

Cost-effectiveness of rivaroxaban versus enoxaparin for thromboprophylaxis after total knee replacement in the UK and Spain

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Introduction

- ◆ Venous thromboembolism (VTE: the composite of deep vein thrombosis [DVT] and pulmonary embolism [PE]) is the outcome of a clot, which forms within a vein and then travels through the blood vessels to a different site
- ◆ Total knee replacement (TKR) surgery is an important risk factor for VTE¹
- ◆ With more than 66,000 TKRs being performed in the UK² and almost 17,000 being performed in Spain annually, the potential impact is large³
- ◆ Rivaroxaban is a novel, once-daily, direct inhibitor of Factor Xa that received marketing approval in the EU and in Canada for the prevention of VTE after elective TKR and total hip replacement. Unlike existing low molecular weight heparins such as enoxaparin, rivaroxaban is administered orally
- ◆ The efficacy and tolerability of rivaroxaban against enoxaparin, both for 14 days, in VTE prevention after TKR was demonstrated in two large, multi-country, randomized clinical trials (RECORD3⁴ and RECORD4⁵)
- ◆ The enoxaparin dose used in RECORD4 (30 mg twice daily) is primarily used in North America, and so while RECORD4 results support those of RECORD3, the data are excluded from this analysis
- ◆ In RECORD3, rivaroxaban reduced total VTE (composite of any DVT, non-fatal PE and all-cause mortality) by 49% and symptomatic VTE by 66% versus enoxaparin.⁴ There was a similar level of major bleeding in both arms⁴

Objective

- ◆ This study assesses the cost-effectiveness of rivaroxaban versus enoxaparin for the prevention of VTE after TKR in the UK and Spain

Methods

- ◆ An economic model assessed the cost-effectiveness of rivaroxaban versus enoxaparin from the healthcare perspective in the UK and Spain. The analysis initially models the period from surgery to up to 90 days after surgery (Figure 1), followed by long-term complications such as recurrent VTE, post-thrombotic syndrome (PTS) and chronic thromboembolic pulmonary hypertension (CTPH; Spain only) from 90 days to 5 years after surgery (Figure 2)

