COST-EFFECTIVENESS ANALYSIS OF ROSUVASTATIN COMPARED TO ATORVASTATIN IN SPANISH PATIENTS AT MODERATE, HIGH, AND VERY HIGH CARDIOVASCULAR RISK

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INTRODUCTION

In recent years, some statin patents have expired, their generic pharmaceutical equivalents have appeared in the market along with a decrease in prices by adopting reference prices. Considering the high prevalence of cardiovascular disease (CVD) and its risk factors, an updated economic assessment is required to re-evaluate the cost-effectiveness of statins in Spain.

OBJECTIVE

We analyzed the cost-effectiveness of rosuvastatin compared to atorvastatin in the treatment of patients at moderate, high and very high cardiovascular (CV) risk (≥1% Systematic Coronary Risk Evaluation [SCORE]) from the Spanish National Healthcare System (NHS) perspective.

METHODS

Model structure

- A Markov model was developed in Microsoft Excel.
- Population: patients with SCORE cardiovascular risk ≥1%, based on gender, age, total cholesterol, blood pressure and smoking habit[1].
- Four health states were defined: patients without CV event, cerebrovascular event, coronary event and death (Figure 1).

Figure 1. Markov health states

*Acute myocardial infarction and angina pectoris
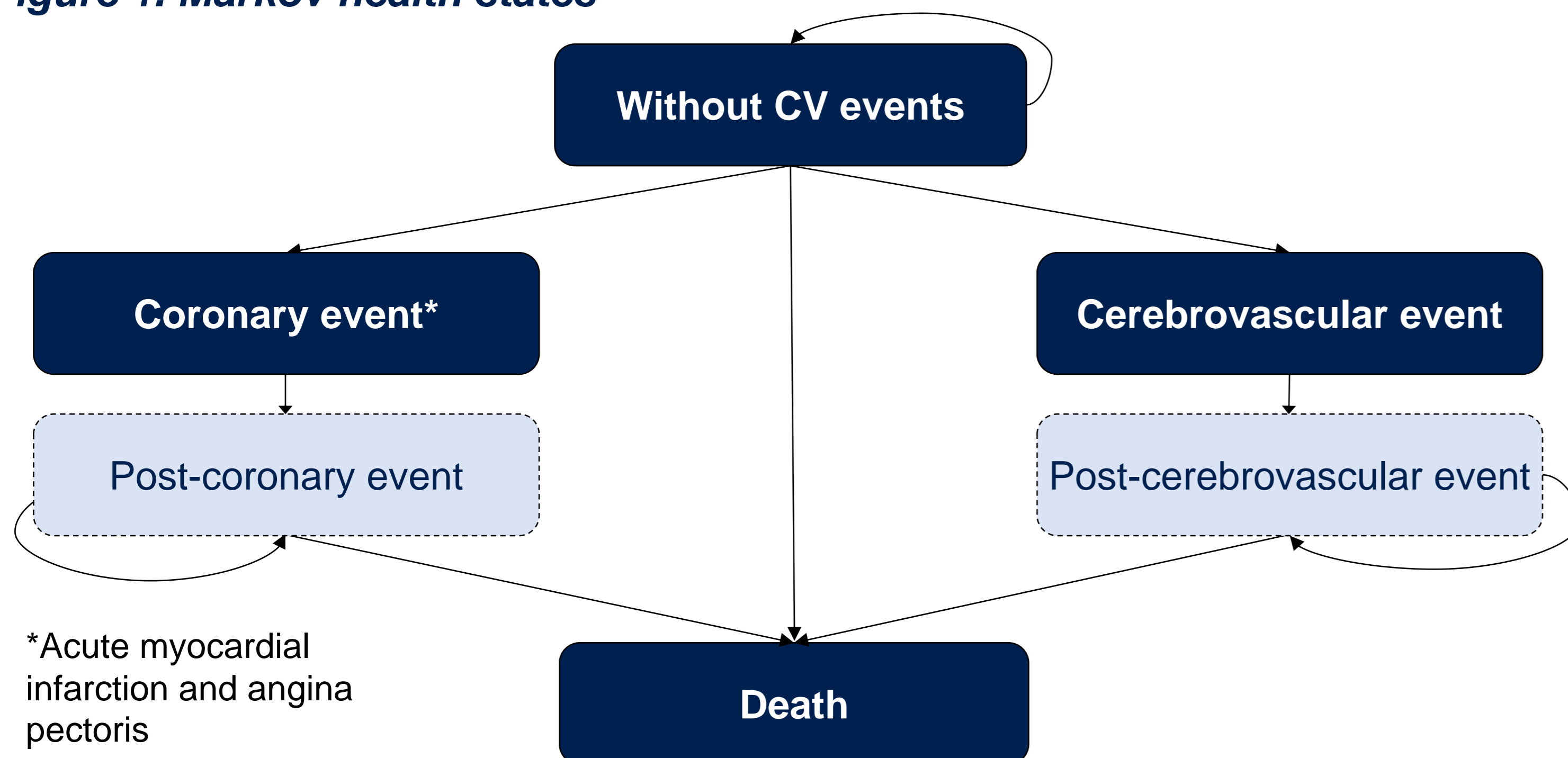
Comparators, time horizon, cycle duration and discount rates

