Cost-Effectiveness of Lanthanum Carbonate versus Sevelamer Hydrochloride in the Treatment of Hyperphosphatemia in End-Stage Renal Disease Patients in Spain

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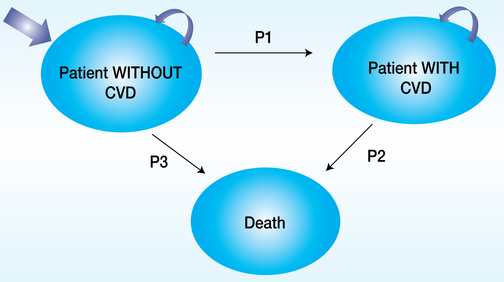
Background

- Hyperphosphataemia in patients with end-stage renal disease (ESRD) undergoing dialysis is associated with cardiovascular disease (CVD), a leading cause of death in these patients.
- Calcium-based phosphate binders are inexpensive and commonly used as first-line therapy for hyperphosphataemia, but their administration is related to an increased risk of hypercalcaemia, parathyroid hormone suppresion with risk for adynamic bone disease and vascular calcification.

Methods

- A previously developed Markov model[1] including three health states (alive without CVD, alive with CVD, death) was customized for the Spanish situation to assess the incremental cost-effectiveness ratio (ICER) of Lantanum Carbonate (LC) versus Sevelamer Hydrochloride (SH) in second-line treatment after calcium-based binders failure. (Figure 1)

Figure 1: Markov model



CVD: cardiovascular disease; P1: probability of CVD; P2: mortality after CVD; P3: general mortality ESRD disease

- This analysis was conducted from the Spanish healthcare perspective.
- CVD was defined as the weighted incidence of several cardiovascular events[2].
- Yearly transition probabilities between states[2,3] were adjusted with the relative risk related to phosphorus levels[4,5].
- Both, 'Intent-to-treat' (ITT) and 'Completer' populations from a head-to head study in dialyzed patients were assessed[6].
- Deterministic and probabilistic sensitivity analyses (PSA) were conducted.
- Effectiveness was measured in a ten year time horizon in Life Year Gained (LYG) and Quality-Adjusted Life Year Gained (QALYs).

Costs and Utilities

- Unitary costs and utilities are collected in Table 1.
- In accordance with perspective, only direct costs (pharmaceutical and CVD management) were included.
- Medical costs (2012 prices in Euros) were obtained from diagnosis-related groups[7].
- Drug costs were derived from ex-factory price (PVL)[8], adjusted with 7.5% mandatory rebate[9].
- Costs and outcomes were discounted at 3% annual rate[10].

Table 1: Unitary costs and utilities

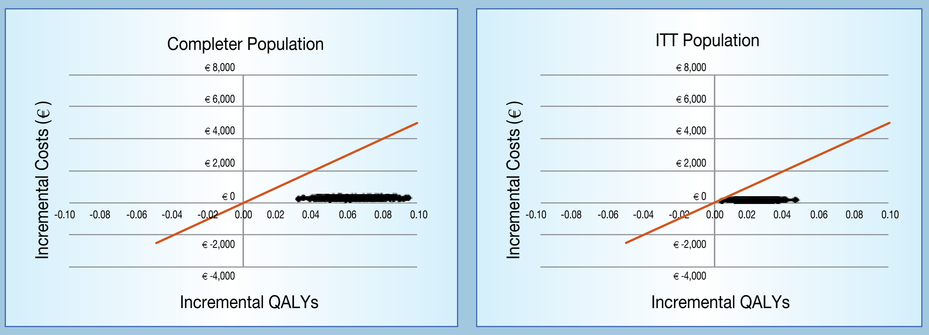
Pharmaceutical Costs[7]		(PVL-7.5% rebate)
LC (Fosrenol®)	1,000mg 90 tablets	€ 210.53
SH (Renagel®)	800mg 180 tablets	€ 157.03
CVD Costs[6]		
Myocardial Infarction	Alive	€ 5,394
	Death	€ 4,522
Congestive Heart Failure		€ 4,499
Cardiac Arrest		€ 4,142
Peripheral vascular disease		€ 2,458
Stroke		€ 3,524
Utilities		
ESRD Utility[11]		0.67
CVD Utility first year[12,13,14]		0.74
CVD Utility second year[12]		0.77

LC: Lanthanum Carbonate, SH: Sevelamer Hydrochloride, ESRD: End-Stage Renal Disease, CVD: Cardiovascular Disease

Results

- For the base-case (Table 2), ICERs of LC versus SH were €6,306/QALY (ITT) and €4,644/QALY (Completer).
- According deterministic analysis, CVD management cost was the most influential parameter in the model.
- Assuming a €30,000/QALY threshold, LC was cost-effective compared with SH in 99.9% of PSA simulations (Completer and ITT). (Figure 2)

Figure 2: Probabilistic Analysis



QALYs: Quality-Adjusted Life Years

Table 2: Base Case Results

Population	Costs		Incremental Costs	LYG	Incremental LYG	QALYs	Incremental QALYs	ICER per LYG	ICER per QALY
Completer	LC	€18,776	€293	6.13	0.11	3.84	0.06	€2,875	€4,644
	SH	€18,482		6.02		3.78			
ITT	LC	€18,680	€163	6.08	0.04	3.81	0.03	€3,902	€6,306
	SH	€18,517		6.04		3.79			

CL: Lanthanum Carbonate, SH: Sevelamer Hydrochloride, ICER: Incremental Cost-effectiveness Ratio, LYG: Life-Year Gained, QALY: Quality-Adjusted Life Year, ITT: Intention to treat

Conclusions

- In Spain, Lanthanum Carbonate is cost-effective compared with Sevelamer Hydrochloride for the second-line treatment of hyperphosphataemia in patients with End-Stage Renal Disease undergoing dialysis.

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Disclosures

This project was supported with a grant from Shire Pharmaceuticals Spain.

Emilio González, Jose A Herrero and Antonio Galán are members of an advisory board for the developement of this project.

Blanca Gros, Itziar Oyagüez and Miguel A Casado are employees of Pharmacoeconomics & Outcomes Research Iberia (PORIB) and consultants to Shire Pharmaceuticals.

Michael Keith is an employee of Shire Pharmaceuticals.

PORIB was funded by Shire Pharmaceuticals to perform the study analysis and provide writing and editorial support.

Designed by PORIB

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Presented at the 50th Annual Congress of ERA-EDTA. Istanbul, Turkey. May 18-21, 2013.