

PNEUMOCOCCAL VACCINATION WITH 13-VALENT POLYSACCHARIDE CONJUGATE VACCINE FOR OLDER ADULTS WITH CHRONIC CONDITIONS: BUDGET IMPACT ANALYSIS IN COLOMBIA

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BACKGROUND

- The risk of invasive pneumococcal disease (IPD) and pneumococcal pneumonia is increased in older adults and in adults with certain chronic medical conditions.¹
- The presence of multiple underlying medical conditions further increases the risk of IPD or pneumococcal pneumonia in adults.^{1,2}
- There is substantial pneumococcal disease burden in the US adults aged 50 years and older, contributing to morbidity, mortality, and health care resource use and costs.³ In Colombia, the lack of a national surveillance and registry system does not allow establishing the true adult pneumococcal disease burden.⁴
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- 13-valent polysaccharide conjugate vaccine (PCV13) efficacy for vaccine-type pneumococcal CAP (invasive and non-invasive) in adults was established in a large, randomized, placebo-controlled trial (CAPiTA).⁵
- Adult immunization programs, especially for those aged above 50, can bring significant health and socio-economic benefits.⁶

OBJECTIVE

- To determine the budget impact of pneumococcal vaccination with PCV13 in adults 60 years of age or older with chronic conditions in Colombia.

METHODS

- A decision tree was developed comparing vaccinated adults 60 years of age or older with chronic risk conditions for pneumococcal diseases. PCV13 was compared with no vaccination.
- A hypothetical cohort of 25,000 people was considered. Age distribution was estimated according to the information obtained from the National Administrative Department of Statistics (DANE) for 2021.⁷
- The age-specific annual rates for outpatient and inpatient pneumonia, meningitis, bacteremia caused by *Streptococcus pneumoniae* were extracted from the literature for patients with chronic obstructive pulmonary diseases (COPD), diabetes, cardiovascular diseases, and cancer.⁸⁻¹¹

Table 1. Annual incidence of pneumococcal disease per 100 000

	Incidence
Outpatient pneumonia	715
Inpatient pneumonia	250 – 516
Meningitis	6 – 16
Bacteremia	99 – 53.64

- Subgroup analysis was conducted for relevant risk group. The frequency of the medical conditions considering of the model was based on the national report.¹²⁻¹³

Table 2. Probability of risk factors by age group

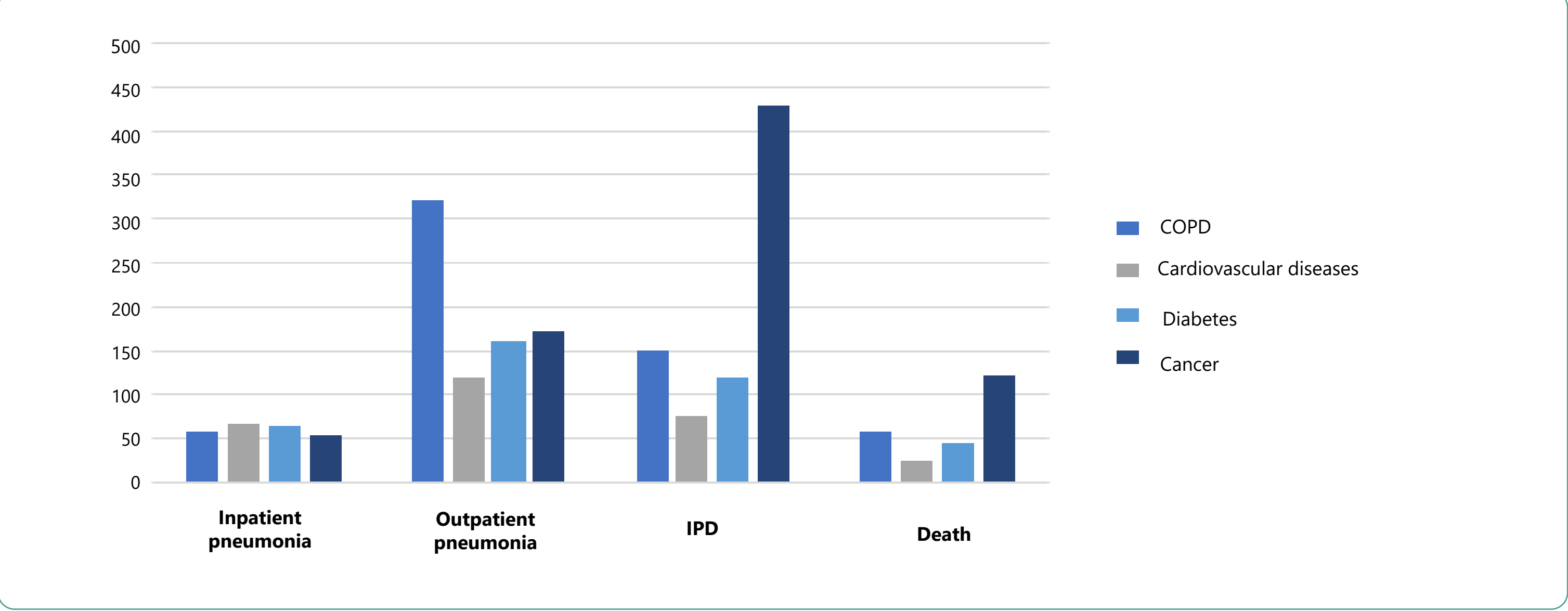
	60-69 years	70-79 years	≥80 years
COPD	11.5%	11.5%	11.5%
Diabetes	0.8%	0.8%	0.8%
Cardiovascular diseases	14.7%	14.7%	14.7%
Cancer	17.4%	20.2%	23.8%

