



Studies on Pneumococcal vaccines in Colombia

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- Introduction Processes for pneumococcal vaccines.
- Burden of disease before vaccine introduction.
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Introduction



- Colombia introduced pneumococcal conjugate vaccines (PCV) in 2007.
- Heptavalent (7v) was used first and then changed to decavalent (10v)
- Initially, PCV7 targeted geographical areas with high infant mortality rate.
- In 2012, 10v vaccine was universally adopted for newborns all around the country

Introduction process



- Studies conducted:
 - Several economical and epidemiological analysis were carried out before a decision was made.
 - The first one was conducted in 2008 focusing on the use of the 7v.
 - The second one was conducted in 2010 estimating the economical and epidemiological impact of the 13v, 10v, and 7v.

Introduction process

- Burden of disease before vaccine introduction:

Vaccine 30 (2012) 1936–1943



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Contents lists available at SciVerse ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Cost-effectiveness of pneumococcal conjugate vaccines of 7, 10, and 13 valences in Colombian children

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Burden of disease before vaccine introduction.

Children < 2 years.

Events	No vaccination (NV)
AOM	767,133 (701,326–812,796)
Outpatient RX pneumonias	17,548 (14,670–24,020)
Inpatient RX pneumonias	31,197 (26,080–42,702)
Pneumococcal meningitis	464 (380–633)
Deaths by outpatient pneumonia	526 (293–1441)
Deaths by inpatient pneumonia	936 (522–2562)
Deaths by meningitis	172 (125–342)
Total deaths	1634 (940–4345)
YLL by Pneumonias	107,519 (59,922–294,351)
YLL by Meningitis	12,619 (9209–25,115)
Total YLL	120,138 (69,130–319,465)

Burden of disease before vaccine introduction. Children < 2 years.

Cost	No vaccination
Vaccination's costs	US\$ 0
AOM's cost	US\$ 94,295,343 (US\$ 68,965,093–119,889,796)
RX pneumonias' cost	US\$ 38,503,110 (US\$ 25,750,079–63,243,236)
Pneumococcal meningitis' cost	US\$ 666,000 (US\$ 435,928–1,089,844)
Total cost (included vaccination)	US\$ 133,464,453 (US\$ 95,151,100–184,222,876)
YLL (discounted)	44,911 (13,429–319,465)
Cost (discounted)	US\$ 124,421,317 (US\$ 82,464,435–184,222,876)

Impact of 7v pneumococcal vaccine introduction in Bogota

Vaccine 31 (2013) 4033–4038



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Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Changes in *Streptococcus pneumoniae* serotype distribution in invasive disease and nasopharyngeal carriage after the heptavalent pneumococcal conjugate vaccine introduction in Bogotá, Colombia[☆]

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Impact of 7v pneumococcal vaccine introduction in Bogota

- Cross sectional surveys before and after 7v vaccine universal introduction in Bogota.
- Children < 2 years
- Nasopharyngeal swabs to detect *S pneumoniae* carriers.
- First survey May 2005 - November 2005 (n=246). Prevacine
- Second survey June 2011- November 2011 (n=197).
Postvaccine

Impact of 7v pneumococcal vaccine introduction in Bogota

- Analysis of serotype distribution among invasive isolates of *S pneumoniae* collected from national surveillance by the Colombian National Institute of Health.
- 2005-2009. Prevaccination period
- 2010-2011. Postvaccination period.

Impact of 7v pneumococcal vaccine introduction.

Table 2

Frequency of PCV and non-PCV serotypes found in carriage and IPD in children.

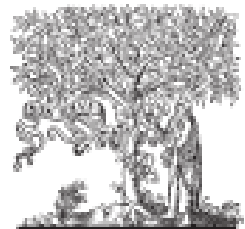
Serotypes	NP Carriage		<i>P</i>	IPD		<i>P</i>
	Unvaccinated	Vaccinated		2005/09	2010/11	
	<i>n</i> - 246	<i>n</i> - 197		<i>n</i> - 340	<i>n</i> - 84	
	<i>n</i> (%)			<i>n</i> (%)		
PCV7						
4	2 (0.8)	0	-	5 (1.5)	1 (1.2)	0.66
6B	12 (4.9)	2 (1.0)	0.02	26 (7.6)	4 (4.8)	0.49
9V	0	0	0	8 (2.4)	2 (2.4)	0.62
14	9 (3.7)	3 (1.5)	0.16	163 (48)	14 (16.7)	<0.001
18C	3 (1.2)	2 (1.0)	0.83	11 (3.2)	5 (6.0)	0.19
19F	25 (10.2)	3 (1.5)	<0.01	13 (3.8)	2 (2.4)	0.40
23F	7 (2.8)	5 (2.5)	0.84	9 (2.6)	4 (4.8)	0.24
All PCV7	58 (23.6)	15 (7.5)	<0.001	235 (69.1)	32 (38)	<0.001

Table 2

Frequency of PCV and non-PCV serotypes found in carriage and IPD in children.

