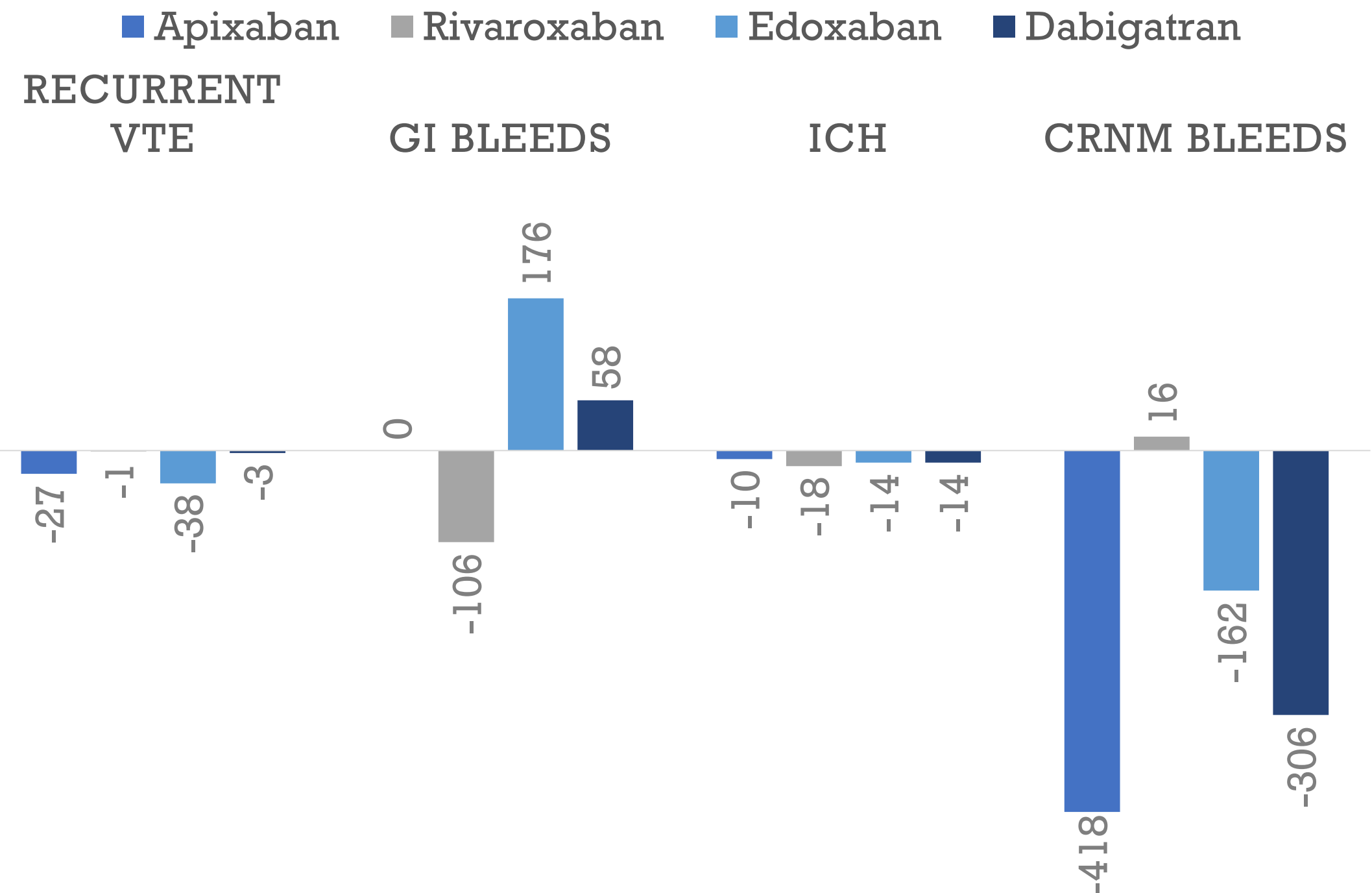
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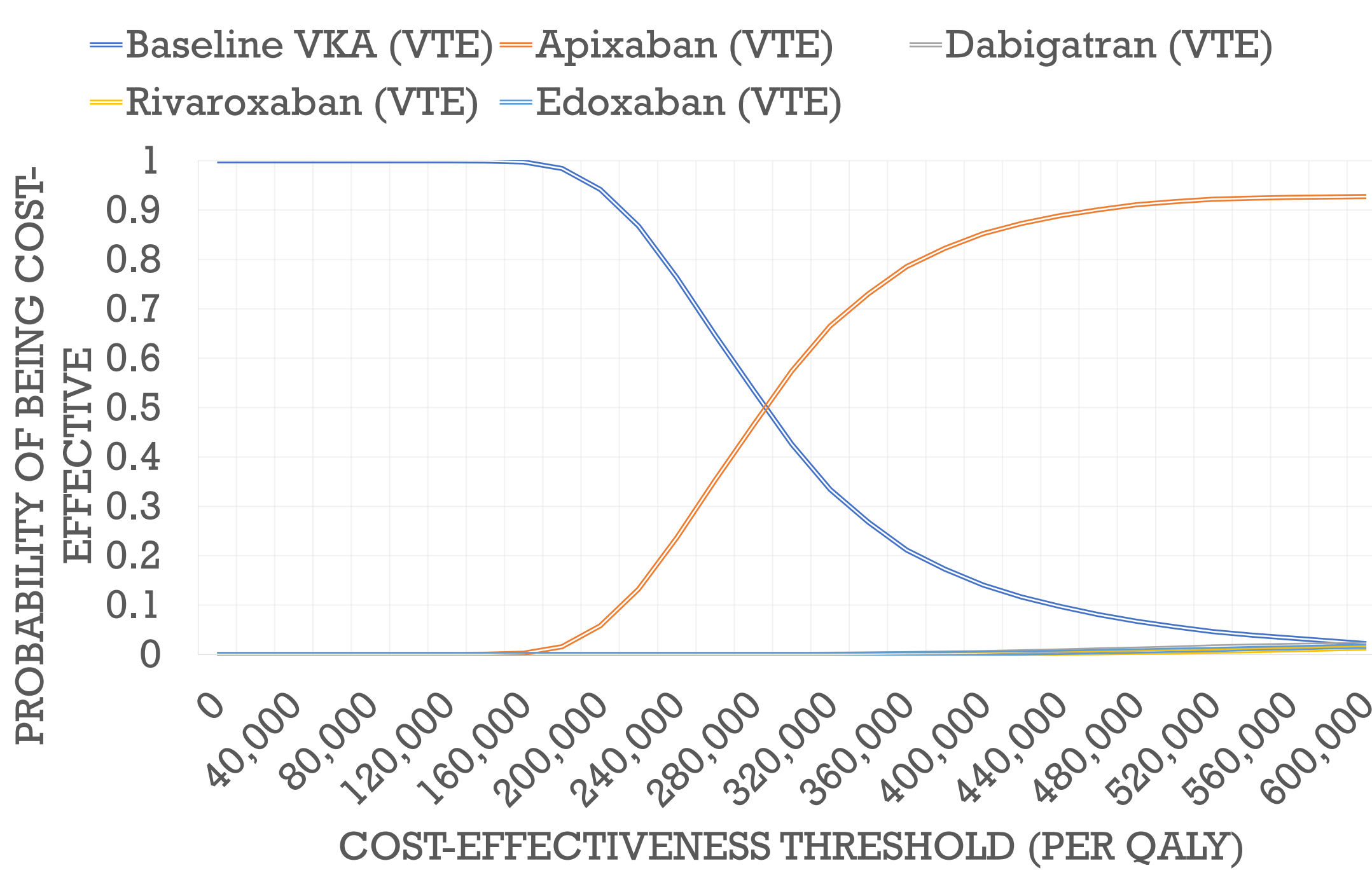


