Burden of Clinical Syndromes Associated with Pneumococcal Disease in Peru: A 2019 Perspective

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Introduction

- Pneumococcal disease (PD) is a significant cause of illness and death globally, resulting from infection with *Streptococcus pneumoniae*. Certain groups, such as young children, older adults, and individuals with chronic or immunosuppressive conditions, are at higher risk for PD.[1,2]
- PD can be prevented through vaccination, and in Peru, the National Immunization Program (NIP) has been offering pneumococcal conjugate vaccine to infants since 2010, as well as to adults over 60 years old since 2018.[3,4]
- However, limited contemporary data is available on the clinical and economic impact of PD in Peru. Therefore, the purpose of this study was to estimate the burden of clinical syndromes associated with PD in Peru in the pre-pandemic year (2019).

Methods

- This was a retrospective study using local inpatient and outpatient databases from the Peruvian Ministry of Health (~60% of population coverage).
- Clinical syndromes associated with PD [pneumonia, bacteremia/sepsis, and acute otitis media (AOM)] were identified through selected specific and non-specific ICD-10 codes (**Table 1**).
- Data on inpatient and outpatient cases of these clinical syndromes associated with PD were obtained from the databases. Incidence rates were calculated per 100,000 inhabitants and stratified by age group.
- Case fatality rates (CFR) were calculated as the number of inpatient cases of pneumonia and IPD that resulted in death, divided by the number of inpatient cases.
- AOM was considered only for children under 5 years old. In Peru, older adults were defined as those with 60 years of age and older.

Table 1. ICD-10 codes used for clinical syndromes associated with pneumococcal disease.

Diagnostic category	ICD 10 codes
Pneumonia	J13, J15-J18
Bacteremia/Sepsis	A40, A49
Acute otitis media	H65-67, H70, H73

Results

- In both the inpatient and outpatient databases, most of the ICD-10 codes (>98%) were unspecific diagnosis codes regarding the etiologic agent.
- In 2019, 48,860 pneumonia cases (19,230 inpatient and 29,630 outpatient) and 4,632 bacteremia cases were reported in all age groups.
- For AOM, 176 inpatient and 21,872 outpatient visits were reported in children <5 years.
- The most affected age groups for clinical syndromes associated with PD were infants <1 year, children 1-4 years, and adults ≥60 years (**Table 2**).
- For inpatient pneumonia, the CFR increased with increasing age from 1.6% in infants <1 year to 16.9% in older adults (**Table 3**).
- In infants <1 year:
  - ✓ Inpatient pneumonia had the highest incidence rate (664.5 cases per 100,000 inhabitants), followed by outpatient pneumonia (627.5 cases/100,000) and outpatient otitis media (611.7 cases/100,000).
  - ✓ Represented 19.3% of inpatient pneumonia and 11% of bacteremia cases
- For children 1-4 years:
  - ✓ The highest disease burden was observed for outpatient AOM, followed by outpatient pneumonia
  - ✓ Along with infants <1 year, represented 44% of inpatient pneumonia cases and 17% of bacteremia cases
- In adults ≥60 years:
  - ✓ Outpatient pneumonia had the highest incidence rate per 100.000 population (290.8 cases), followed by inpatient pneumonia (195.5 cases) and bacteremia (70.4 cases)
  - ✓ The in-hospital case-fatality rate was higher compared to the overall population for pneumonia (16.8% vs 7.6%) and bacteremia (60.4% vs 47.9%)
  - ✓ Represented 34% of inpatient hospitalizations and 71% of the total deaths caused by pneumonia and bacteremia.

Table 2. Cases, inpatient rates, and outpatient rates of clinical syndromes associated with pneumococcal disease by age group in Peru, 2019

	Inpatient pneumonia		Outpatient pneumonia		Bacteremia		Inpatient AOM		Outpatient AOM	
	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*	Cases	Rate*
All ages	19,230	59.2	29,630		4,632	14.3	176	6.3	21,872	780.1
<1 y	3,718	664.5	3,511	627.5	523	93.5	64	11.4	3,423	611.8
1-4 y	4,820	214.8	6,400	285.2	290	12.9	112	5	18,449	822
5-19 y	1,776	20.5	3,541	40.9	237	2.7	–	–	–	–
20-49 y	1,343	9.2	3,913	26.9	704	4.8	–	–	–	–
50-59 y	790	26.2	2,185	72.3	432	14.3	–	–	–	–
≥60 y	6,776	195.5	10,080	290.8	2,441	70.4	–	–	–	–

AOM, acute otitis media; * Incidence rates were calculated per 100,000 inhabitants

Table 3. Deaths and case fatality rates due to pneumonia and bacteremia by age group, Peru, 2019.

	Inpatient Pneumonia		Bacteremia	
	Deaths (n)	CFR (%)	Deaths (n)	CFR(%)
All ages	1,453	7.6	2,220	47.9
< 1 y	61	1.6	98	18.7
1-4 y	20	0.4	55	19.0
5-7 y	24	0.4	60	25.3
18-49 y	101	7.5	301	42.8
50-59 y	105	13.3	232	53.7
≥60 y	1,142	16.9	1,474	60.4

Limitations

- Databases utilized in this study lack information regarding comorbid risk conditions. Therefore, it was not feasible to assess other high-risk populations for pneumococcal disease beyond the age-based groups such as children under 5 years and adults over 60 years
- As a result of the lack of specificity in many of the ICD-10 codes utilized in this study, it is advisable to apply *S. pneumoniae* attributable fraction for the identified clinical syndromes to estimate more accuracy specific-PD rates. Existing literature suggests that the estimated rates for the attributable fraction of *S. pneumoniae* vary depending on clinical syndrome, age group, magnitude of vaccinated population and diagnostic techniques, ranging from 6% to 27%.[5-7]

Conclusion

- In 2019, the burden of clinical syndromes associated with PD in Peru was significant, particularly affecting children <5 years of age and older adults.
- Strengthening immunization strategies by enhancing vaccine uptake and coverage for the main serotypes causing IPD holds the potential to reduce the burden of pneumococcal disease within these vulnerable populations.

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