



Quality Assessment (QA) of Antimicrobial Susceptibility Testing in Russia

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ABSTRACT

Objectives: To assess quality and to determine the overall accuracy of antimicrobial susceptibility testing in Russian laboratories.

Methods: Eighteen laboratories performed the following QA tests: 1) Test control strains of *E.coli* ATCC 25922 and *S.aureus* ATCC 25923 once each day for 10 working days; 2) test strains granted by WHO/CDC: *K.pneumoniae* WHO-1, *S.aureus* WHO-2, *E.faecium* WHO-3 and Enteric WHO-5 only once to defined sets of antimicrobials; 3) Identification of Enteric WHO-5.

Results: Participating laboratories used different media (Russian AGV-media and Mueller-Hinton) and antimicrobial disks from different producers both domestic and imported. Interpretation of the results they performed according to "Methodical Rules" by Ministry of Health of the USSR dated 1983 and NCCLS 1995-96 recommendations.

Results of testing of *E.coli* ATCC 25922 and *S.aureus* ATCC 25923 to different antimicrobials were within the NCCLS range in 30-94% and 41-91% respectively. Smaller zone diameters were obtained in 6-64% and 4-53% and larger - in 0-7% and 1-44% respectively.

Testing of WHO strains to different antimicrobials showed that agreement in the interpretation of results was attained in 33-100% for *K.pneumoniae* WHO-1, 67-100% for *S.aureus* WHO-2, 20-92% for *E.faecium* WHO-3 and 0-100% for Enteric WHO-5. Correct identification of Enteric WHO-5 (*Enterobacter cloacae*) was performed in 10/17 centres.

Conclusion: The above results elucidate the problems with the internal quality control in most Russian laboratories. Personnel education and procedures standardisation are needed for the improvement of the present situation.

INTRODUCTION AND PURPOSE

The impact of antimicrobial susceptibility testing (AST) on effective antibacterial therapy is of increasing importance. The results of AST *in vitro* serve as a basis for administration of optimal antibiotic regimen for current patient, for empirical choice of the drugs for the treatment of definite type of infection and for creating of hospital formulary.

Strict standardisation of the testing procedure and regular performing of quality control tests are essential for achieving of repeatable clinically relevant results.

The purpose of the current study was to assess the quality and to determine the overall accuracy of AST in Russian microbiology laboratories.

MATERIALS AND METHODS

Eighteen Russian microbiology laboratories were asked to perform the following QA tests:

1. Test control strains of *E.coli* ATCC 25922 and *S.aureus* ATCC 25923 to defined sets of antimicrobials once each day for 10 working days;
2. Test strains granted by WHO/CDC: *K.pneumoniae* WHO-1, *S.aureus* WHO-2, *E.faecium* WHO-3 and Enteric WHO-5 to defined sets of antimicrobials once only;
3. To perform identification of Enteric WHO-5.

RESULTS AND DISCUSSION

Tables 1-2. Distribution (%) of the results (zone diameters) of ATCC strains with respect to NCCLS (1998) acceptable ranges (Normal - % of results within NCCLS range, Low - % of zone diameter results smaller than NCCLS range, High - % of zone diameter results larger than NCCLS range).

Antimicrobial	<i>E.coli</i> ATCC 25922			Antimicrobial	<i>S.aureus</i> ATCC 25923		
	N	Low, %	Normal, %		N	Low, %	Normal, %
Ampicillin	136	49	48	3	137	53	45
Carbenicillin	95	64	30	6	165	15	41
Cefazolin	52	54	46	0	20	45	55
Cefotaxime	69	26	72	0	137	2	91
Gentamicin	101	27	73	0	123	4	80
Ciprofloxacin	75	24	76	0	122	19	81
Tetracyclin	89	6	94	0	112	10	83
Co-trimoxazole	102	30	58	2	136	29	70

Tables 3-6. Agreement (%) and the rates of errors (%) of the results of WHO/CDC QA strains interpretation (by sensitivity category) with respect to CDC results interpretation:

Antimicrobial	<i>K.pneumoniae</i> WHO-1				Antimicrobial	Enteric (<i>E.cloacae</i>) WHO-5			
	Agreement, %	Minor Errors, %	Major Errors, %	Very major Errors, %		Agreement, %	Minor Errors, %	Major Errors, %	Very major Errors, %
Ampicillin	100	0	0	0	Ampicillin	100	0	0	0
Cefotaxime	46	27	0	27	Cefotaxime	100	0	0	0
Gentamicin	50	12	38	0	Gentamicin	93	0	7	0
Ciprofloxacin	60	40	0	0	Ciprofloxacin	80	20	0	0
Co-trimoxazole	54	23	0	23	Co-trimoxazole	73	0	27	0
Chloramphenicol	33	67	0	0	Chloramphenicol	0	30	70	0

Antimicrobial	<i>S.aureus</i> WHO-2				Antimicrobial	<i>E.faecium</i> WHO-3			
	Agreement, %	Minor Errors, %	Major Errors, %	Very major Errors, %		Agreement, %	Minor Errors, %	Major Errors, %	Very major Errors, %
Penicillin	100	0	0	0	Penicillin	92	8	0	0
Oxacillin	79	7	0	14	Ampicillin	54	8	38	0
Gentamicin	84	0	16	0	Gentamicin (High)	20	20	60	0
Ciprofloxacin	79	14	7	0	Ciprofloxacin	50	25	0	25
Vancomycin	92	0	8	0	Vancomycin	92	8	0	0
Chloramphenicol	67	24	8	0	Chloramphenicol	46	54	0	0

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CONCLUSION

- The above results elucidate the problems with the internal quality control in most Russian laboratories.
- Personnel education and procedures standardisation are needed for the improvement of the present situation.
- There is an urgent demand for National guidelines for AST in Russia harmonised with the international practices (WHO, NCCLS, SFM, DIN, BSAC, etc. ???)