

Cost-Effectiveness of Alternative Anticoagulation Strategies for Postoperative Management of Total Knee Arthroplasty Patients

Savannah R. Smith^{1,2,3}, Jeffrey N. Katz^{2,3,4}, Elena Losina^{2,3,4,5}

¹ George Washington University School of Medicine and Health Sciences, Washington, DC

² Orthopedic and Arthritis Center for outcomes Research (OrACORe), Brigham and Women's Hospital, Boston, MA

⁴ Harvard Medical School, Boston, MA

³ Policy and Innovation eValuation in Orthopedic Treatments (PIVOT) Center, Brigham and Women's Hospital, Boston, MA

⁵ Department of Biostatistics, Boston University School of Public Health, Boston, MA

THE GEORGE WASHINGTON UNIVERSITY WASHINGTON, DC

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Background

- Anticoagulation is essential for deep vein thrombosis (DVT) and pulmonary embolism (PE) prevention following total knee arthroplasty (TKA)
- Prolonging the duration of anticoagulation post-TKA can substantially reduce DVT and PE risks
- Clinicians must weigh the risks of DVT and PE against those of excessive anticoagulation, including hemorrhage and prosthetic joint infection (PJI)

Objective

- Evaluate the cost-effectiveness of prolonged (35-day) and standard (14-day) duration anticoagulation therapy following TKA

Methods

Model Structure (Figure 1)

- State-transition Monte-Carlo computer simulation model (TreeAge Pro©) following subjects for one year post-TKA, tracking clinical and economic outcomes of TKA and anticoagulation therapy
- Subjects transition between the following major health states post-TKA:
 - DVT, PE, PJI, hemorrhage, no postoperative complications

Input Data (Table 1)

- Published literature, RedBook Online®, Medicare Fee Schedules
- Each anticoagulant associated with unique cost, efficacy, and bleeding risk
- Each complication associated with unique cost, quality of life, and mortality

Anticoagulation Strategies

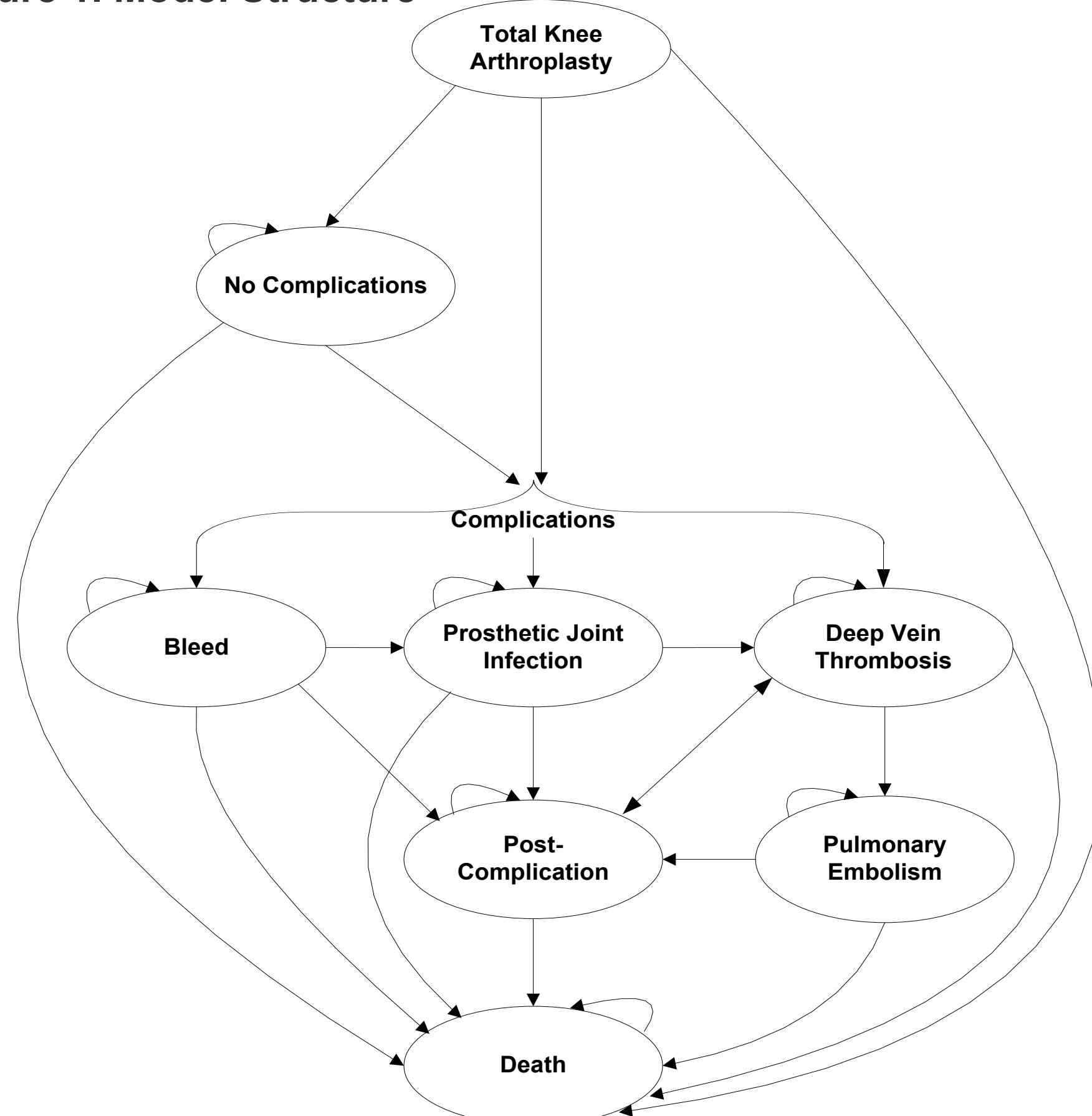
- Anticoagulants considered:
 - Fondaparinux, Rivaroxaban, Low molecular weight heparin (LMWH), Warfarin, Aspirin
- Duration of post-TKA anticoagulation:
 - Standard duration (14-day) or Prolonged duration (35-day)