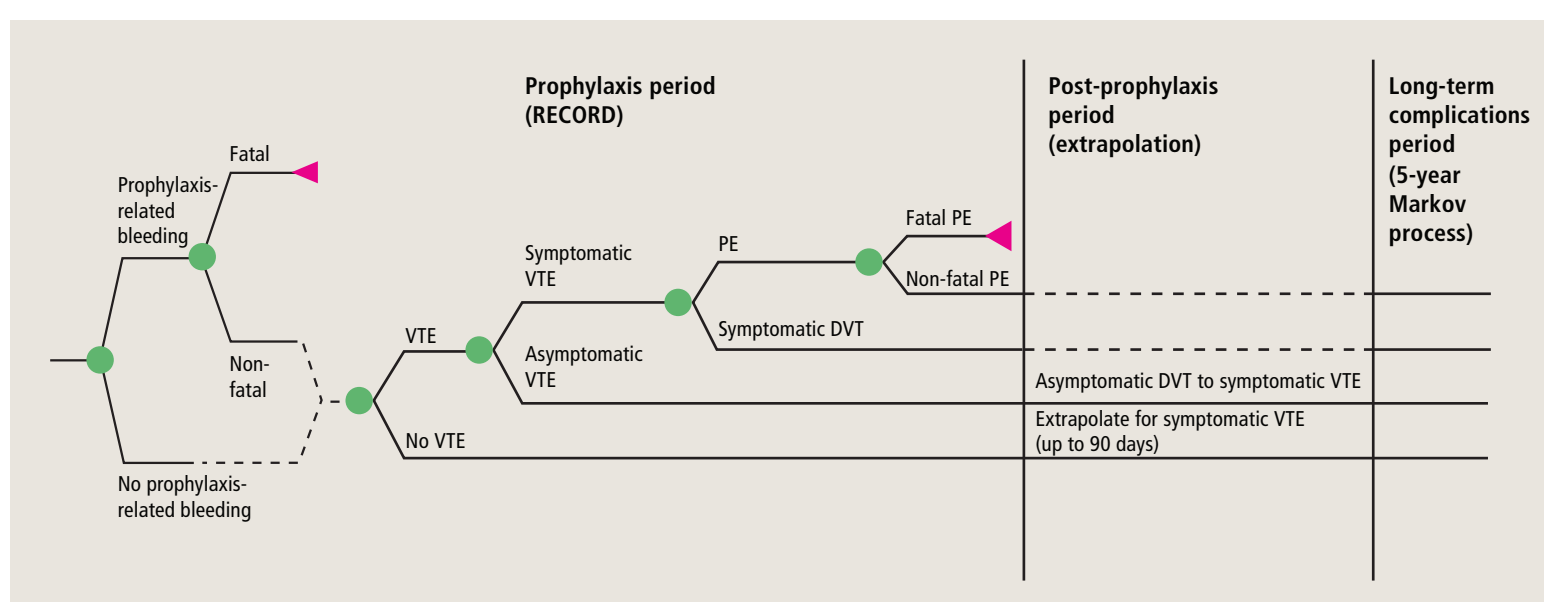


Figure 1. Prophylaxis and post-prophylaxis phases of the model. DVT, deep vein thrombosis; PE, pulmonary embolism; VTE, venous thromboembolism.

