

ECONOMIC EVALUATION OF PNEUMOCOCCAL VACCINATION -PCV13- IN ADULTS AGED OVER 65 YEARS IN CASTILLA Y LEÓN (SPAIN)

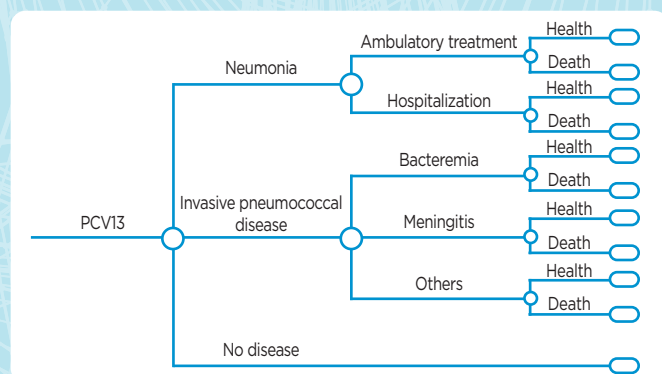
Alberto Pérez-Rubio¹, Miguel López-Gobernado², Jose María Eiros Bouza¹, Agustín Mayo Íscar²,
Hospital Clínico Universitario de Valladolid¹, Medicine University of Valladolid², Spain



INTRODUCTION

Disease caused by pneumonia in older adults presents a high burden of morbidity and mortality worldwide. Furthermore, it is one of the main causes of hospital admission. Hospitalization is increasing due to the difficulty of community care interrelated problems with reference to infectious diseases among the elderly and recovery time comprises an important factor of the total current healthcare expenditure.

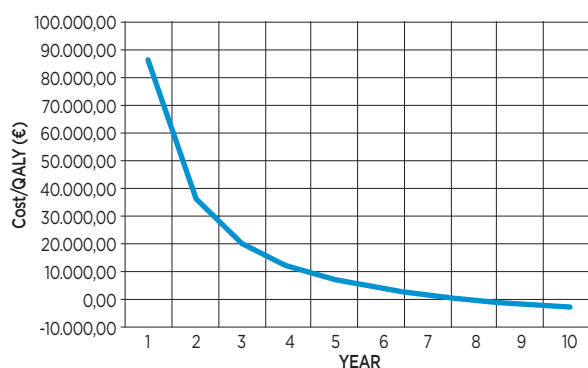
The prevention of this infection in adults by vaccination is a reality. The aim of this study is to conduct an economic evaluation of the vaccination strategy against *Streptococcus pneumoniae* using the 13-valent pneumococcal conjugate vaccine (PCV13).



SIMULATION ECONOMIC MODEL

A simulated economic model has been developed in decision tree diagram, built to evaluate the cost / effectiveness of the vaccination versus non-vaccination strategy using a Monte Carlo probabilistic analysis of 1.000 randomized samples, for all decision nodes / parameters of each alternative / each vaccination strategy of the population cohort studied.

The total number of pneumococcal pneumonias has been modeled both non-invasive (ambulatory and hospitalized) and invasive, as well as the number of expected deaths. The incidence of NID cases requiring hospitalization was retrieved from a burden of disease and incidence study performed by our group in the Area of Health Valladolid-Este during the period 2009-2014. The total cost of medical treatment for each variant of pneumococcal disease as well as total vaccination costs in the evaluated cohort. A time horizon of up to 10 years with an average coverage of 60%. The perspective chosen for the model has been that of the System Health Service, applying a discount rate for both costs and results of 5%. The efficiency of the measure has been estimated through a ratio. The variables used and its sources of information are presented in the table.



RESULTS

Streptococcus pneumoniae annually generates 557,24 cases of pneumococcal disease in the Valladolid-Este Health Area, 506.60 episodes are pneumonic. Vaccination to the age cohort over 65 years is an efficient measure from the third year, with a cost per quality-adjusted life years (QALY) of 20.496,20 euros. The number of QALYs gained in a decade is 86,07 and the expense of 216.252,89 euros with this vaccination strategy would be avoided.