Serotypes	NP Carriage		<i>P</i>	IPD		<i>P</i>
	Unvaccinated <i>n</i> - 246 <i>n</i> (%)	Vaccinated <i>n</i> - 197		2005/09 <i>n</i> - 340 <i>n</i> (%)	2010/11 <i>n</i> - 84	
PCV13						
3	1 (0.4)	1 (0.5)		6 (1.8)	12 (14.3)	<0.001
6A	23 (9.3)	6 (3.0)	<0.001	16 (4.7)	1 (1.2)	0.12
19A	3 (1.2)	3 (1.5)	0.78	10 (2.9)	5 (6.0)	0.15
6A/B	1 (0.4)	2 (1.0)		0	0	-
All PCV13	86 (34.9)	27 (13.5)	<0.001	304 (89.4)	59 (70.2)	0.002
Non-PCV						
All Non-PCV	59 (24.0)	67 (34.0)		38 (8.2)	25 (29.8)	<0.001

Effectiveness of 7v on clinical outcomes



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Procedia in Vaccinology 6 (2012) 150 – 155

**Procedia in
Vaccinology**

www.elsevier.com/locate/procedia

5th Vaccine and ISV Global Annual Congress

Evaluating the effectiveness of conjugated pneumococcal vaccines in Colombia

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Effectiveness of 7v on clinical outcomes

- Retrospective cohort study among children <2 years vaccinated in the private market.
- Cohort ensambled before 7v vaccine was available in EPI.
- Cross comparation between:
 - children with complete 7v vaccination schedule
 - VS
 - children not vaccinated.

Effectiveness of 7v on clinical outcomes

- 2631 children < 2 years affiliated to a major Health Management Organization (HMO-EPS in Spanish)
- Outcomes:
 - Hospitalization due to acute respiratory infections (bronchitis, bronchiolitis, and pneumonia).
 - Hospitalization due to sepsis or meningitis
 - Hospitalization due to otitis media.

Effectiveness of 7v on clinical outcomes

- Vaccine Effectiveness was adjusted by:
 - Age
 - Sex
 - Previous hospitalization.
 - Economical level

Effectiveness of 7v on clinical outcomes

- Results:

- 877 children vaccinated
- 1,754 children unvaccinated
- 42 children hospitalized among vaccinated
- 114 children hospitalized among unvaccinated.

Effectiveness of 7v on clinical outcomes

- Results:

- 877 children vaccinated. 42 hospitalized during follow up
- 1,754 children unvaccinated. 114 hospitalized during follow up.
- Hazard Ratio (HR)=0.58 (0.41-0.82) for all hospitalization.
- 42% effectiveness against hospitalization.

Effectiveness of 7v on clinical outcomes

- Results:
 - Hazard Ratio (HR)=0.51 (0.31-0.85) for pneumonia hospitalization.
 - 49% effectiveness against pneumonia hospitalization.

