

# Cost-effectiveness of tiotropium in the treatment of patients with asthma

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## Background

- Asthma is one of the most common chronic diseases globally with an increasing prevalence and incidence<sup>1</sup>. It has a significant negative impact on health-related quality of life<sup>2,3</sup> and its associated costs are among the biggest in chronic diseases<sup>4,5</sup>.
- Alternative treatment options are limited for patients with asthma poorly controlled and recurring symptoms and exacerbations despite using inhaled corticosteroids (ICS) and inhaled long-acting  $\beta$ -agonists (LABAs) due to marginal efficacy, side effects, cumbersome routes of administration and high costs<sup>6,7</sup>.

## Objective

To assess the cost-effectiveness of tiotropium (Spiriva<sup>®</sup> RMT) in adults with poorly controlled asthma and persistent airflow obstruction who were already treated with ICS and LABAs in Spain.

## Methods

- A Markov model was developed with 7 health states, according to severity of exacerbations and asthma control, and weekly cycles (figure 1).
- The following therapeutic alternatives were considered:
  - Tiotropium bromide 5  $\mu$ g/day + Usual Care Treatment
  - Usual Care Treatment (ICS + LABAs):
    - Budesonide/formoterol fumarate dehydrate
    - Fluticasone propionate/salmeterol
- The model evaluated efficacy from randomized clinical trials<sup>8</sup> for each treatment alternative measured as quality-adjusted life years (QALYs) gained, based on utility values for each health state<sup>9,10</sup> (table 1).
- A lifetime horizon and a Spanish National Health System perspective were considered, including only direct healthcare costs (€, 2015) (table 1):
  - Pharmaceutical costs: 2-puff daily dose, based on ex-factory prices including applicable deductions<sup>11</sup>

- Management costs per health state: from literature<sup>9,12</sup> and Spanish National databases<sup>13,14</sup>
- A 3% annual discount rate was applied to both costs and health outcomes<sup>15</sup>.
- A deterministic sensitivity analysis (SA) was performed modifying discount rate and health state costs.
- Additionally, a probabilistic SA was performed for the following variables (10,000 simulations): total cost per health state, usage of rescue medication, utilities and treatment efficacy variables.

Figure 1. Markov model structure

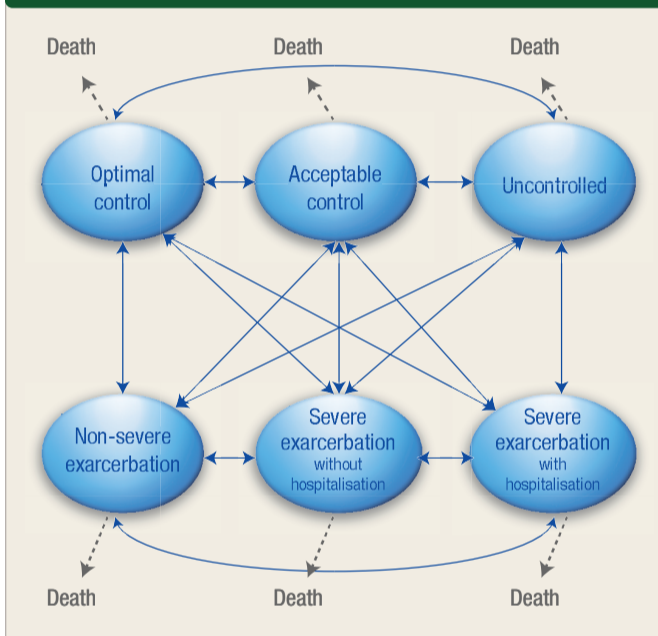


Table 1. Model parameters: pharmaceutical, health state costs and utilities

PHARMACEUTICAL COST			
Drug	Presentation	Ex-factory price with deduction	Deduction
Tiotropium bromide	Spiriva Respimat (2.5 $\mu$ g/inhalation, 30 doses)	€ 28.21	7.5%
Usual Care Treatment (high-dose ICS + LABA)	Symbicort forte Turbuhaler (320 $\mu$ g/9 $\mu$ g/inhalation)	€ 38.35	7.5%
	Seretide Accuhaler (50 $\mu$ g/100 or 250 or 500 $\mu$ g/inhalation)	€ 36.69*	15%

HEALTH STATE COSTS AND UTILITIES		
Health State	Weekly cycle cost (€, 2015) <sup>9,12</sup>	Utility value
Optimal control	€ 29.96	0.890
Acceptable control	€ 36.95	0.820
Uncontrolled	€ 90.10	0.690

Type of exacerbation	Cost per event (€, 2015) <sup>13</sup>	Utility value
Non-severe exacerbation	€ 130.31	0.649
Severe exacerbation- without hospitalisation	€ 139.87	0.570
Severe exacerbation- with hospitalisation	€ 630.66	0.330

\*Average cost estimated according to market share of presentations. IMS Health.