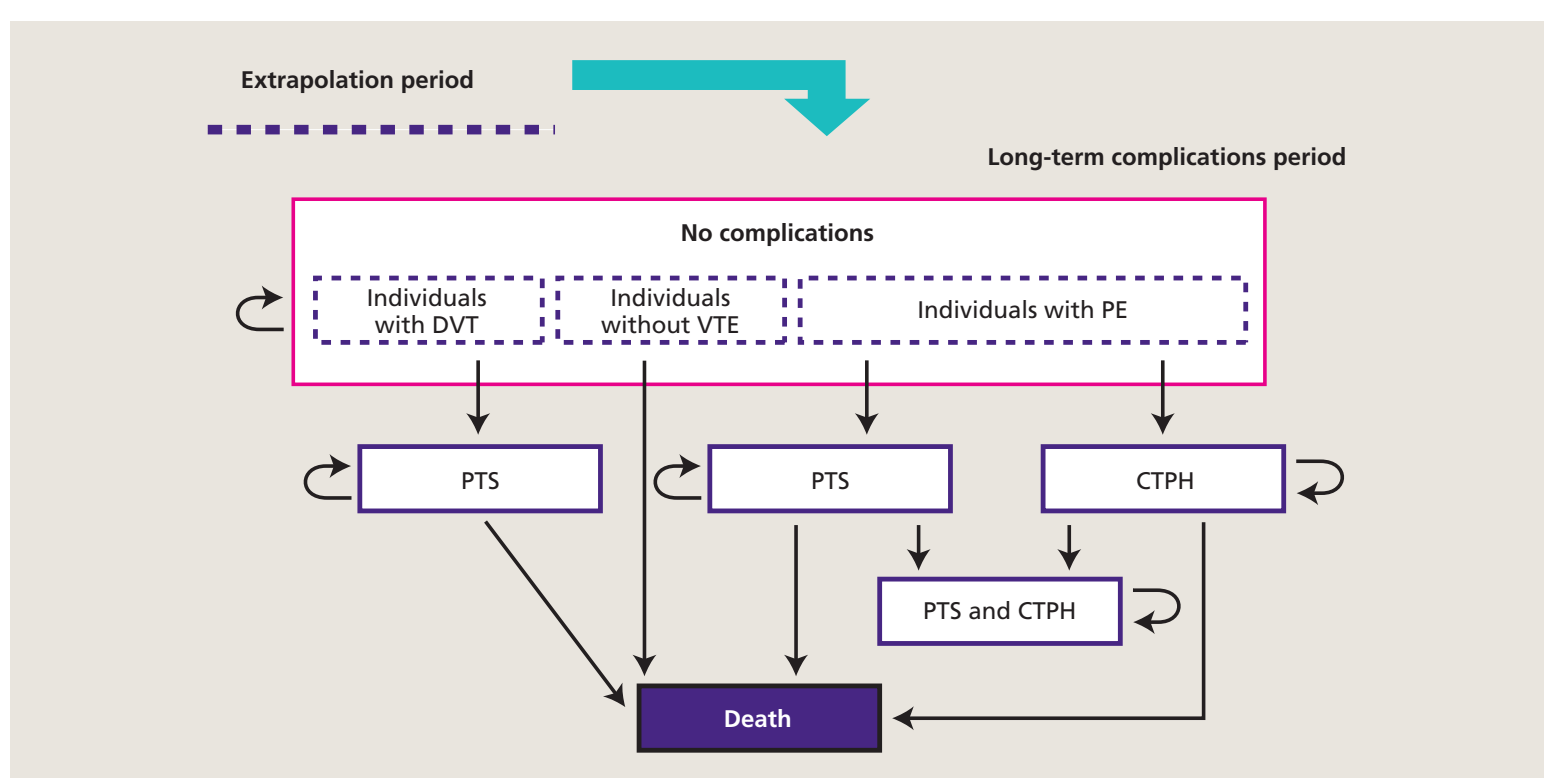


Figure 2. Long-term complications phase of the model. CTPH, chronic thromboembolic pulmonary hypertension; DVT, deep vein thrombosis; PE, pulmonary embolism; PTS, post-thrombotic syndrome; VTE, venous thromboembolism.

- ◆ Event probabilities during prophylaxis were derived from RECORD3 data. The probability of asymptomatic events developing into symptomatic events after prophylaxis was based on published clinical data.⁶ The estimated risks of VTE, CTPH and PTS beyond the initial 90 days after surgery were based on epidemiological data.^{7,8}
- ◆ Resource consumption and associated costs of symptomatic events (2008 pounds [£] in the UK, euros [€] in Spain) were derived from published sources (Table 1)^{1,9-20}

Table 1. Unit costs included in the model for the UK and Spain

	UK (£)	Spain (€)
Rivaroxaban 10 mg per day	4.50	5.25
Enoxaparin 40 mg per day	4.20	2,71 ^{9,10}
Enoxaparin administration per day	See text	2.45 ¹¹
Bleeding	1,106.71 ^{2,11,13}	1,212.98 ^{12*}
DVT diagnosis ¹	64 (inpatient) ^{2,13}	76.72 ¹³
	96.80 (outpatient) ^{2,11,13}	
PE diagnosis ¹	179 (inpatient) ^{2,13}	184.51 ¹³
	215.20 (outpatient) ^{2,11,13}	
DVT		
Inpatient	–	1,774.76 ^{9,10,13,14}
Outpatient	–	209.87 ^{9,10,13}
Readmission	–	3,025.88 ^{9,10,13,14}
PE		
Inpatient	–	3,747.04 ^{9,10,13,14}
Readmission	–	5,159.26 ^{9,10,13}
PTS	4,183.31 ²	4,721.33 ^{15*}
CTPH [†]	NA	1,316.37 ^{16,17*}

*Cost updated based on www.ine.es. [†]Referring to inpatient means diagnosis while the patient is still an inpatient. CTPH is excluded from the UK model. [‡]£1 = €1.25893 (23 October 2008). CTPH, chronic thrombotic pulmonary hypertension; DVT, deep vein thrombosis; NA, not applicable; PE, pulmonary embolism; PTS, post-thrombotic syndrome.

- ◆ In the UK, the fact that rivaroxaban is an oral drug with no monitoring requirements resulted in the following savings
 - 8% of patients require daily nurse visits to inject subcutaneous enoxaparin (the remainder self-inject), at £24 per visit^{1,9}
 - While in hospital, enoxaparin patients require a full blood count at baseline and then every 2–4 days until 14 days, at £2.35 per test^{1,9}
- ◆ These savings are not realized in Spain because these resources are not allocated for Spanish patients
- ◆ Utilities were taken from a systematic literature review, which provided the utility associated with DVT and PE²¹ and long-term complications.²² Both utilities were adjusted for the fact that patients had undergone TKR²³
- ◆ Costs and outcomes beyond the first year were discounted at 3.5% per annum in the UK and 3% per annum in Spain. Probabilistic sensitivity analyses were conducted. Event probabilities and utilities used a beta distribution, whereas costs used either a normal or gamma distribution

Results

- ◆ In the UK, 14 days' rivaroxaban prophylaxis produced savings of £90.99 (€144.55) and yielded a gain of 0.0146 quality-adjusted life years (QALYs) per patient versus 14 days' enoxaparin
- ◆ In Spain, 14 days' rivaroxaban prophylaxis produced savings of €135.93 and a gain of 0.0215 QALYs per patient versus 14 days' enoxaparin
- ◆ The reduction in long-term complications with rivaroxaban efficacy drives cost-effectiveness (Table 2). The analyses also show that rivaroxaban remains cost-saving and more efficacious when long-term complications are excluded
- ◆ Probabilistic sensitivity analyses show that dominance is maintained in 100% of cases in both the UK (Figure 3) and Spain (Figure 4)
- ◆ These results demonstrate that baseline results are reliable and withstand changes to the value of key variables