Effectiveness of 7v on clinical outcomes

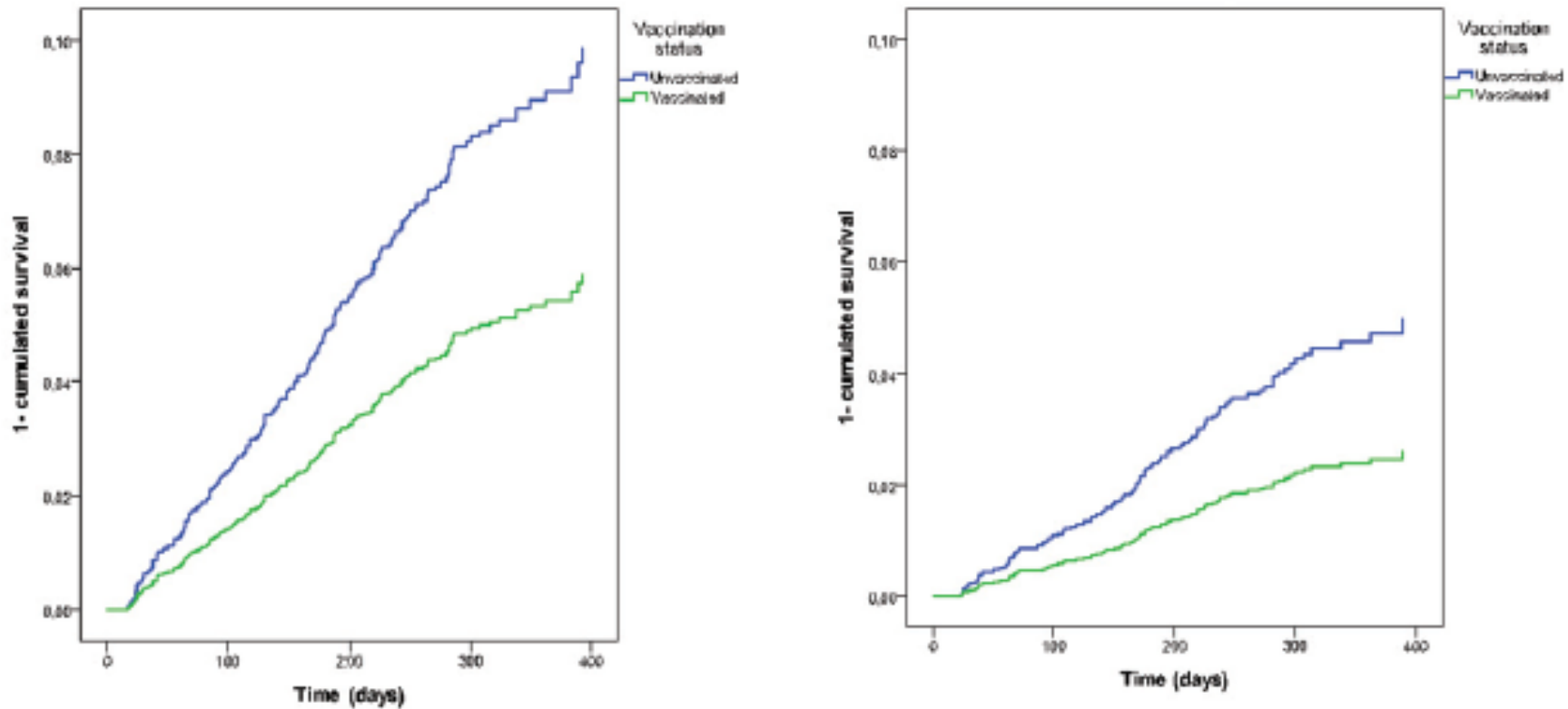


Fig. 1. (a) Function of survival for all events potentially related with infection by *Streptococcus pneumoniae*. (b) Function of survival for pneumonia admission.

Effectiveness of 10v on clinical outcomes in Colombia



- Case control study conducted in 2013 and 2014:
 - MOH
 - CDC
 - PAHO
- Cases: patients with invasive disease by *S pneumoniae* confirmed by isolate from sterile sites.

Effectiveness of 10v on clinical outcomes in Colombia



- Controls: 4 Healthy children per case.
- Controls selected from the same communities than cases.
- 32 cases and 132 controles were identified.
- Meningitis (n=12), neumonía (n=11), sepsis (n=9).

Effectiveness of 10v on clinical outcomes in Colombia



- 21 cases had serotypes contained in PCV10.
 - 23F. N=6
 - 14. N=4
 - 19F. N=4
- Frequency of vaccination was similar for cases and controls:
 - 94% cases
 - 95% controls

Effectiveness of 10v on clinical outcomes in Colombia



- However, timely vaccination with PCV10 was more frequent among controls:
 - 25% among cases.
 - 45% among controls.
 - OR=0.16 (0,05-0,5)

Surveillance of serotypes changes after vaccine introduction.



