

# Serotype distribution among *Streptococcus pneumoniae* isolates in Puerto Rico

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## Background

Pneumococcal diseases (PD) are vaccine-preventable conditions caused by *Streptococcus pneumoniae*. Despite the availability of pneumococcal conjugate vaccines (PCV) and pneumococcal polysaccharide vaccine (PPSV23) developed to cover the most prevalent pneumococcal serotypes, PDs continue to be an important cause of morbidity and mortality worldwide. The information about the distribution of pneumococcal serotypes in Puerto Rico is limited.

## Objectives

### Primary objectives

- To determine the serotype distribution of *S pneumoniae* isolates obtained from normally sterile and nonsterile sites in participating hospitals in Puerto Rico
- To describe the study population demographic characteristics associated with *S pneumoniae* serotypes

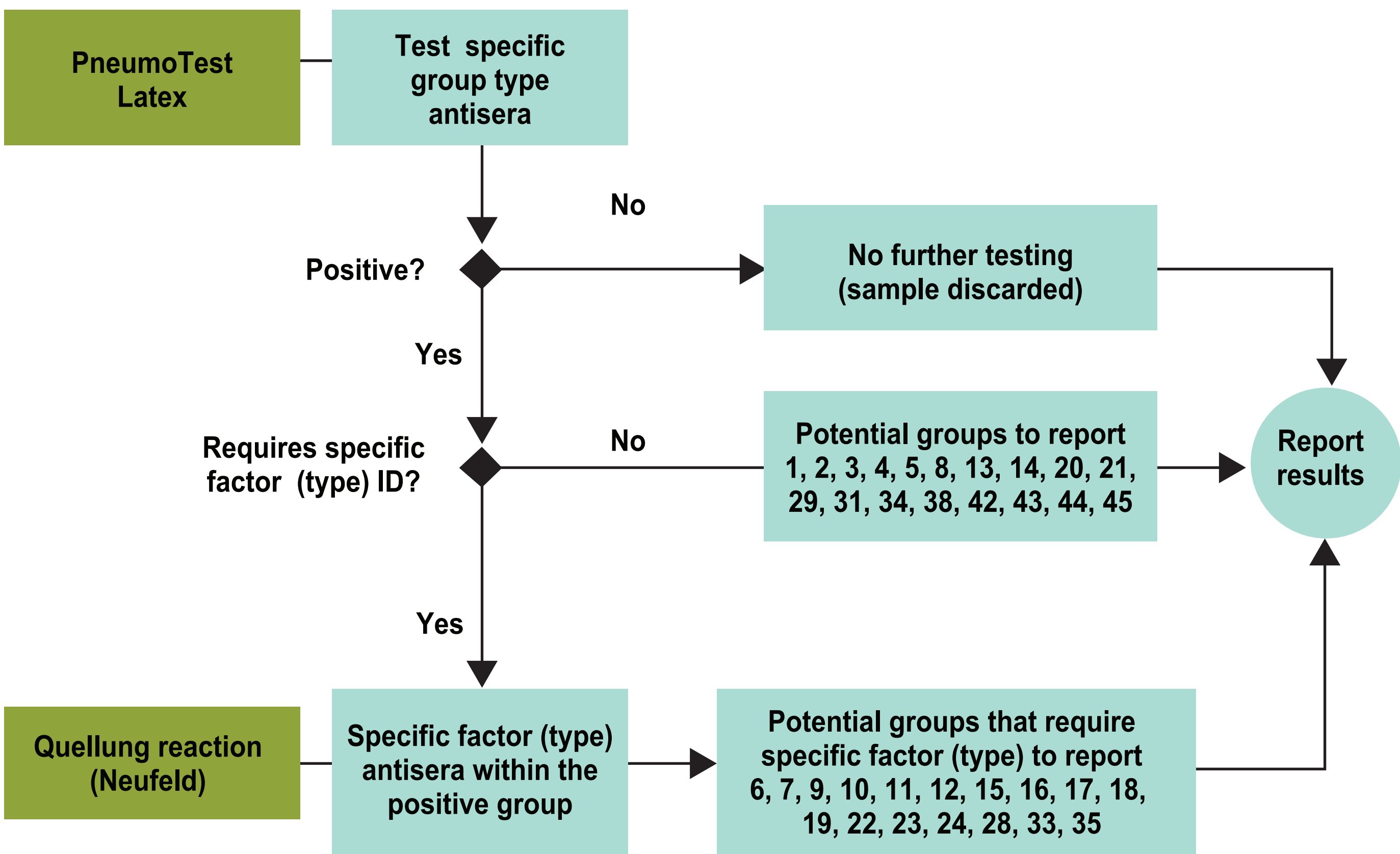
### Secondary objectives

- To quantify the number of *S pneumoniae* isolates obtained from normally sterile and nonsterile sites from the study population that were also coinfectd with SARS-CoV-2

## Methodology

This was a prospective, noninterventional, observational laboratory-based study. *S pneumoniae*-positive specimens collected from the microbiology laboratories of each participating hospital from patients (children and adults, ≥6 weeks of age and older) with positive laboratory-confirmed *S pneumoniae* culture (sterile and nonsterile sites) were included in the study. Twenty-five hospitals in Puerto Rico participated. Data were collected from April 2020 through June 2023. Serotype identification was performed by antigen-antibody agglutination reactions (Pneumo-Test Latex) and capsule swelling test (Quellung reaction). The distribution of *S pneumoniae* isolates was summarized by frequencies and percentages, and descriptive statistics were performed for demographic characteristics.