Variable	Valor	Reference
Poblacion		
> 65 years	61.922	Sanitary stadisties Castilla y León 2014
Disease		
Incidence NN>65 years	9.2x1000	Own data. Valladolid 2009-2014
- Incidence NN ambulatory	39-78%	Blanques J. Sanz F. Neumonia adquirida en la comunidad. Arch Bronconeumol. 2010; 46 Suppl 7:26-30.
- Incidence NN hospital	22-61%	
Incidence Invasive Diseases >65	10.544x100.000	Epidemiologic Report Castilla y León
- Incidence Bacteremia	4.83x100.000	https://www.saludcastillayleon.es/profesionales/es/inf-epidemiologicos/informes-epidemiologicos-castilla-leon/enfermedades-declaracion-obligatoria
- Incidence Meningitis	125x100.000	Gil-Prieto R. et al. The burden of hospitalisations for community-acquired pneumonia (CAP) and pneumococcal penumonia in adults in Spain (2003-2007). Vaccine. 2011;29:412-6.
- Incidence Others (sepsis + others)	4.45x100.000	Own Data. Valladolid 2009-2014.
Letality NN ambulatory	1-5%	
Letality NN hospital	18%	
Letality	9.8%	
- Bacteremia	23.5%	Epidemiologic Report Castilla y León
- Meningitis	30.65	https://www.saludcastillayleon.es/profesionales/es/inf-epidemiologicos/informes-epidemiologicos-castilla-leon/enfermedades-declaracion-obligatoria
- Others (sepsis+others)		
Vaccine efficacy		
Efficacy NN	411-45%	Boten MJ et al. Polysaccharide Conjugate againts Pneumococcal Pneumonia in Adult. N England J Med. 2015; 372:1114-25.
Efficacy Invasive Disease	75-75.8%	
HRQoL		
QALY lost NN ambulatory	0.0045±0.00051	Mangen MJ. et al. Cost-effectiveness of adult pneumococcal conjugate vaccination in the Netherlands. Eur Respir J. 201; 46:1407-16.
QALY lost NN hospital	0.0709±0.020	
QALY lost Invasive Disease	0.0709±0.020	
Cost		
Vaccine	49.92€-4%	
Administration vaccine	+10%	
Direct Cost NN hospitalization	3.741.63±2.703.27€	Own data. Valladolid 2009-2014
Direct Cost NN ambulatory	74€	Diez-Domingo J. et al. Pharmacoeconomic assessment of implementing a universal PCV-13 vaccination programme in the Valencian public health system (Spain). Vaccine. 2011; 29:9640-8.
Cost Bacteremia	3.662€	https://pestadistico.inteligenciadegestion.mscbs.es/publicoSNS/comun/DefaultPublico.aspx
Cost Meningitis	6.930€	
Cost Others (sepsis+others)	5896±1783€	



DISCUSSION

Vaccination systematically in adults over 65 years of age is a practice that has become widespread in developed countries in recent years. Since the emergence of clinical data on the efficacy of PCV13 in adults, different economic evaluations have been carried out in the different national health systems that have identified that vaccination with PCV13 was profitable in adults and the elderly.

Different international studies have evaluated routine vaccination in a population over 65 years of age, the object of this study. Although in Spain we have not found enough evidence in this regard, dynamic transmission models have been found, which determined that the use of PCV13 in 5 years would expect to prevent 10.360 cases of pneumococcal disease in a cohort between 65 and 69 years of age, 699 deaths, with 14.736 years of life gained, which is presented as profitable for the National Health System. Different studies presented internationally show an efficiency in systematic vaccination programs.



CONCLUSION

The evaluation of the different incremental costs (QALY, euros) in the years of follow-up the program of vaccination against pneumococcus in people over 65 in Castilla y León with PCV13 is cost-effective.

	1 year	2	3	4	5	6	7	8	9	10
Avoid Costs (€)	-1.469.495,60	-1.110.155,05	-857.324,07	-635.318,38	-438.592,19	-267.388,65	-118.921,39	10.476,47	121.641,22	216.252,89
QALY (€)	17,10	30,48	42,56	52,88	61,64	68,79	74,88	79,61	83,33	86,07