Outcomes:

- Proportion of first post-operative year spent in each health state
- Incremental cost-effectiveness ratio (ICER):

$$\frac{\text{Increase in costs (dollars)}}{\text{Increase in health benefits (QALYs)}}$$

Figure 1. Model Structure



Results

Table 1. Select Input Parameters

	Anticoagulation Characteristics		
	Daily Cost	RR DVT	RR Bleeding
Fondaparinux	\$43 ¹	0.08	2.21
Rivaroxaban	\$8	0.12	2.12
LMWH	\$37 ¹	0.20	1.23
Warfarin	\$6/\$3 ²	0.36	1.21
Aspirin	\$1	0.69	1.0

LMWH – low molecular weight heparin

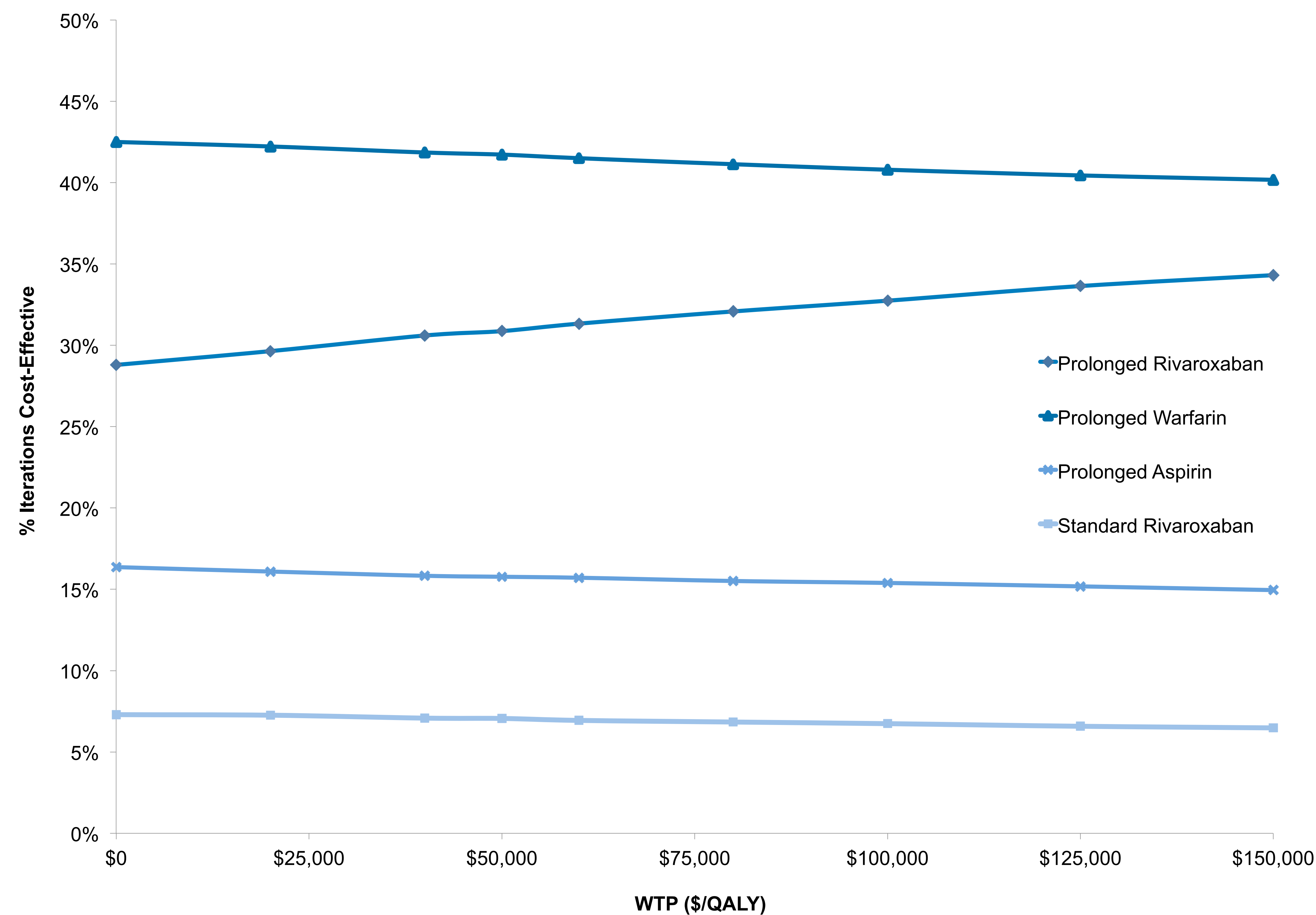
1 – Includes cost of injection administration (\$20)

2 – Week 1/Weeks 2+; includes cost of monitoring

Table 2. Cost-effectiveness of anticoagulation strategies after TKA

Regimen	Cost	QALY	ICER	DVT	Bleed
Prolonged Rivaroxaban	\$3,279	0.7328	Cost Saving	18.0%	6.0%
Prolonged Warfarin	\$3,291	0.7325	Cost Saving	21.9%	4.0%
Standard Rivaroxaban	\$3,416	0.7322	Cost Saving	22.8%	5.4%
Standard Warfarin	\$3,551	0.7319	Reference	25.6%	3.9%
Prolonged Aspirin	\$3,689	0.7315	Dominated	25.7%	3.5%
Standard Aspirin	\$3,777	0.7312	Dominated	28.4%	3.4%
No prophylaxis	\$3,869	0.7262	Dominated	32.1%	3.3%
Standard LMWH	\$3,898	0.7321	Dominated	23.9%	3.9%
Standard Fondaparinux	\$3,932	0.7323	\$977,100	22.3%	5.6%
Prolonged LMWH	\$4,375	0.7326	Dominated	19.5%	4.1%
Prolonged Fondaparinux	\$4,529	0.7328	\$1,085,600	17.3%	6.2%

Figure 1. Cost-Effectiveness Acceptability Curve



Results

Figure 3. Distribution of Costs in the First Postoperative Year for Prolonged Strategies

