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

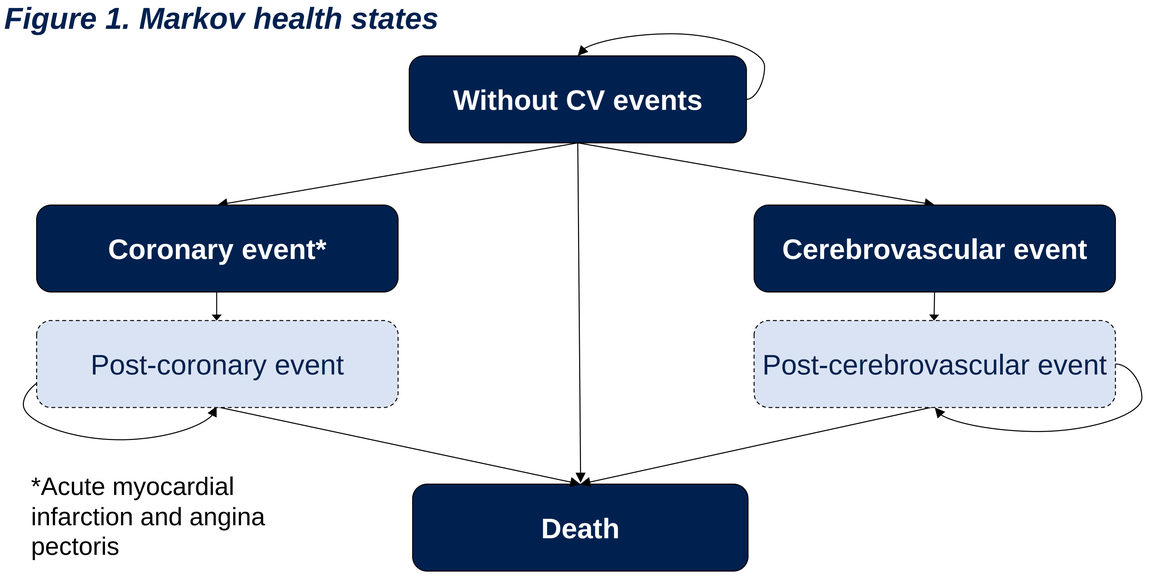
We analyzed the cost-effectiveness of rosuvastatin compared to atorvastatin in the treatment of patients at moderate, high and very high cardiovascular (CV) risk (≥1% Systematic Coronary Risk Evaluation [SCORE]) from the Spanish National Healthcare System (NHS) perspective.

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



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*

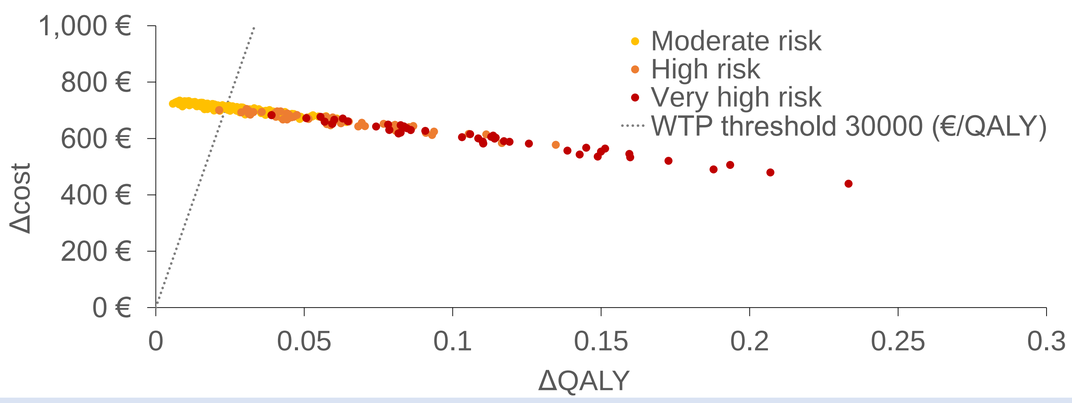
Outcome measures

- 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.



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.

Referencias: **1.** Sans S, et al. Rev Española Cardiol. 2007;60(5):476-85. **2.** López-Bastida J, et al. Eur J Heal Econ. 2010;11(5):513-20. **3.** Catapano AL, et al. 2016 ESC/EAS Guidelines for the Management of Dyslipidaemias. Vol. 37, European Heart Journal. 2016. p. 2999-3058l. **4.** Instituto Nacional de Estadística (INE). Encuesta de morbilidad hospitalaria 2015. Resultados nacionales. Altas hospitalarias según el sexo, el grupo de edad y el diagnóstico principal. 2015. **5.** Weng TC, et al. Journal of Clinical Pharmacy and Therapeutics 2010;35: 139-151. **6.** (CTT) CTT. Lancet. 2010;376(9753):1670-81. **7.** Jowett S, et al. PLoS One. 2017;12(9). **8.** Consejo General de Colegios Oficiales de Farmacéuticos. Botplusweb. **9.** Grupo de trabajo de la guía de práctica clínica sobre el manejo de los lípidos como factor de riesgo cardiovascular. Guía de Práctica Clínica sobre el manejo de los lípidos como factor de riesgo cardiovascular. 2017. (Guías de Práctica Clínica en el SNS.). **10.** Gisbert R, et al. Base de datos de costes sanitarios y ratios coste-efectividad españoles: eSalud [Internet]. Barcelona: Oblikue Consulting, S.L. **11.** Ministerio de Sanidad SS e I. Registro de Altas de los Hospitales Generales del Sistema Nacional de Salud. CMBD. Norma Estatal . Resultados según la versión 27 de los AP_GRD. 2015. **12.** Sacristán J, et al. ¿Qué es una tecnología sanitaria eficiente en España? Gac Sanit. 2002;16(4):334–43.

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