Table 2. Cost-effectiveness of rivaroxaban versus enoxaparin after total knee replacement in the UK and Spain

	Rivaroxaban	Enoxaparin	Incremental
UK cost-effectiveness analysis			
Prophylaxis-related costs	£78.00	£83.42	–£5.42
Cost of events: 0–90 days	£23.68	£32.23	–£8.54
Cost of long-term complications	£48.53	£125.55	–£77.02
Total costs	£150.21	£241.20	–£90.99 (–€144.55)
QALYs	3.5342	3.5196	0.0146
Rivaroxaban saves £90.99 per patient and produces a gain of 0.0146 QALYs per patient			
Spain cost-effectiveness analysis			
Prophylaxis-related costs	€73.14	€42.65	€30.49
Cost of events: 0–90 days	€45.02	€87.26	–€42.24
Cost of long-term complications	€75.19	€199.38	–€124.19
Total costs	€193.35	€329.29	–€135.93
QALYs	4.3010	4.2795	0.0215
Rivaroxaban saves €135.93 per patient and produces a gain of 0.0215 QALYs per patient			

QALY, quality-adjusted life year.

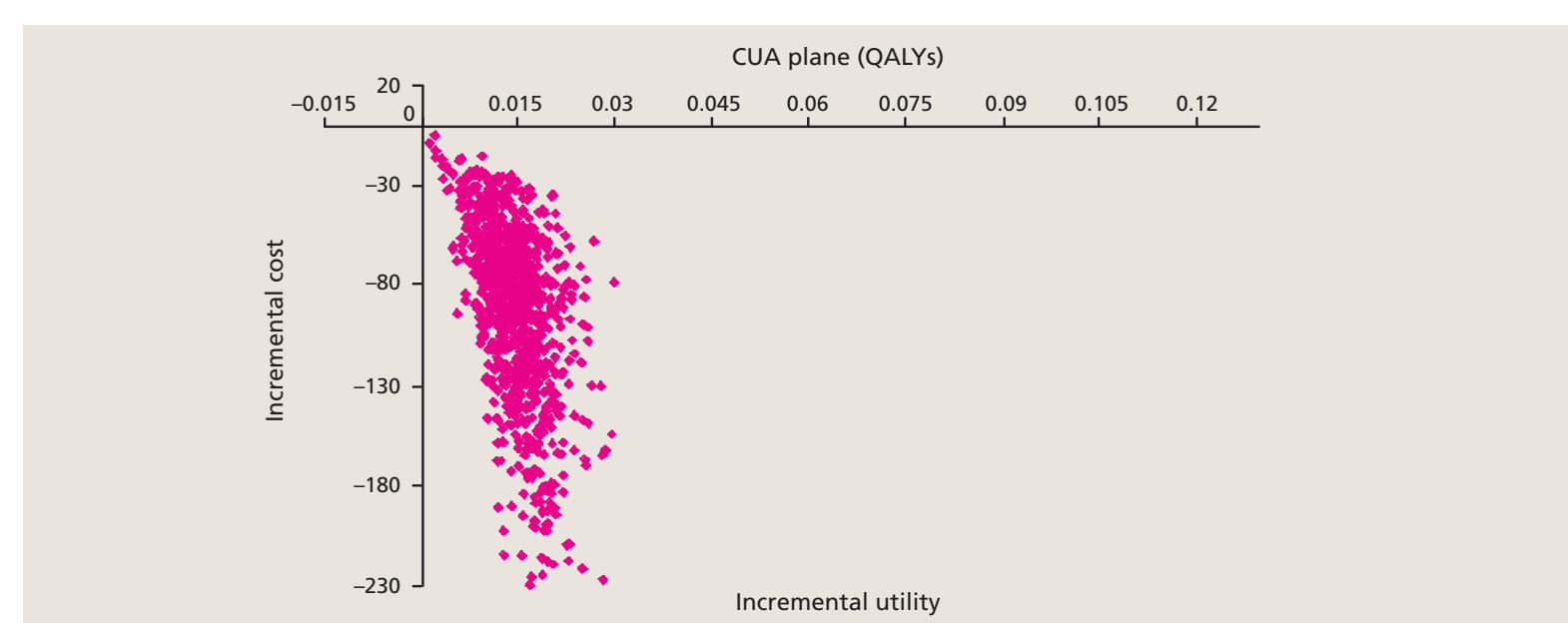


Figure 3. Cost-effectiveness scatter plot: rivaroxaban versus enoxaparin after TKR in the UK. CUA, cost-utility analysis; QALY, quality-adjusted life year.