- The highest doses of each statin intensity group were compared: rosuvastatin 10mg versus atorvastatin 20mg (moderate-intensity), and rosuvastatin 20mg versus atorvastatin 80mg (high-intensity).
- A time horizon of 25 years and an annual cycle length were considered.
- A 3% annual discount rate was used for costs and benefits[2].

Model parameters

- Risk of death from CV causes at 10 years was estimated using Spanish SCORE tables[1]. Risk of non-fatal CVD was estimated from SCORE risk of death at 10 years[1] and from European guidelines, which indicate that 1 out of 3 and 1 out of 4 CV events are fatal in men and women, respectively[3].
- CV events were distributed according to the data published in the National Statistical Institute hospital discharges survey[4] (Table 1).

Table 1. CV events distribution according to hospital discharges survey

CV event	ICD-9 code	Men (%)	Women (%)
Coronary event			
Acute myocardial infarction	410	35.6%	21.0%
Angina pectoris	413	5.2%	4.8%
Cerebrovascular event			
Cerebrovascular disease	430-438	59.2%	74.2%

- Low-density lipoprotein cholesterol (LDL-c) reduction was the efficacy measure used. For rosuvastatin 10 and 20 mg, the reduction values were 46% and 50%, respectively; for atorvastatin 20 and 80 mg, were 43 and 50%, respectively[3,5]. In addition, a 21.0% reduction in the risk of CVD (fatal and non-fatal) has been considered for each 1.0 mmol reduction of LDL-c[6].

- Utility values were associated with each health state[7]. A utility value of 1 was assumed for the patient "without CV events" and 0 for "death".

Table 2. Utility values for each health state

Health state	Event utility (1st year)	"Post-event" utility
Without CV events	1	-
Angina pectoris	0.77	0.88
Acute myocardial infarction	0.76	0.88
Cerebrovascular event	0.63	0.63
Death	0	-

- Pharmacological cost: a daily cost of €0.24 and €0.48 for rosuvastatin 10 and 20 mg, respectively; €0.21 and €0.84 and for atorvastatin 20 and 80 mg were considered. Each cost was estimated as the average of ex-factory prices of statins in the same dose (€, 2018)[8].
- Monitoring costs: an annual cost of €79.02 was associated with the follow-up of the patient treated with statins. This cost includes primary care consultations and clinical analysis[9,10].
- Costs related to CV events (event and follow-up during first and subsequent years) were obtained from the diagnosis-related groups (DRG) defined by the NHS[11]. Follow-up costs include medical consultations, pharmacological treatment and diagnostic and imaging tests. The frequency and percentage of use of these resources were defined by a group of experts.
- Unit costs were extracted from Spanish pharmacological and healthcare cost databases[8,10], respectively.

