The Burden of *Streptococcus pneumoniae* Meningitis and Serotype Distribution in Vietnam

Huong Thien Pham[1,2,3], Van Hung Pham[1,3], Nhu Hong Thi Tran[1,3], Duy Khanh Tran[1,3], Quoc Viet Nguyen[1,3]*

[1]Vietnam Research and Development Institute of Clinical Microbiology, Ho Chi Minh city 70000, Vietnam; [2]Pham Ngoc Thach University of Medicine, Ho Chi Minh city 70000, Vietnam; [3]Nam Khoa Biotek Co.

Background

Streptococcus pneumoniae (*S. pneumoniae*) is a leading cause of bacterial meningitis, with over 100 serotypes identified. While vaccines have reduced the burden of vaccine-type disease, the emergence of non-vaccine serotypes remains a significant public health challenge. Continuous monitoring of serotype distribution is essential to evaluate vaccine efficacy and inform future immunization strategies.

Aims of the study

This study aimed to determine the prevalence of *S. pneumoniae* in bacterial meningitis and its serotype distribution.

Materials and methods

This retrospective descriptive study analyzed cerebrospinal fluid (CSF) data collected at the Vietnam Research and Development Institute of Clinical Microbiology (VCM) from January 2024 to January 2026.

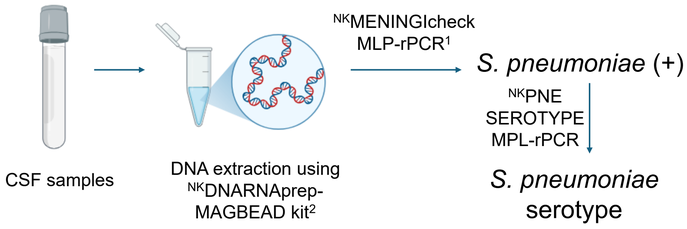

Figure 1. Protocol used at the VCM from sample collection to *S. pneumoniae* serotyping using multiplex realtime PCR (MLP-rPCR)

Table 1. List of *S.pneumoniae* serotypes detectable in the NKPNE SEROTYPE MPL-rPCR

MLP1	1	**MLP6**	16
	2		17
	3		18A/B/C/F
	4		19A
MLP2	7C/B/40	**MLP7**	19F
	5		20
	6A/B		21
	6C/D		22A/F
MLP3	7F/A	**MLP8**	23A
	8F		23B
	9N/L		23F
	9A/V		24A/F
MLP4	10	**MLP9**	31
	10F/C/33C		33F/A/37
	11A/D		34
	12F/A/B/44/16		35A/C/42
MLP5	13	**MLP10**	39
	14		35B
	15A/F		35F/47F
	15B/C		25A/F/38

Results

2982 CSF samples were obtained, 119 of which were positive for bacteria (4%). Among these, *S. pneumoniae* accounted for 35.29% (42/119).

Serotyping was performed on 31 *S. pneumoniae*-positive samples, with 29 (93.5%) successfully identified. The most prevalent serotypes were 19A (n=5, 17.2%) and 34 (n=5, 17.2%), followed by 15A/F (n=4, 13.8%) and 15B/C (n=3, 10.3%). Other identified serotypes included 6A/B (n=2) and single isolates of serotypes 4, 11A/D, 12F/A/B/44/16, 14, 18, 19F, 23A, 23F, 24A/F, and 25A/F/38.

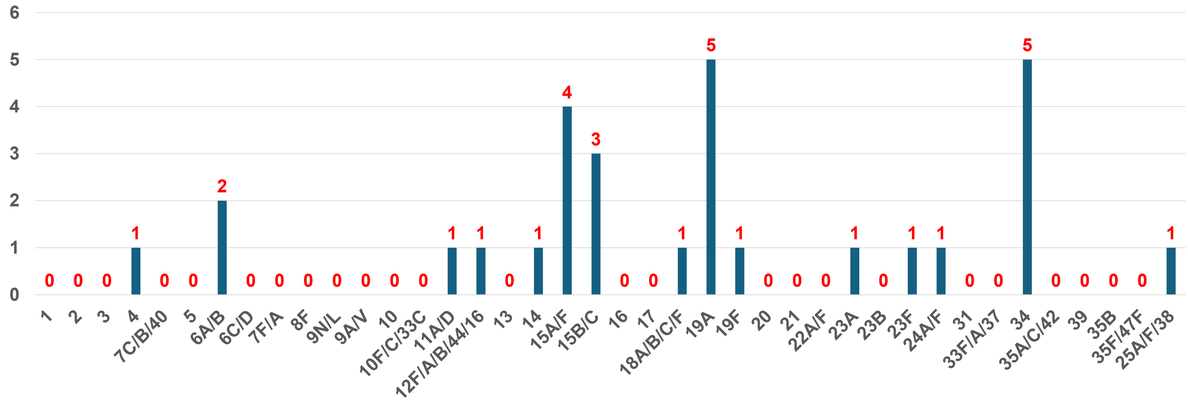

Figure 2. *S. pneumoniae* serotypes detected by multiplex realtime PCR from January 2024 to January 2026

Potential serotype coverage was 20.7% (6/29) for PCV10 (covering serotypes 4, 14, 18, 19F, 23F, 6B). PCV13 and PCV15 both showed a coverage of 41.4% (12/29) by including serotypes 19A and 6A. The broadest coverage was observed in PCV20 and PPSV23 at 51.7% (15/29), attributed to the addition of serotypes 11A and 15B.

Conclusions

S. pneumoniae remains a major cause of bacterial meningitis in this setting. The dominance of non-vaccine serotypes and limited coverage by current PCV10/PCV13 vaccines highlights the importance of ongoing serotype surveillance in Vietnam.

References

[1]Phung NTN, Pham HT, Tran TT, Dinh VH, Tran NM, Tran NAN, Ngo MQN, Nguyen HTT, Tran DK, Le TKT, Quek C, Pham VH, Pham ST. *Naegleria fowleri:* Portrait of a Cerebral Killer. Diagnostics (Basel). 2025 Jan 3;15(1):89. doi: 10.3390/diagnostics15010089. PMID: 39795618; PMCID: PMC11719733.

[2]Van, P., Thanh, B., Quoc, N., Viet, N., & Huong, P. (2017). Production and evaluation of the kit using magnetic silica coated nano-iron beads to extract the nucleic acid from different samples. *Int. J. Antimicrob. Agents*, *50*, S92-S93.