

Cost-effectiveness of a 13-valent conjugate pneumococcal vaccination program in COPD patients aged ≥50 years in Spain: preliminary results

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Introduction

- *Streptococcus pneumoniae* is a predominant cause of invasive (IPD) and non-invasive pneumococcal disease (non-IPD) responsible of high morbidity, mortality and associated costs¹.
- Comorbidities increase IPD risk and mortality. In particular, it has been reported that patients with chronic obstructive pulmonary disease (COPD) have more than four-fold increased risk of IPD².
- A 13-valent pneumococcal-conjugate vaccine (PCV13) has recently been approved for adult prevention against *S. pneumoniae*.

Objective

To estimate the clinical and economic consequences of vaccinating COPD patients aged ≥50 years with PCV13 compared to current vaccination policy (CVP), from the Spanish Healthcare System perspective.

Methods

- A microsimulation Markov model accounting for risks and costs for IPD and all-cause nonbacteremic pneumonia (NBP) was developed for a ≥50 year-old COPD population (estimated on 1.6 million patients).
- Five health states were considered: alive without pneumococcal disease, alive with IPD, alive with inpatient NBP, alive with outpatient-NBP and death.
- Pneumococcal disease related cases included both IPD (such as meningitis and bacteremia) and all-cause NBP (outpatient and inpatient).
- Model results were evaluated for each individual in the model on an annual basis, for a lifetime and five-year horizon. Clinical outcomes and costs were simulated 100 times.
- Annual incidence of IPD and NBP by age group and mortality rates, were obtained from published data (table 1).
- Serotype coverage³ and vaccines effectiveness⁴ were obtained from literature. Vaccination coverage was estimated as 66%⁵.
- A waning effect over time was applied to vaccines efficacy.
- Vaccination strategy consisted on one-time vaccination at model entry. Herd-immunity and revaccination were not considered.
- Only direct healthcare costs (disease management cost and vaccine cost) were considered. As pneumococcal vaccine was assumed to be administered with influenza vaccine, no administration costs were considered.
- Vaccine costs were calculated based on the ex-factory price¹⁰. The 7.5% mandatory rebate was applied¹¹. Unit costs (€ 2013) are shown on table 2.
- Annual discount rate of 3% was applied for both cost and health benefits.

Table 1. General inputs

		AGE GROUP			
		50-64	65-74	75-84	85-99
INCIDENCE RATES	IPD ⁶	91/100,000			
	Outpatient NBP ⁷	187.2/100,000	298.3/100,000	473.9/100,000	473.9/100,000
	Inpatient NBP ⁸	181/100,000	485/100,000	1,094/100,000	1,909/100,000
MORTALITY RATES	General population ⁹	0.51%	1.38%	4.4%	21.7%
	Patients with IPD ⁶	18.3%	32.9%		
	Patients with NBP ⁷	Inpatient: 2.5%			

Table 2. Unit costs (€ 2013)

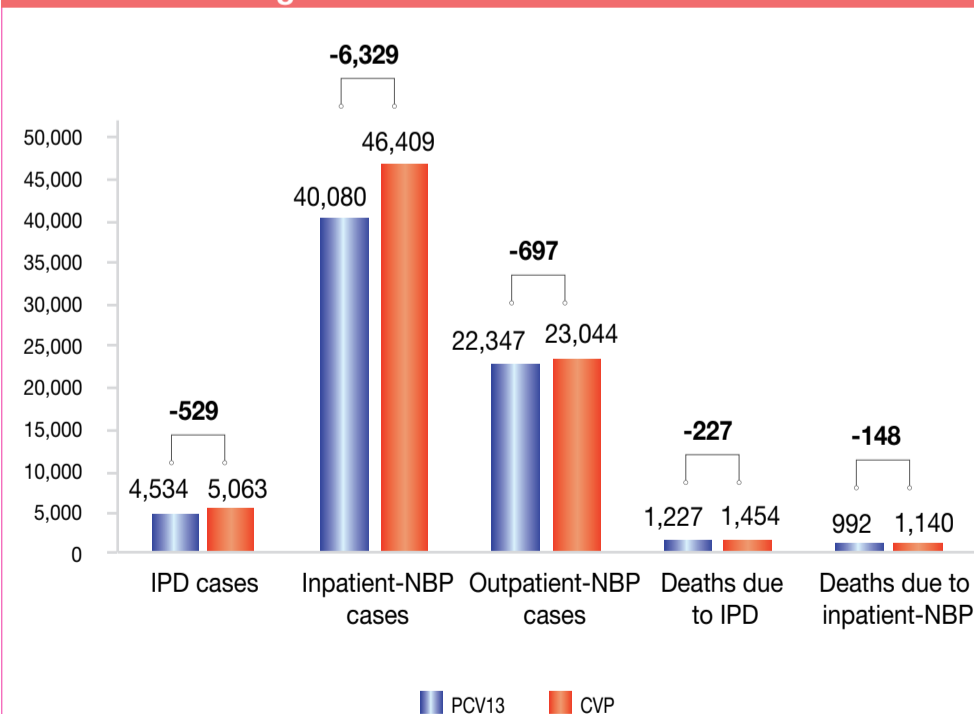
PCV13 (Prevenar 13 [®])	€45.23/prefilled syringe ¹⁰	
PPV23 (Pneumo23 [®])	€8.70/prefilled syringe ¹⁰	
Management disease costs	Outpatient NBP	€484.5 ⁷
	Inpatient NBP	€2,140.8 ⁷
	IPD	€5,555.91 ¹²