Table 3. Costs of events and follow-up (€, 2018)

Health state	Cost of event	Follow-up costs (1st year)	Follow-up costs (from 2nd year)
Acute myocardial infarction	€4,217.26	€1,166.42	€496.64
Angina pectoris	€2,862.46	€1,166.42*	€496.64*
Cerebrovascular event	€4,565.90	€287.36	€276.96
Cardiovascular death	€4,160.76	NA	NA

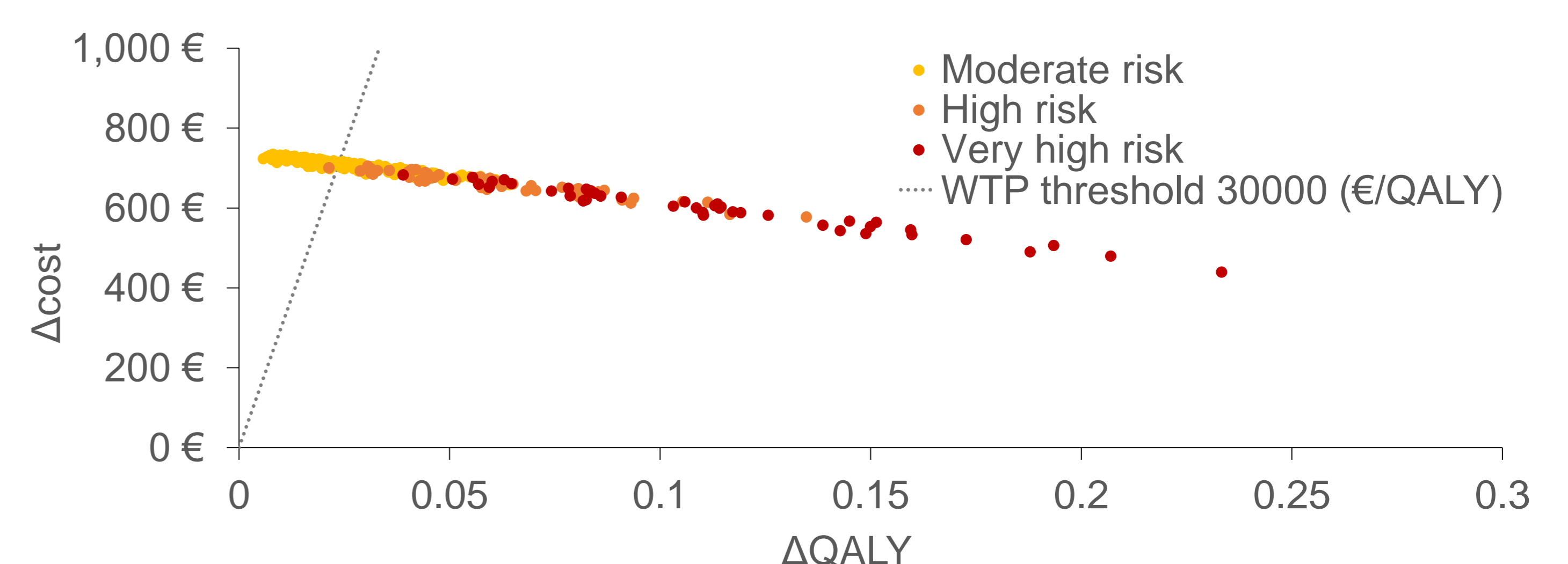**It was assumed the same cost as acute myocardial infarction. NA: not applicable*

Outcome measures

- The profiles of patients have been grouped according to the SCORE risk level: moderate (1-4%), high (5-9%) and very high (≥ 10%).
- For each risk profile, the proportion of results falling in each quadrant of the cost-effectiveness plane (dominant, dominated, cost-effective) was calculated.
- Incremental cost-effectiveness ratios (ICER) were estimated for each comparison and SCORE risk profile. A willingness-to-pay threshold of €30,000/QALY was assumed[12].

RESULTS

- 426 SCORE risk profiles were evaluated: 288 moderate, 86 high and 52 very high.
- The ICERs showed that rosuvastatin 10mg was cost-effective versus atorvastatin 20mg in 35% of the moderate profiles, the ICERs remaining were above €30,000/QALY. Most of the results of high-risk (98%) and 100% of the very high-risk profiles were cost-effective (Figure 2).
- Atorvastatin 80 mg was dominated by rosuvastatin 20mg, in all of the risk profiles assessed. Rosuvastatin was more economic than atorvastatin with an equivalent efficacy.

Figure 2. Cost-effectiveness plane of all profiles assessed with rosuvastatin 10 mg versus atorvastatin 20 mg.

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CONCLUSIONS

From the Spanish NHS perspective, and in terms of LDL-c reduction, rosuvastatin is a dominant or cost-effective alternative to atorvastatin in most SCORE risk profiles.