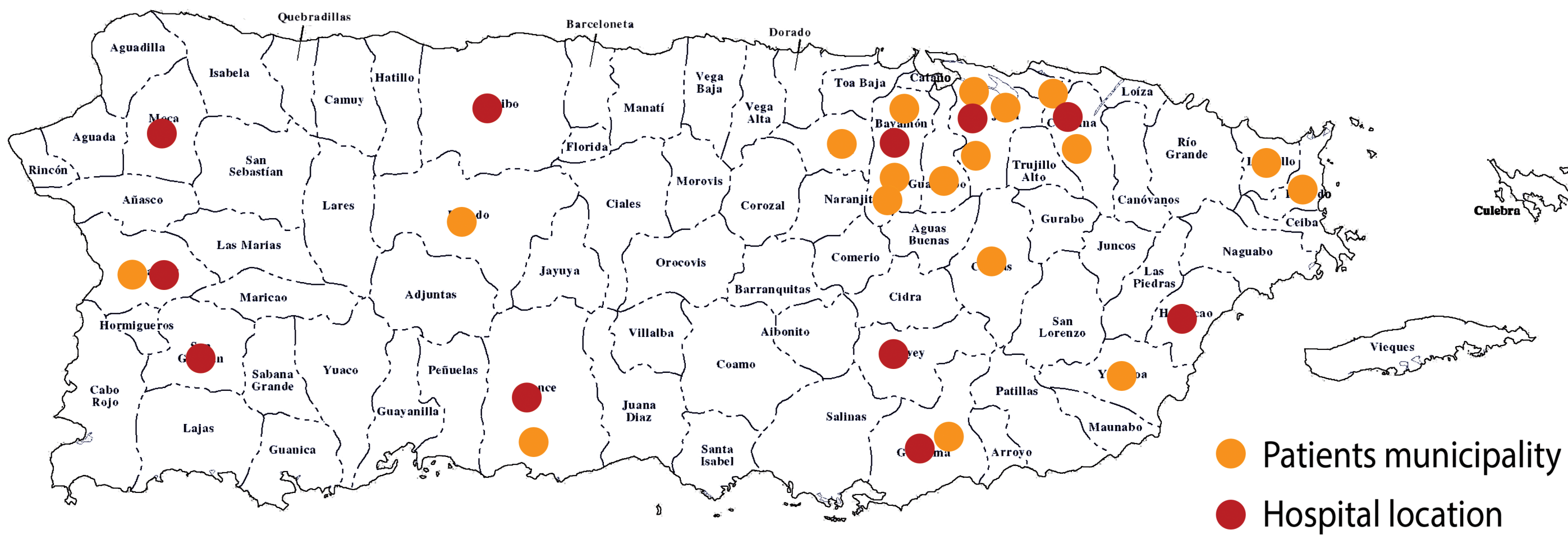
Figure 1. Summary of laboratory procedures for serotyping



## Results

Nineteen patients were included; 83.1% of the samples were from men. The median age was 67 years old (range: 8 months-87 years). The municipalities with the highest number of specimens were San Juan (15.8%), Bayamón (15.8%), and Carolina (10.5%).

Figure 2. Geographic distribution of participating hospitals and municipalities of residence of patients with *S pneumoniae* infection



Samples were collected from blood (42%), lower respiratory tract secretions (21%), sputum (21%), nasal secretions (11%), and ear secretions (5%).

Table 1. Serotypes isolated in sterile or nonsterile sites (n=19)

Sterile sites serotypes (n=8)	Non-sterile sites serotypes (n=11)
3	3
6A	6A
11D	11C
15A	19A*
15C	19B
19C	19C
19F	19F
35	22A
	34*

\*2 isolates of the serotype.

Table 2. Serotype distribution causing non-invasive PD by age group and vaccine coverage (n=11)

Age group (years)	Number of isolates	Percent	Serotypes covered by PPSV23, PCV13, PCV15, PCV20	Serotypes not covered by any currently approved vaccine
<14	0	0	—	—
15 – 49	5	45.5	19F, 19A	11C, 22A, 19C
50 – 64	2	18.2	3	34
65+	4	36.3	19A (2 isolates)	19B, 34

Table 3. Serotype distribution causing invasive PD by age group and vaccine coverage (n=8)

Age group (years)	Number of isolates	Percent	Serotypes covered by PPSV23, PCV13, PCV15, PCV20	Serotypes not covered by any currently approved vaccine
<14	1	12.5	19F	—
15 – 49	0	0	—	—
50 – 64	1	12.5	3	—
65+	6	75.0	6A	11D, 19C, 35, 15A, 15C

## Discussion

In contrast to a hospital surveillance study conducted in 2001, where the majority of identified pneumococcal serotypes were already covered by existing vaccines at that time, the present study discovered that a significant portion of the serotypes identified were not included in the pneumococcal vaccines being administered during the enrollment period (PPSV23, PCV13 and recently introduced PCV15). However, a limitation of the study was the relatively low number of collected pneumococcal samples. This could be attributed to the impact of COVID-19 pandemic control measures, as well as other respiratory diseases.

## Conclusions

The majority of pneumococcal serotypes identified were not included in the vaccines being administered during the enrollment period. These findings highlight the necessity of implementing a surveillance system to monitor the evolving *S. pneumoniae* serotype distribution in Puerto Rico. Vaccines that will cover more serotypes are expected to be available in the near future.

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## Disclosure

Drs. Claudia Beltrán, Edgar Miranda, and Yemile Ron are Merck Puerto Rico and MSD Colombia employees.