- The effectiveness of PCV13 were estimated from the clinical trial CAPiTA: Community-acquired pneumonia 5.1%, Confirmed pneumococcal community-acquired pneumonia 30,6% and IPD 51,8%.⁵
- The health care resources of the events were obtained for published national study¹⁴ and the cost of vaccine dose was estimated from the January to March 2021 reports of the Drug Price Information System (SISMED).¹⁵
- Time horizon in the analysis was 10 years. The cost and events were discount with annual rate of 3%. The exchange rate used was 3 600 Colombian pesos/1 USD.¹⁶

RESULTS

- The cases between clinical conditions were different. In a case of the whole cohort were underling one condition, the observed cases in persons COPD were substantially higher in outpatient pneumonia than other high-risk conditions and in cancer for bacteremia (Figure 1).

Figure 1. Number of pneumococcal cases and death averted by clinical manifestation and risk groups



- In total cohort, PCV13 prevent 185 cases of inpatient pneumonia, 63 cases of outpatient pneumonia, 118 cases of invasive pneumococcal diseases and 41 deaths compared to no vaccination.

- The savings associated to medical care would be 771.114 USD characterized mainly by inpatient pneumonia and bacteremia.

Table 3. Savings in cumulative medical costs by type of event

	Outpatient pneumonia	Inpatient pneumonia	Bacteremia	Meningitis	TOTAL
1	\$ 779	\$ 32,709	\$ 69,788	\$ 1,145	\$ 104,422
2	\$ 1,481	\$ 63,073	\$ 134,721	\$ 2,211	\$ 201,486
3	\$ 2,112	\$ 91,272	\$ 195,160	\$ 3,203	\$ 291,747
4	\$ 2,681	\$ 117,471	\$ 251,436	\$ 4,127	\$ 375,714
5	\$ 3,193	\$ 141,821	\$ 303,855	\$ 4,987	\$ 453,856
6	\$ 3,654	\$ 164,463	\$ 352,697	\$ 5,789	\$ 526,602
7	\$ 4,068	\$ 185,523	\$ 398,223	\$ 6,536	\$ 594,350
8	\$ 4,442	\$ 205,120	\$ 440,670	\$ 7,233	\$ 657,465
9	\$ 4,778	\$ 223,361	\$ 480,260	\$ 7,883	\$ 716,282
10	\$ 5,081	\$ 240,347	\$ 517,196	\$ 8,489	\$ 771,114

- The vaccination cost may vary 500.000 and 875.000 USD. The net savings would be 83.614 USD which can vary according to the price of the vaccine in the cohort. The highest return on investment is were obtained in COPD patients due to the high risk of invasive pneumococcal disease and pneumonia.