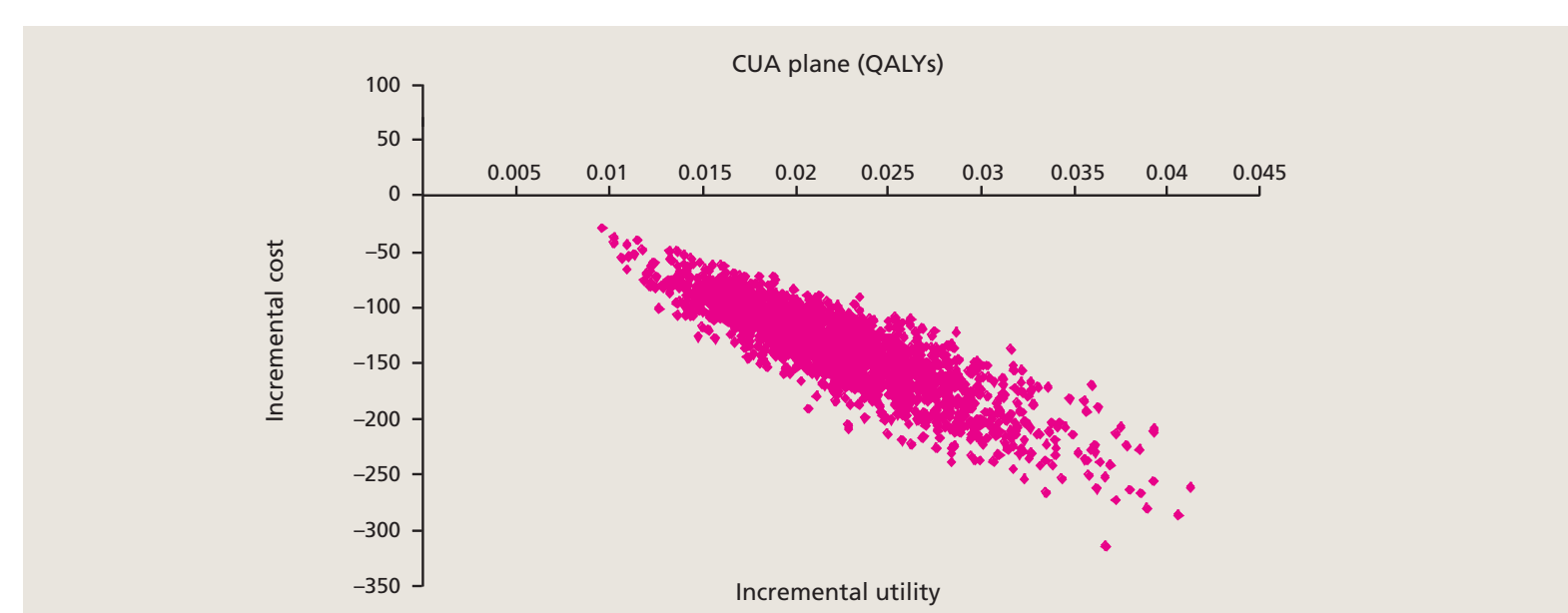


Figure 4. Cost-effectiveness scatter plot: rivaroxaban versus enoxaparin after TKR in Spain. CUA, cost-utility analysis; QALY, quality-adjusted life year.

Conclusions

- ◆ Rivaroxaban produced gains in QALYs and is cost-saving against enoxaparin after TKR in the UK and Spain
- ◆ Disaggregated results show that savings from long-term complications are key drivers of cost offsets
- ◆ Probabilistic sensitivity analyses show that these results are robust

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Disclosures

This study was supported by Bayer HealthCare AG and J&JPRD. Xarelto® (rivaroxaban) is licensed in the EU and in Canada for the prevention of venous thromboembolism after elective total hip or knee replacement. The data contained within this poster do not support or recommend the use of Xarelto in any other indication or countries in which it is not licensed.

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