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Paper Poster Session I

Focus: Pneumococcus

Distribution of *Streptococcus pneumoniae* serotypes among adults 65 years and greater in the United States, 2004-2013

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Background: *Streptococcus pneumoniae* (SPN) represents a leading cause of mortality and morbidity worldwide in children and adults, causing pneumonia, bacteremia and meningitis. Serotype surveillance is necessary to monitor both the burden of pneumococcal disease, and changing serotype specific epidemiology, especially in the setting of pneumococcal vaccination programs. A heptavalent pneumococcal vaccine (PCV7) was introduced in the United States in 2000, followed by changes in the epidemiology of pneumococcal disease and the emergence of nonvaccine serotype strains. PCV13, covering six additional emerging serotypes, was introduced in 2010. Serotype distribution is associated with varying levels of antibiotic resistance, with certain resistance phenotypes more prevalent in specific serotypes.

Methods: In this analysis, we document serotype distribution of 892 *S. pneumoniae* isolates from respiratory specimens from adults ≥65 y collected in the United States through the Tigecycline Evaluation Surveillance Trial, (TEST) 2004-2013. Specimens included sputum (643), bronchial (88), trachea (43), sinus (22), and other (16). Serotypes were determined by a combination of PCR using four multiplex reactions based on serotype-specific genes within the capsular polysaccharide synthesis genes (*cps*) of *S. pneumoniae* including an internal *cps* control, and the Quellung reaction. Minimum inhibitory concentrations (MICs) were determined by the Clinical and Laboratory Standards Institute (CLSI) recommended broth microdilution testing method.

Results: 812 of 892 (91.0%) of isolates were typable. Serotypes 19A, 6A, 6B, 15A, and 19F exhibited higher levels of erythromycin resistance, while 19A and 19Fdemonstrated higher rates of penicillin resistance (all $p<0.05$, Fisher's exact test). Prevalence of serotypes and susceptibility to penicillin and erythromycin for the most common serotypes is shown below.

Serotype	N	% of total typed	% PEN S	%ERY S
19A	124	15.2	48.4	20.2
3	87	10.7	100	88.9
6A	68	8.3	89.7	36.5
11A	54	6.6	100	71.2
35B	54	6.6	51.9	64.2
22F	45	5.5	95.6	75.0
19F	42	5.2	54.8	41.0
23B	34	4.2	97.1	81.3
31	30	3.7	100	71.4
23A	28	3.4	100	53.8
15B	25	3.1	100	50.0
6B	22	2.7	81.8	35.0
15C	20	2.5	100	70.0
15A	19	2.3	100	11.8
16F	15	1.8	100	78.6
35F	13	1.6	100	84.6
7F	11	1.3	100	55.6
9N	10	1.2	100	100

Conclusions: This analysis of an existing isolate database found the most common serotypes in respiratory specimens from adults ≥65 y were 19A, 3, and 6A. The largest percentage of penicillin-resistance isolates was found in serotypes 19A, 23F, and 35B. Erythromycin resistance was most commonly seen in 15A, 19A, and 33A. Erythromycin resistance (41.8%) was more prevalent then penicillin resistance (15.6%). 19A, the most common serotype, was associated with higher levels resistance to both antimicrobials. Six serotypes (19A, 3, 6A, 35B, 11A and 22F) accounted for more than half (53.0%) of all isolates. These data suggest a substantial burden of pneumococcal disease can be attributed to these serotypes. The association between pneumococcal serotypes and antibiotic resistance highlights the need for ongoing monitoring of the serotype epidemiology of this important pathogen.