- Results were presented as disease-related cases and deaths averted and incremental cost-effectiveness ratio (ICER) in terms of cost per life-year gained (LYG) of PCV13 versus CVP using a 23-valent pneumococcal-polysaccharide vaccine.
- One-way sensitivity analyses were performed to confirm model robustness.

Results

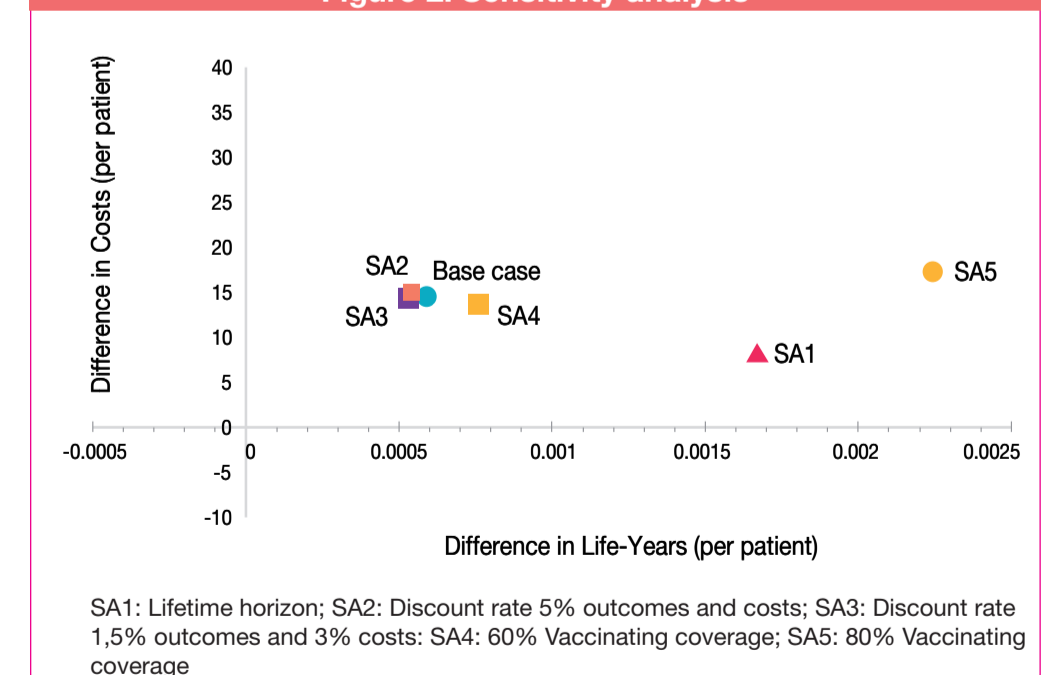
- Over a 5-year period, the use of PCV13 vs. CVP in adult COPD subjects would prevent 529 IPD cases, 6,329 inpatient-NBP cases, and 697 outpatient-NBP cases (figure 1). Additionally, 231 IPD and 148 inpatient-NBP related deaths would be averted.

Figure 1. Results: Clinical burden



- The ICER was €24,557/LYG for PCV13 vs. CVP. Based on sensitivity analyses performed, ICER ranged from €26,986/LYG (for a discount rate 5%) to €7,661/LYG (vaccination coverage 80%) (figure 2).
- For a lifetime horizon 1,271 IPD cases, 10,294 inpatient-NBP cases, and 2,072 outpatient-NBP cases would be prevented with PCV13 vs. CVP resulting an ICER of €5,030/LYG.

Figure 2. Sensitivity analysis



Conclusions

At a willingness-to-pay threshold of €30,000/LYG, PCV13 vaccination in COPD patients aged ≥50 years in Spain is a cost-effective option compared to current vaccination strategy for both, 5-year and lifetime time horizons.

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