Cost-effectiveness of rivaroxaban versus enoxaparin for thromboprophylaxis after total hip replacement in the UK

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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 hip replacement (THR) surgery is an important risk factor for VTE.
- With more than 65,000 THRs being performed in the UK annually, the potential public health risk is sizeable.
- 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 THR and total knee replacement. Unlike existing low molecular weight heparins such as enoxaparin, rivaroxaban is administered orally.
- In two pivotal randomized controlled trials in patients undergoing THR, rivaroxaban reduced total VTE (composite of any DVT, non-fatal PE and all-cause mortality) by 79% versus enoxaparin (both 35 days) and then traveled through the blood vessels to a different site.
- Probabilistic sensitivity analyses showed dominance in 98% of cases versus 35 days’ enoxaparin followed by placebo.
- When compared to 12 days’ enoxaparin followed by placebo, based on RECORD2, 35 days’ rivaroxaban resulted in a QALY gain of 0.0194 and savings of £24.83 per patient. This result was primarily driven by improved efficacy for the extended rivaroxaban regimen and in substantial savings in long-term complications (Table 1).
- Probabilistic sensitivity analyses showed dominance in 57% of cases versus 12 days’ enoxaparin.
- In addition, the cost-effectiveness acceptability curve (Figure 4) shows that rivaroxaban is 100% cost-effective at a threshold of less than £15,000 per QALY.
- These results demonstrate that baseline results are reliable and withstand changes to the value of key variables.

Objectives

- The aim of this study was to assess the cost-effectiveness of rivaroxaban versus enoxaparin for the prevention of VTE after THR in the UK.

Methods

- An economic model assessed the cost-effectiveness of rivaroxaban versus enoxaparin from the UK National Health Service and personal and social services perspective. 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 and post-thrombotic syndrome (PTS) from 90 days to 5 years after surgery (Figure 2).
- Event probabilities during prophylaxis were derived from RECORD1 and 2 data. The probability utilities associated with DVT and PE11 and long-term complications12 were taken from a published clinical trial.
- Resource consumption and associated costs of symptomatic events (2008 pounds [£]) were modelled as a transitory event. PTS, post-thrombotic syndrome.
- Probabilistic sensitivity analyses showed dominance in 98% of cases versus 35 days’ enoxaparin (Table 1).
- When compared to 12 days’ enoxaparin followed by placebo, based on RECORD2, 35 days’ rivaroxaban resulted in a QALY gain of 0.0194 and savings of £24.83 per patient. This result was primarily driven by improved efficacy for the extended rivaroxaban regimen and in substantial savings in long-term complications (Table 1).
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Results

- When comparing 35 days’ rivaroxaban with 35 days’ enoxaparin based on RECORD1, rivaroxaban yielded a gain of 0.004 quality-adjusted life years (QALYs) and saved £68.35 per patient. Savings were driven mainly by reduced outpatient administration costs and in savings associated with long-term complications (Table 1).

| Table 1. Cost-effectiveness of rivaroxaban versus enoxaparin after total hip replacement in the UK |
|--------------------|-----------------|-----------------|
| **Rivaroxaban**    | **Enoxaparin**  | **Incremental** |
| 35 days’ rivaroxaban versus 35 days’ enoxaparin (RECORD1) | | |
| Prophylaxis-related costs | £192.50 | £224.22 | £31.72 |
| Cost of events: 0-90 days | £21.63 | £25.93 | £4.30 |
| Cost of long-term complications | £13.28 | £35.61 | £22.32 |
| Total costs | £237.41 | £285.76 | £48.35 |
| QALYs | 3.5928 | 3.5887 | 0.0041 |
| Rivaroxaban saves £68.35 per patient and produces a gain of 0.0041 QALYs per patient |

- When comparing 35 days’ rivaroxaban versus 12 days’ enoxaparin followed by placebo (RECORD2), 35 days’ rivaroxaban reduced total VTE by 79% and symptomatic VTE by 80% versus 12 days’ enoxaparin followed by placebo. There was a similar level of major bleeding in both arms.

| Figure 3. Plot of incremental cost versus incremental quality-adjusted life years: 35 days’ rivaroxaban versus 35 days’ enoxaparin (RECORD1). The figure shows that rivaroxaban produces cost savings and QALY gains, and is thus the dominant strategy, in more than 98% of simulations versus 35 days’ enoxaparin. CUA, cost-utility analysis; QALY, quality-adjusted life year. |
|--------------------|-----------------|-----------------|
| **Rivaroxaban**    | **Enoxaparin**  | **Incremental** |
| 35 days’ rivaroxaban versus 12 days’ enoxaparin followed by placebo (RECORD2) | | |
| Prophylaxis-related costs | £183.50 | £289.58 | £106.08 |
| Cost of events: 0-90 days | £18.08 | £32.76 | £14.68 |
| Cost of long-term complications | £22.40 | £38.92 | £16.52 |
| Total costs | £223.98 | £248.82 | £24.83 |
| QALYs | 3.5996 | 3.5712 | 0.0194 |
| Rivaroxiban saves £24.83 per patient and produces a gain of 0.0194 QALYs per patient |

Conclusions

- Rivaroxaban produced gains in QALYs and is cost-saving against both 12-day and 35-day regimens of enoxaparin after THR.
- Disaggregated results show that the savings associated with long-term complications are key drivers of these overall cost savings.
- Probabilistic sensitivity analyses show that these results are robust.

References


Disclosures

- The study was supported by Bayer HealthCare and AstraZeneca. Bayer HealthCare is licensed in the US and in Canada for the prevention of VTE after major surgery. Statements on this publication do not necessarily reflect the views of the sponsor. The study was designed and sponsored by the sponsor. The authors did not support or recommend its use or the use of any other medications or treatments not included in this work.


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. Note: recurrent venous thromboembolism is modelled as a transitory event. PTS, post-thrombotic syndrome.

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