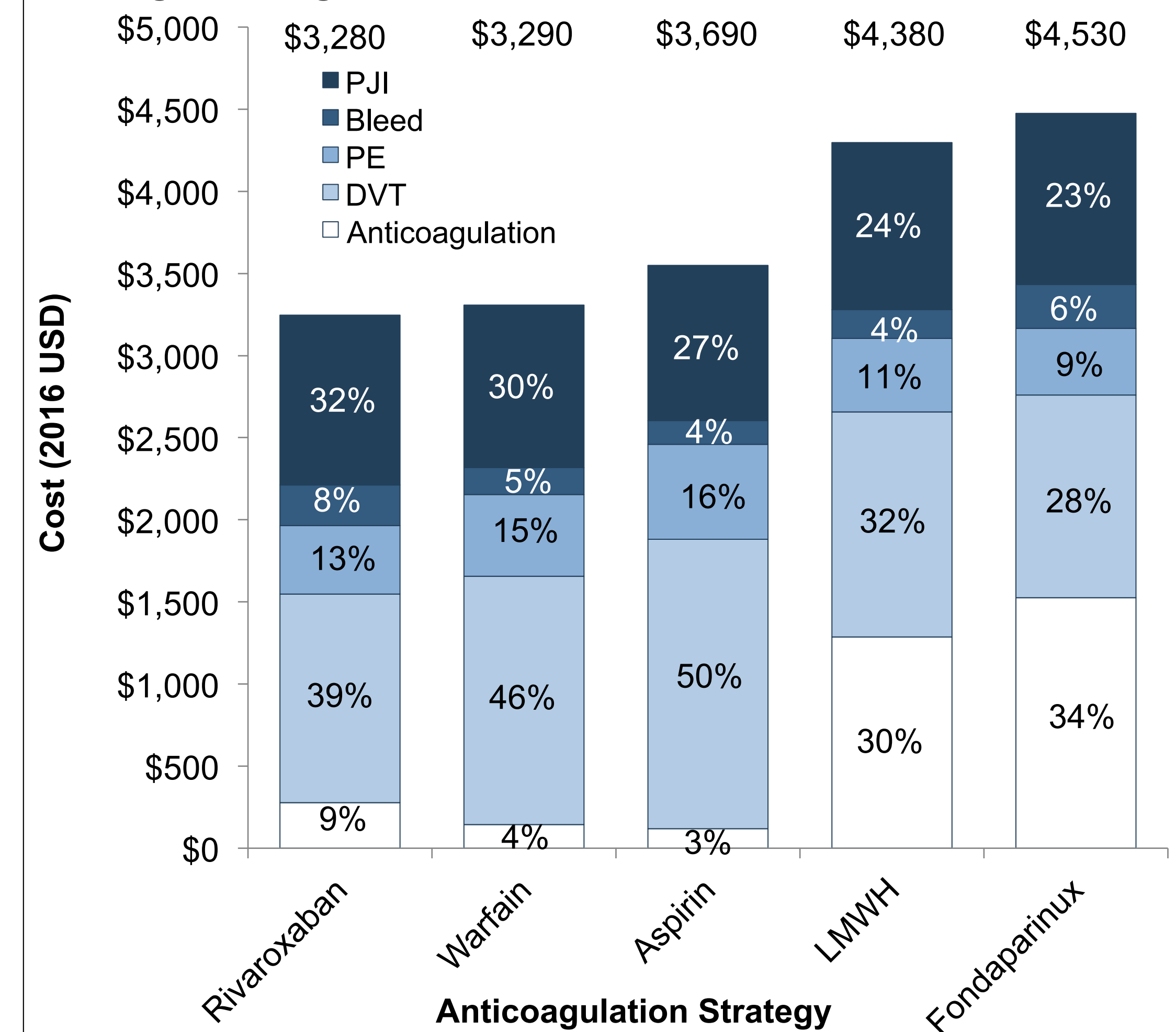
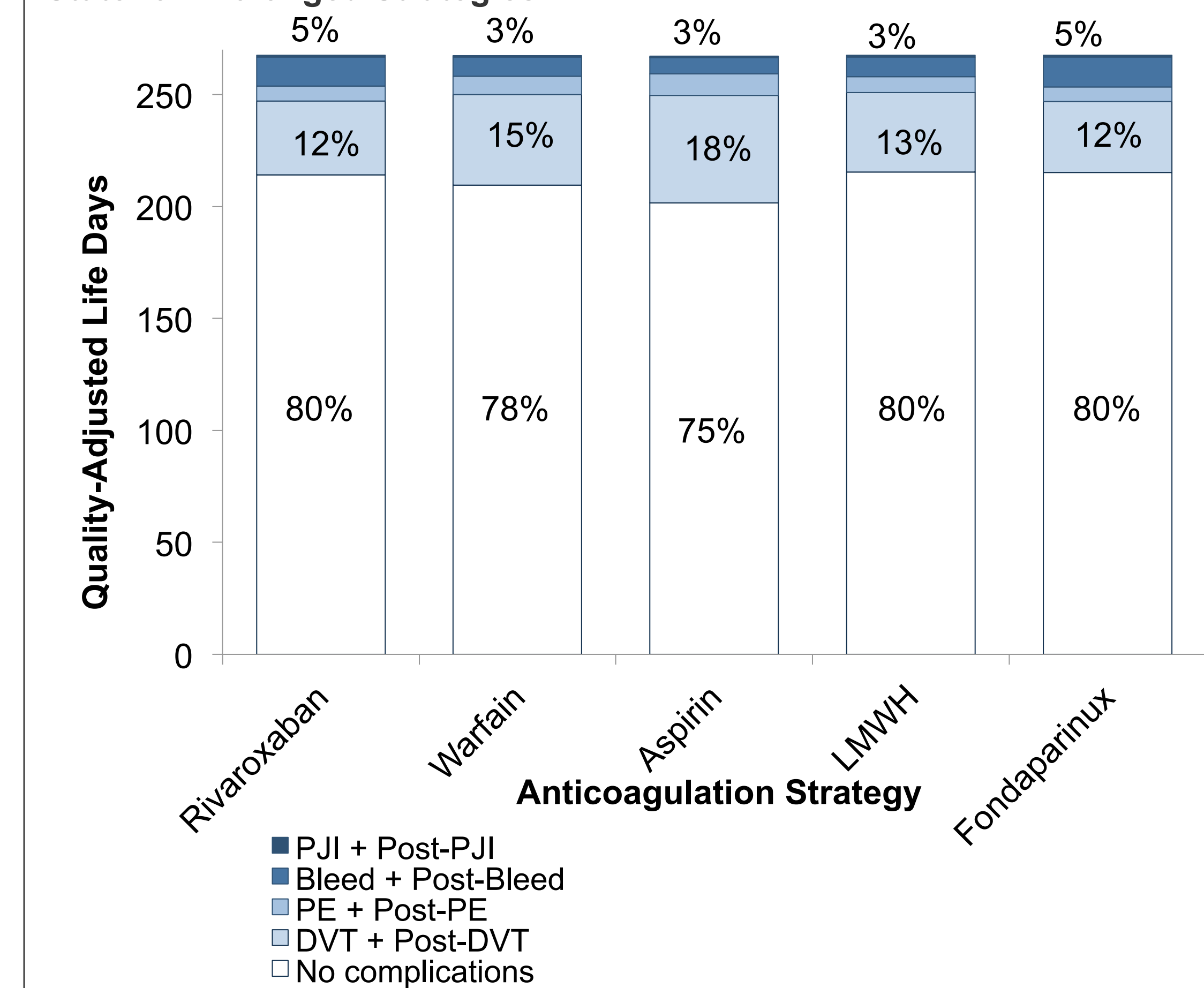


Figure 4. Proportion of the First Postoperative Year Spent in Each Health State for Prolonged Strategies



Limitations

- There are sparse data on continued efficacy of anticoagulants in extended prophylactic period.
- We assumed, in the base case, that aspirin did not increase the risk of bleeding. We addressed the uncertainty in this parameter in sensitivity analyses.

Conclusions

- Prolonged therapies increase QALYs compared to standard duration therapies, supporting the extension of anticoagulation post-TKA.
- Prolonged prophylaxis with warfarin and rivaroxaban emerged as cost-effective strategies.
- As prolonged rivaroxaban and warfarin are comparable from a cost-effectiveness standpoint, patient preferences can help inform the choice of the appropriate postoperative anticoagulation strategy.