28th ECCMID EUROPEAN CONGRESS OF CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES
Madrid, Spain
21 – 24 April 2018

P0591 Antibiotic resistance, serotypes and vaccine coverage of Streptococcus pneumoniae in patients with meningitis and pneumonia in Belarus

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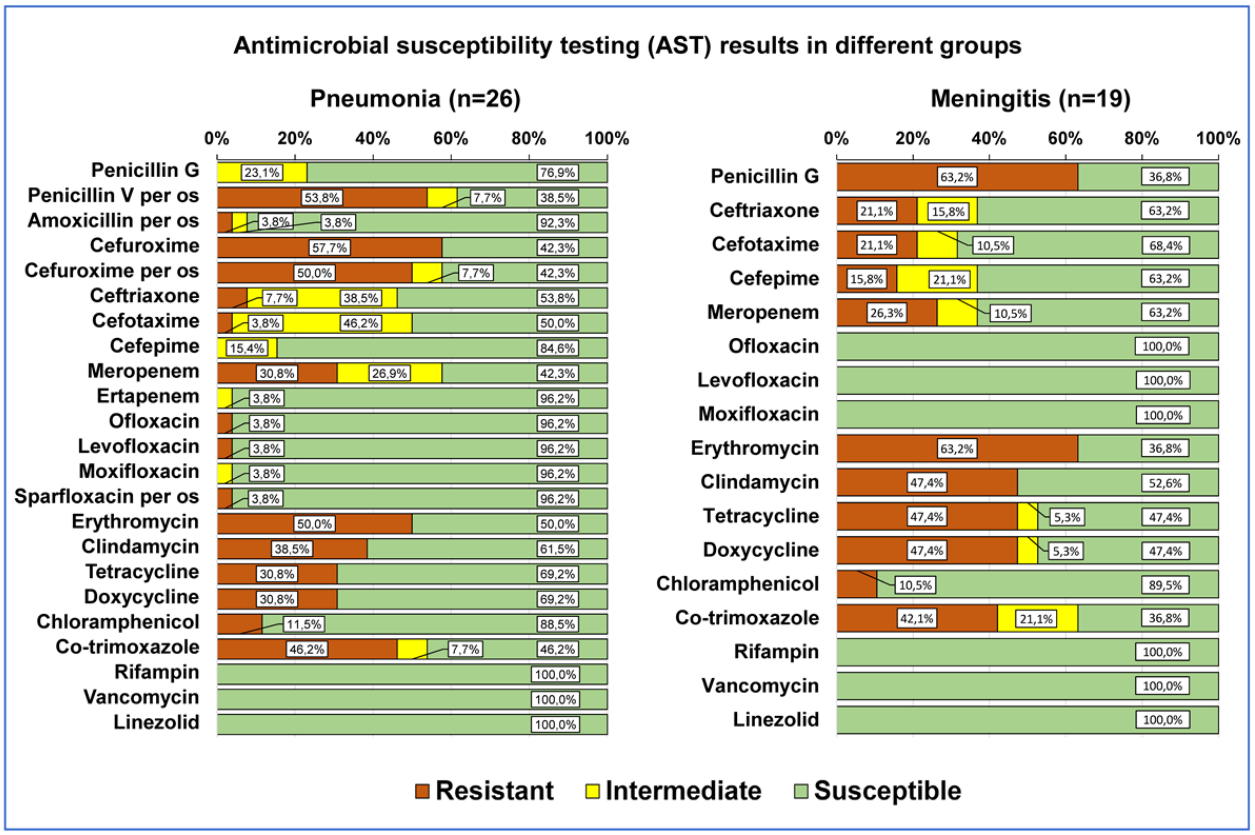
Background: There're no relevant and current *Streptococcus pneumoniae* antibiotic resistance data in Belarus. The aims of the investigation: to determine antibiotic resistance rates and serotype distribution of pneumococcal strains isolated from patients with community-acquired pneumonia or meningitis in 2013-2016 in Belarus; to assess serotype coverage by different vaccines.