CONCLUSION

PCV13 immunization is most likely to lead substantial cost savings in the following 10 years after vaccination with high impact in the public health

REFERENCES

1. Pelton SI, et al. Relative rates of pneumococcal disease are disproportionately high in adults with multiple chronic medical conditions. Presented at ISPPD-9 / pneumonia. 2014 Mar9-13:3:1-286. 2. Shea KM, et al. Rates of Pneumococcal Disease in Adults with Chronic Medical Conditions. Open Forum Infect Dis. 2014 May 27;1(1):ofu024. doi: 10.1093/ofid/ofu024. eCollection 2014 Mar. 3. Talbird, S. E., La, E. M., Carrico, J., Poston, S., Poirrier, J. E., DeMartino, J. K., & Hoge, C. S. Impact of population aging on the burden of vaccine-preventable diseases among older adults in the United States. Human vaccines & immunotherapeutics. 2021. 17(2). 332-343. 4. Montúfar, F. E., Varón, F. A., Giraldo, L. F., Sáenz, Ó. A., Rodríguez, A., Alarcón, A. M., & Londoño, N. 2013. Recomendaciones para el diagnóstico, tratamiento y prevención de la neumonía adquirida en la comunidad en adultos inmunocompetentes. Infectio. 17(15). 5. Bonten MJM, Huijts SM, Bolkenbaas M, Webber C, Patterson S, Gault S, et al. Polysaccharide conjugate vaccine against pneumococcal pneumonia in adults. N Engl J Med. 2015 Mar;372(12):1114–25. 6. Immunisation, S. A. A. T. 2018. Adult vaccination: a key component of healthy ageing. The benefits of life-course immunisation in Europe. 7. Departamento Administrativo Nacional de Estadística (DANE). Estimaciones y Proyecciones de Población. 2021. 8. Ochoa-Gondar O, Vila-Corcoles A, Ansa X, Rodriguez-Blanco T, Salsench E, de Diego C, et al. Effectiveness of pneumococcal vaccination in older adults with chronic respiratory diseases: Results of the EVAN-65 study. Vaccine [Internet]. 2008 Apr 7 [cited 2021 Aug 8];26(16):1955–62. Available from: <https://www.sciencedirect.com/science/article/pii/S0264410X08001631?via%3Dihub>. 9. Shea KM, Edelsberg J, Weycker D, Farkouh RA, Strutton DR, Pelton SI. Rates of pneumococcal disease in adults with chronic medical conditions. Open forum Infect Dis [Internet]. 2014 Mar [cited 2021 Aug 8];1(1):ofu024. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25734097>. 10. Kyaw MH, Rose, Jr. CE, Fry AM, Singleton JA, Moore Z, Zell ER, et al. The Influence of Chronic Illnesses on the Incidence of Invasive Pneumococcal Disease in Adults. J Infect Dis [Internet]. 2005 Aug 1 [cited 2021 Aug 8];192(3):377–86. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/1595950>. 11. Gil-Prieto, R., Pascual-García R, Walter S, Alvaro-Meca A, Gil-De-Miguel Á. Risk of hospitalization due to pneumococcal disease in adults in Spain: The CORiNE study. Hum Vaccin Immunother [Internet]. 2016 Feb 22 [cited 2021 Sep 12];1–6. Available from: <http://www.tandfonline.com/doi/full/10.1080/21645515.2016.1143577>. 12. Lenis, Delia Ortega; Mendez F. Encuesta de salud, bienestar y envejecimiento sabe Colombia 2015. 2015. 13. Cuenta Alto Costo. Situación del cáncer en la población adulta atendida en el SGSSS en Colombia. 2018. 14. Ordóñez JE, Orozco JJ. Cost-effectiveness analysis of pneumococcal conjugate vaccine 13- valent in older adults in Colombia. BMC Infect Dis. 2014 Mar;14:172. 15. Sistema Integral de Información de la Protección Social, SISPRO- Sistema de Información de Precios de Medicamentos, SISMED. [cited 2021 Sep 19]. Available from: <http://www2.sispro.gov.co/Paginas/Publicaciones.aspx>. 16. Central Bank of Colombia. Market representative exchange rate [Internet]; 2019. [cited 2021 Jan 19]. Available from: <http://www.banrep.gov.co/es/-estadisticas>.

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