SUSCEPTIBILITY OF *STAPHYLOCOCCUS AUREUS* IN THE COMMUNITY SETTINGS IN RUSSIA

P 1077

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Abstract

Objectives

To evaluate antimicrobial susceptibility of community-onset strains of *S. aureus* in different regions of Russia.

Methods

A total of 417 clinical community-onset *S. aureus* strains were collected from 12 cities during multicenter study. Susceptibility testing to 15 antimicrobials was performed by CLSI agar dilution method. CLSI 2008 criteria were used for the interpretation of susceptibility testing results (with the exception of fusidic acid, for which the criterion of French Society for Microbiology was applied).

Results

Only 3.8% of strains were resistant to oxacillin. In general, all tested antibimicrobials revealed good activity against MSSA. At the same time MRSA strains were much less susceptible than MSSA to fluoroquinolones, macrolides, lincosamides, tetracyclines, aminoglycosides and chloramphenicol.

Conclusion

Overall resistance rates in *S. aureus*, including MRSA incidence, in the community settings are relatively low in Russia. It is necessary to perform further investigation to assess the dynamics and epidemiology of antimicrobial resistance.

INRODUCTION AND PURPOSE

Growing antibacterial resistance of *Staphylococcus aureus* in the community is an emerging problem. Though surveillance of spread and resistance of these strains is performed in some countries, it is done for first time in Russia. The aim was to evaluate antimicrobial susceptibility of *S. aureus* in the community in different regions of Russia.

METHODS

A total of 417 clinical community-onset *S. aureus* strains were collected from 12 cities during a multicenter study. Strains were collected from the 12 cities from the following regions: Central (Moscow, Smolensk), Volga region (Ufa), South (Volgograd, Voronezh), Ural (Chelyabinsk, Ekaterinburg, Tyumen), Siberian (Irkutsk, Novosibirsk, Tomsk) and the Far-East (Yakutsk).

Figure 1. **Geographical distribution of centers, participating in the studies**

All bacterial cultures were delivered to a reference laboratory of Institute of Antimicrobial Chemotherapy (Smolensk, Russia) and were re-identified by standard biochemical methods and stored at -70°C in glycerol broth. The susceptibility testing to chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, gentamicin, levofloxacin, linezolid, mupirocin, netilmycin, oxacillin, rifampicin, tetracycline, trimethoprim/sulfamethoxazole and vancomycin was performed by agar-dilution method using Mueller-Hinton agar (Becton Dickinson, USA). Inoculated plates were incubated in ambient air at 35°C for 24 hours. Interpretation of results was performed in accordance with CLSI recommendations (2008). The French Society for Microbiology criteria were used for the interpretation of fusidic acid susceptibility testing results. *S. aureus* ATCC®29213 strain was used for quality control.

RESULTS

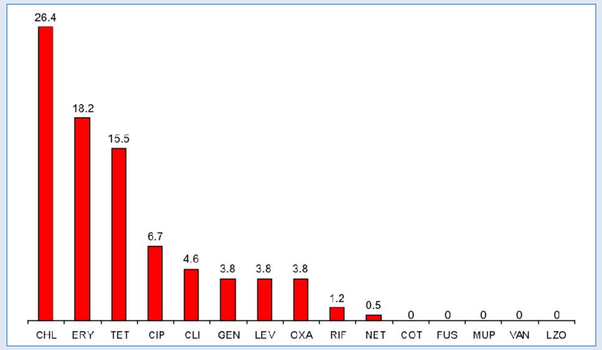
Oxacillin resistance rate was 3.8%. The most active agents were linezolid (MIC_{50} and MIC_{90} 2 mg/l), vancomycin (MIC_{50} and MIC_{90} 1 mg/l), co-trimoxazole (MIC_{50} and MIC_{90} 0.06 mg/l), fusidic acid (MIC_{50} and MIC_{90} are 0.06 and 0.125 mg/l, respectively) and mupirocin (MIC_{50} and MIC_{90} are 0.125 and 0.25 mg/l, respectively) to which no resistance was found. The percentage of strains with vancomycin MIC of 0.25 mg/l, 0.5 mg/l and 1 mg/l were 0.2, 10.3 and 89.5%, respectively. No strains with MIC > 1 mg/l were found. Majority of other antimicrobials tested showed relatively good *in vitro* activity: netilmicin (non-resistant strains percentage was 0.5%), rifampicin (1.2%), levofloxacin (3.8%), gentamycin (3.8%), clindamycin (4.6%) and ciprofloxacin (6.7%). Highest percentage of non-susceptible isolates was found for chloramphenicol (26.4%), erythromycin (16.2%) and tetracycline (15.5%).

Table 1. In vitro **activity of tested antimicrobials against community-onset *S. aureus* isolates**

Antibiotic	MIC_{50}	MIC_{90}	*S (%)*	*I (%)*	*R (%)*
Chloramphenicol	8	64	73.6	0	26.4
Ciprofloxacin	0.5	1	93.3	1.9	4.8
Clindamycin	0.06	0.125	95.4	0	4.6
Erythromycin	0.25	512	81.8	1.0	17.2
Fusidic acid	0.06	0.125	100	0	0
Gentamycin	0.5	1	96.3	0	3.8
Levofloxacin	0.125	0.25	96.2	0	3.8
Linezolid	2	2	100	0	0
Mupirocin	0.125	0.25	100	0	0
Netilmicin	0.25	0.5	99.5	0.2	0.3
Oxacillin	0.5	0.5	96.2	0	3.8
Rifampicin	0.015	0.015	98.8	0	1.2
Tetracycline	0.5	32	84.4	0.2	15.3
Co-trimoxazole*	0.06	0.06	100	0	0
Vancomycin	1	1	100	0	0

* MIC values are indicated for trimethoprim

Figure 2. **Non-susceptibility rates, %**



CONCLUSIONS

- Overall resistance rates of *S. aureus*, including MRSA incidence, in the community settings are relatively low in Russia.
- Considering the growing resistance of community-onset *S. aureus* worldwide, it is necessary to perform further investigation to assess the dynamics and epidemiology of antimicrobial resistance of such strains in Russia.