Materials/methods: Strains were isolated from hospitalized patients with pneumonia (n=26, Median(age)=20 years, LQ–UQ:4–43) or meningitis (n=19, Median(age)=37 years, LQ–UQ:5–49.5). Identification results were confirmed by conventional bacteriological methods and quantitative PCR autolysin gene detection. Phenotypic resistance to antibiotics was examined using broth microdilution method. Results interpretation was performed according to CLSI 2017 criteria and breakpoints. Serotyping was performed by conventional multiplex PCR using CDC protocol.

Results: AST results are shown on Graph. Of 45 strains, 13 (28.9%) were wild-type pneumococci (susceptible to all antibiotics) and 25 (55.6%) were found to be multidrug-resistant (MDR). Extensively drug-resistant pneumococci (XDR, resistant to ≥5 classes of antimicrobials from the list: b-lactams, macrolides, lincosamides, tetracyclines, fluoroquinolones, folate pathway inhibitors) rate was 52.0% (13/25) among MDR strains and 28.9% (13/45) overall. Most frequent serotypes were: 14(20.0%), 19F(15.6%), 1(13.3%), 6A/6B(11.1%), 3, 9V/9A,19A (4.4% each). The majority of MDR strains (24/25, 96.0%) and all of XDR strains were referred to 'pediatric' serotypes (defined as 6A, 6B, 9V, 14, 19A, 19F and 23F serotypes and characterized by common epidemiological features – prevalence among children or during carriage, antibiotic resistance). Furthermore, all these serotypes were included in PCV13 and PPSV23, while PCV10 serotype coverage was 88% among MDR and 92% among XDR strains.

Conclusions: Belarus should be considered as a region with high level of *S.pneumoniae* penicillin and macrolides resistance with frequent circulation of meningeal strains resistant to III-IV generation cephalosporins, carbapenems and respiratory strains not susceptible to penicillin, II-IV generation cephalosporins, macrolides, lincosamides, folate pathway inhibitors, tetracyclines and phenicols. We could recommend using obtained results by clinicians for empiric antibacterial treatment and correction of pneumococcal infection national treatment guidelines. However, most of MDR and XDR strains relate to vaccine serotypes, whereby associated pneumococcal disease cases are considered to be vaccine preventable (88-92% by PCV10, 96-100% by PCV13 and PPSV23.


Antimicrobial susceptibility testing (AST) results in different groups
Pneumonia (n=26)
0%
20%
40%
60%
80%
100%
Penicillin G
23,1%
76,9%
Penicillin V per os
53,8%
7,7%
38,5%
Amoxicillin per os
3,8%
3,8%
92,3%
Cefuroxime
57,7%
42,3%
Cefuroxime per os
50,0%
7,7%
42,3%
Ceftriaxone
7,7%
38,5%
53,8%
Cefotaxime
3,8%
46,2%
50,0%
Cefepime
15,4%
84,6%
Meropenem
30,8%
26,9%
42,3%
Ertapenem
3,8%
96,2%
Ofloxacin
3,8%
96,2%
Levofloxacin
3,8%
96,2%
Moxifloxacin
3,8%
96,2%
Sparfloxacin per os
3,8%
96,2%
Erythromycin
50,0%
50,0%
Clindamycin
38,5%
61,5%
Tetracycline
30,8%
69,2%
Doxycycline
30,8%
69,2%
Chloramphenicol
11,5%
88,5%
Co-trimoxazole
46,2%
7,7%
46,2%
Rifampin
100,0%
Vancomycin
100,0%
Linezolid
100,0%
Meningitis (n=19)
0%
20%
40%
60%
80%
100%
Penicillin G
63,2%
36,8%
Ceftriaxone
21,1%
15,8%
63,2%
Cefotaxime
21,1%
10,5%
68,4%
Cefepime
15,8%
21,1%
63,2%
Meropenem
26,3%
10,5%
63,2%
Ofloxacin
100,0%
Levofloxacin
100,0%
Moxifloxacin
100,0%
Erythromycin
63,2%
36,8%
Clindamycin
47,4%
52,6%
Tetracycline
47,4%
5,3%
47,4%
Doxycycline
47,4%
5,3%
47,4%
Chloramphenicol
10,5%
89,5%
Co-trimoxazole
42,1%
21,1%
36,8%
Rifampin
100,0%
Vancomycin
100,0%
Linezolid
100,0%
Resistant
Intermediate
Susceptible