RESULTS



Abbreviations: VTE, venous thromboembolism; CRNM bleed, clinically relevant non-major bleed; GI bleed, gastrointestinal bleed; ICH, intracranial hemorrhage

Figure 2: Number of clinical events avoided versus warfarin (in a cohort of 10,000 patients)



Abbreviations: VTE, venous thromboembolism

Figure 3: Cost-effectiveness acceptability curves

Table 1: Fully incremental analysis

Treatment	Warfarin	Apixaban	Rivaroxaban	Edoxaban	Dabigatran
ICER compared to (THB/QALY gained)					
Warfarin	-	269,809	757,363	709,944	707,145
Apixaban	-	-	Dominated	Dominated	Dominated
Rivaroxaban	-	-	-	359,106	401,389
Edoxaban	-	-	-	-	597,892

Table 2: Base-case cost-effectiveness results

Treatment	Warfarin	Apixaban	Rivaroxaban	Edoxaban	Dabigatran
Cost (THB)	129,873	172,302	197,603	201,944	203,499
Life years	7.41	7.51	7.47	7.56	7.47
QALYs	6.27	6.43	6.36	6.38	6.38
Incremental cost (95% CrI), THB	Reference	42,429 (36,414 – 49,968)	67,730 (58,292 – 79,342)	72,071 (62,154 – 88,027)	73,626 (62,222 – 86,889)
Incremental QALY (95% CrI)		0.16 (0.06 – 0.22)	0.09 (0.02 – 0.16)	0.1 (-0.05 – 0.17)	0.1 (-0.07 – 0.19)
ICER (95% CrI) THB/QALY gained		269,809 (181,807 – 656,799)	757,363 (424,842 – 3,046,158)	709,944 (Dominated – 5,252,952)	707,145 (Dominated – 5,299,164)
ICER (95% CrI) USD/QALY gained		8,437 (5,685 – 20,538)	23,682 (13,285 – 95,252)	22,200 (Dominated – 164,257)	22,122 (Dominated – 168,681)

DISCUSSION

- Our findings were inconsistent with previous cost-effectiveness studies which indicated that DOACs were cost-effective options compared to vitamin K antagonist for VTE treatment and prevention. The differences might be due to the differences in healthcare system, treatment costs and current WTP.
- We also found that all DOACs could reduce the risk of overall VTE recurrence and the risk of bleeding. Patients with apixaban experienced much fewer cases of CRNM bleeding than those with other DOACs, while edoxaban was associated with the lowest number of recurrent VTE.
- This study provided valuable information for clinical decision makers. Although our findings showed that all DOACs were not cost-effective options, they might be needed for VTE patients in some circumstances.
- According to our finding, apixaban seems to be the most cost-effectiveness option. It provided relatively similar QALY with lower cost. When in need, apixaban might need to be firstly considered.

STUDY LIMITATIONS

- Warfarin adjusted doses according to INR level and adjusted DOAC doses according to renal impairment, age, weight, or genetic variations were not considered in our model.
- The rates of outcome occurrence were converted to reflect treatment durations of six months. It was necessary to assume that the rate of outcome was consistent over the course of the study's follow-up period.
- We assumed that patients with major bleeding stopped taking anticoagulants but switching to other treatment options may have occurred in real-world practice.

CONCLUSIONS

All DOACs were not cost-effective for VTE treatment at current WTP in Thailand. Apixaban is likely to be the best option among DOACs. Thai national policy makers might need to consider further price negotiation or managed entry agreement with pharmaceutical companies to increase accessibility of DOACs for patients with VTE in Thailand.