## Results

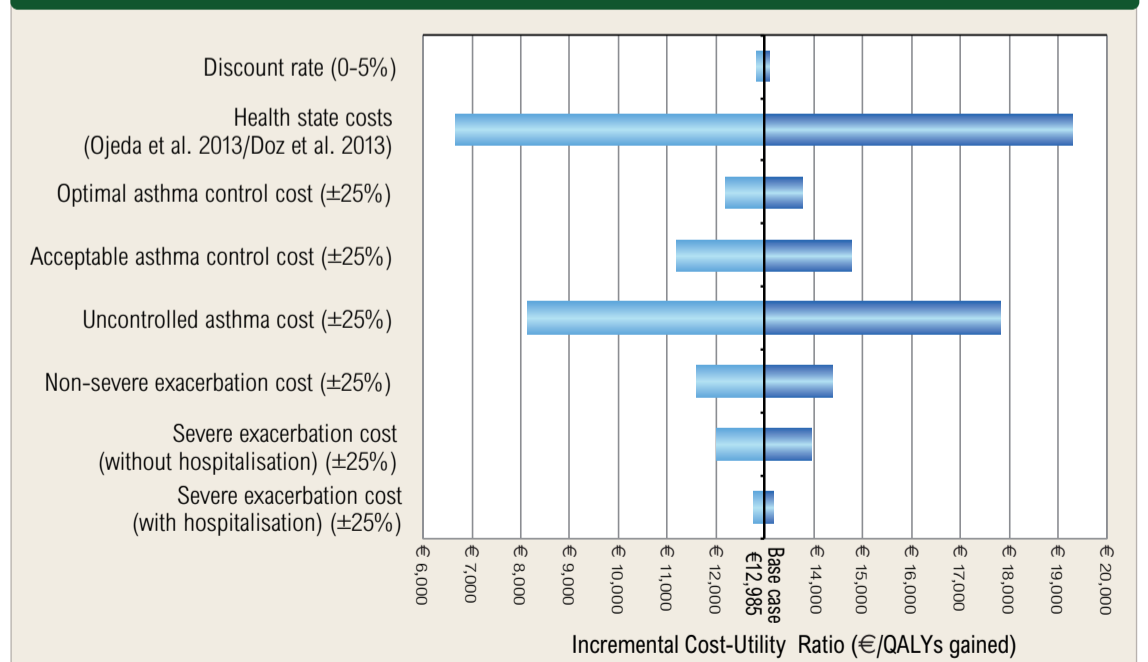
- Tiotropium plus ICS/LABAs showed a higher effectiveness (15.0 QALYs gained) than ICS/LABA (14.8 QALYs) (table 2).
- Lifetime total costs were €83,689 Tiotropium plus ICS/LABAs and €80,996 with ICS/LABAs (table 2).
- The incremental cost-utility ratio (ICUR) was €12,985/QALY gained for tiotropium as add-on treatment to ICS/LABAs versus ICS/LABAs alone.
- Deterministic and probabilistic SA results were consistent with base case scenario (figure 2).
- Tiotropium plus ICS/LABAs therapy ICUR was < €30,000/QALY in 67.5% of simulations performed (74.7% with < €45,000/QALY).

Table 2. Base case analysis

BASE CASE ANALYSIS RESULTS	Tiotropium plus ICS/LABAs	Usual Care Treatment (ICS/LABAs)	Incremental value
Total costs	€ 83,688.53	€ 80,996.26	€ 2,692.27
QALYs gained	15.00	14.79	0.21
<b>ICUR (€/QALY gained) tiotropium plus ICS/LABAS versus ICS/LABAS</b>			<b>12,985.00</b>

IC: inhaled corticosteroids; ICUR: incremental cost-utility ratio; LABAs: long-acting beta agonists; QALYs: quality-adjusted life years.

Figure 2. Deterministic Sensitivity Analysis



QALYs: quality-adjusted life years.

## Conclusions

The addition of tiotropium to usual care treatment (ICS/LABAs) could be considered a cost-effective therapeutic option for the treatment of persistent severe asthma in Spain.

## References

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