RED NEUMOCOLOMBIA

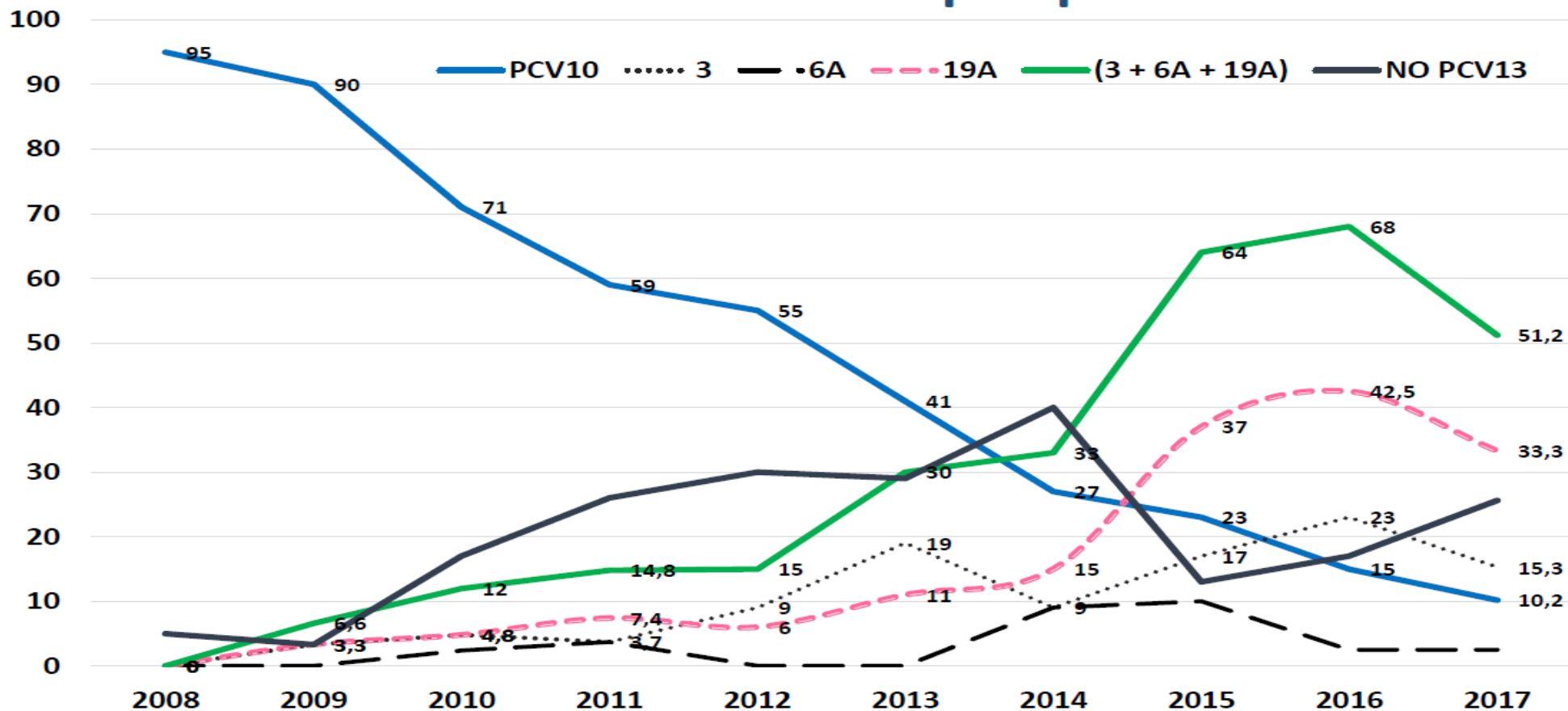


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Surveillance of serotypes changes after vaccine introduction.

Tendencia de serotipos por año



Conclusions

- Colombia has successfully introduced PCV7 first and PCV10 lately.
- Both vaccines have had an impact on distribution of serotypes, carriage and invasive disease.
- Effectiveness against clinical outcomes have been demonstrated for both of them.
- Changes in the distribution of serotypes have been demonstrated after PCV7 and PCV10 introduction.
- Still, efforts to improve opportune access to timely vaccination should be reinforced.

Conclusions

- Potential Research questions:
 - How ecological changes on decrease of mortality on respiratory diseases can be attributed to pneumococcal vaccine alone or to a compound of actions including other vaccines introduction?
 - What is the efficacy of PCV10 in older adults?
 - Changes in serotype 19 A are permanent? Cyclic?
 - Is really outside there an effectiveness of PCV10 on 19^a invasive infections?

Gracias-Thanks

