



Fully automated disk diffusion susceptibility testing by ADAGIO WASPLab Expert System compared to VITEK2 and manual disk diffusion in urines from daily clinical practice

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Introduction

Decreasing reimbursements stimulate clinical laboratories to search for the most cost-effective diagnostic approach. Over the past years PAMM has implemented COPAN WASPLab which provides automated streaking, dispersion of antibiotic disks, incubation and digital imaging of incubated culture media. In this study, we investigated the next step: fully automated disk diffusion interpretation by ADAGIO WASPLab Expert System (WASPLab DD) of urine cultures from daily clinical practice.

Materials and Methods

From october to december 2017 culture positive urine samples derived from daily clinical practice were considered for this study. If these cultures showed Gram negative rods (GNR), Staphylococci (STAP) or Enterococci (ENCO), demanding antibiotic susceptibility testing (AST) according to our laboratory SOP, the strains were enrolled in the study. Susceptibility testing was performed according to EUCAST breakpoints as follows:

GNR AST VITEK2 versus WASPLab DD for amoxicillin-clavulanic acid, cefotaxim, ceftazidim, ciprofloxacin, fosfomycin, nitrofurantoin, trimethoprim and trimethoprim-sulfamethoxazol.

STAP AST VITEK2 versus WASPLab DD for cefoxitin, ciprofloxacin, clindamycin, erythromycin and trimethoprim-sulfamethoxazol.

ENCO AST Manual disk diffusion versus WASPLab DD for nitrofurantoin, norfloxacin, tetracyclin (CLSI breakpoints) and fosfomycin.

Agar dilution versus WASPLab DD for ampicillin.

Besides AST a cost-effectiveness analysis was performed comparing hands-on time and material cost per sample between the various methods.

Results

In total 886 strains (810 GNR, 41 STAP, 35 ENCO) were derived from 862 urine samples. WASPLab DD GNR results were in concordance with the gold standard in 95,2% of the strains (see table 1 for a breakdown of these results). For STAP and ENCO concordance was 99,5% and 98,9% respectively.

The cost comparison is shown in table 2.

Table 2

	materials	hands-on time	total
GNR WASPLab DD	€ 1,33	€ 1,08	€ 2,41
STAP WASPLab DD	€ 1,13	€ 1,08	€ 2,21
ENCO WASPLab DD	€ 1,20	€ 1,08	€ 2,28
GNR VITEK2	€ 6,02	€ 0,98	€ 7,00
STAP VITEK 2	€ 6,97	€ 0,98	€ 7,95
ENCO disk diffusion / agar dil.	€ 1,34	€ 1,53	€ 2,87

Comparison between costs for the different methods.

Table 1

Antibiotic	concordant (%)	Minor (%)	Major (%)	Very major (%)
trim-sulf	97,7%	0,9%	1,2%	0,2%
trimethoprim	98,9%	0,7%	0,4%	-
nitrofurantoin	97,0%	1,2%	0,4%	1,5%
fosfomycin	92,3%	-	7,2%	0,6%
ciprofloxacin	94,2%	3,0%	-	2,8%
ceftazidim	98,2%	0,8%	-	1,0%
cefotaxim	99,7%	0,3%	-	-
amox-clav	83,5%	-	0,9%	15,5%*

Comparison between VITEK2 and WASPLab DD voor GNR

*all strains were retested by Etest and proved to be susceptible

Conclusions

→ ADAGIO WASPLab Expert System disk diffusion reading and interpretation shows excellent overall results (concordance >95%) compared to VITEK2 and manual disk diffusion based AST.

→ A large part of the very major errors (40%) was based on the well known discrepancy between amoxicillin-clavulanic acid AST with a fixed and a variable concentration of clavulanic acid.

