Antimicrobial Resistance in Nosocomial Strains of *Acinetobacter spp.* Isolated in ICUs in Russia

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INTRODUCTION

Nosocomial infections are one of the most important problems in hospital settings. In spite of the advances in infectious control measures the mortality and morbidity remain extremely high.

Gram-negative aerobic bacteria remain to be the most important causative agents in Russia.

Nosocomial infections due to *Acinetobacter* spp. mostly represent severe problems for choosing effective antimicrobials because of the resistance to many currently available drugs.

OBJECTIVE

- To investigate the prevalence of nosocomial infections due to *Acinetobacter* spp. in 10 ICUs in different parts of Russia
- To study the susceptibility of nosocomial *Acinetobacter* spp. strains to 12 most commonly used antimicrobials
- To determine the aminoglycoside-resistance mechanisms (AGRM) of nosocomial isolates of *Acinetobacter* spp.

MATERIALS AND METHODS

Consecutive non-duplicate aerobic gram-negative bacteria isolated from patients with nosocomial infections in 10 ICUs in different parts of Russia were studied. Identification of the strains was performed in accordance to the standard procedures. Susceptibility testing was done using the Etests (AB Biodisk, Sweden) with amoxicillin/clavulanate (XL), piperacillin (PP), piperacillin/tazobactam (PTc), cefuroxime (XM), cefotaxime (CT), ceftriaxone (TX), ceftazidime (TZ), imipenem (IP), gentamicin (GM), amikacin (AK), ciprofloxacin (CI), trimethoprim/sulfamethoxazole (TS).

Strains were tested on Mueller-Hinton II Agar, inoculum 0.5 McFarland. Plates were incubated for 16-18 h at 35°C. *E.coli* ATCC 25922 and ATCC 35218 and *P.aeruginosa* ATCC 27853 were used for Quality Control. Interpretation of the results was performed according to NCCLS (1997) criteria. Data were calculated using software WHONET4.

Aminoglycoside-resistance mechanisms of nosocomial isolates of *Acinetobacter* spp. were determined according to their aminoglycoside resistance patterns (AGRP) (G. Miller, Schering-Plough Research Institute, USA).

RESULTS AND DISCUSSION

A total of 1005 non-duplicate consecutive strains of aerobic gram-negative bacteria from 863 patients with nosocomial infections from 10 ICUs were received and evaluated. *Acinetobater* spp. (N=77) was the 6th most frequently isolated nosocomial pathogen (after *P.aeruginosa*, *K.pneumoniae*, *E.coli*, *Enterobacter* spp. and *Proteus* spp.). The results of antimicrobial susceptibility testing of nosocomial isolates of *Acinetobater* spp. are indicated in the following table.

Antibiotics	Breakpoints	%R+%I	%S	MIC_{50}	MIC_{90}	MIC Range
XL	S≤8 R≥32	73	27	16	128	0.5-128
PP	S≤16 R≥128	88	12	256	256	2-256
PTc	S≤16 R≥128	82	18	256	256	1-256
XM	S≤8 R≥32	96	4	128	128	2-128
CT	S≤8 R≥64	88	12	128	128	0.5-128
TX	S≤8 R≥64	94	6	128	128	0.25-128
TZ	S≤8 R≥32	78	22	32	128	2-128
IP	S≤4 R≥16	0	100	0.5	2	0.125-4
GM	S≤4 R≥16	91	9	128	128	0.25-128
AK	S≤16 R≥64	7	93	2	256	1-256
CI	S≤1 R≥4	53	47	2	32	0.006-32
TS	S≤2 R≥4	88	12	32	32	0.125-32

Taking into consideration high rate of gentamicin-resistance and emerging amikacin-resistance in nosocomial *Acinetobacter* spp. isolates AGRM were determined. Gentamicin-resistant strains were simultaneously resistant to tobramycin (due to ANT(2") production), kanamycin and neomycin (APH(3')-I). Emerging amikacin-resistance is due to the production of APH(3')-VI-modifying enzyme. All amikacin-resistant strains of *Acinetobacter* spp. were simultaneously resistant to isepamicin (due to the same enzyme), gentamicin (AAC(3)-I), kanamycin and neomycin (APH(3')-I).

CONCLUSIONS

- The above data suggest that only imipenem and amikacin can be effective antimicrobials for the treatment of nosocomial infections caused by *Acinetobacter* spp. in Russia.
- Antimicrobial susceptibility testing for all range of antimicrobials is required for each clinically significant isolate of *Acinetobacter* spp.