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Background and objective

The diagnosis of urinary tract infection generally requires a 48-hour microbiological delay to obtain the antibiotic susceptibility test (AST). In the context of multidrug resistance, reducing the time to obtain AST results is an essential issue to avoid treatment failure.

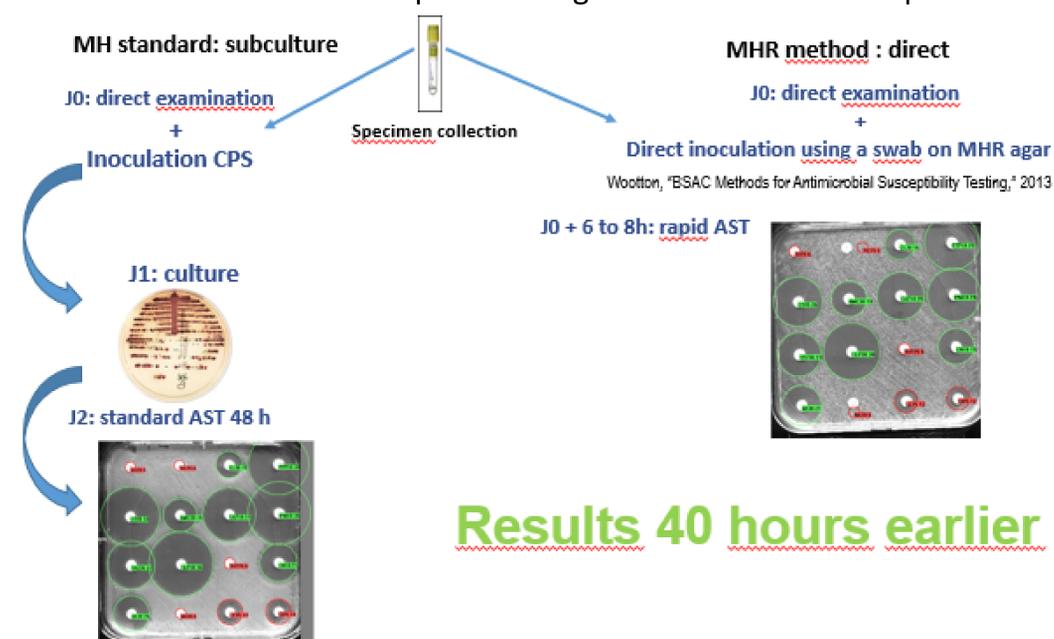
In our previous published study (1), an excellent categorical agreement and correlations between diameters for MHR-SIR and standard methods were reported (concordance = 97,9%). Rapid AST by disk diffusion performed on MHR-SIR agar directly on urine samples with monomicrobial *Enterobacteriaceae* can predict the result of overall AST profile in 8 h with reliable results. The objective of this study was to evaluate the clinical impact of this practice.

Material and Methods

Urine samples were selected on the following two criteria: leukocyturia > 50.000/mL and presence of only Gram-negative bacilli on direct examination. Urinary cytology was performed by flow cytometry on the Sysmex UF-500i (bioMérieux, France) and direct Gram stain examination was performed when UF-500i detected the presence of bacteria.

The rapid method was performed by direct inoculation on MHR-SIR agar (i2a, France) using a swab as recommended by the British Society for Antimicrobial Chemotherapy (BSAC).

Inhibition zones were read from digital images with the SIRscan® 2000 Automatic system (i2a, France) after 8 hours of incubation and were interpreted using CASFM-EUCAST breakpoints.



Results and discussion

107 patients urine samples were included. The mean age of patients was 70 years [52-80], sex ratio F:H 2.1 with a median CRP of 104 [39-145] and a Charlson score of 3 [1-5.5].

Urine specimens showed median leucocyturia of 380/mm³ [192-1497] and median bacteriuria of 10⁶UFC/ml [10⁵-10⁷]. Antibiotic treatment was introduced for 65% of patients, mainly using third generation cephalosporins (33), fluoroquinolones (15), beta-lactamase inhibitors (7), fosfomycin (5), nitrofurantoin (5).

The average time to obtain results was 7.2 hours (+/- 1.6 hours). The time saving of the MHR-SIR compared to the standard technique was 42.6 hours

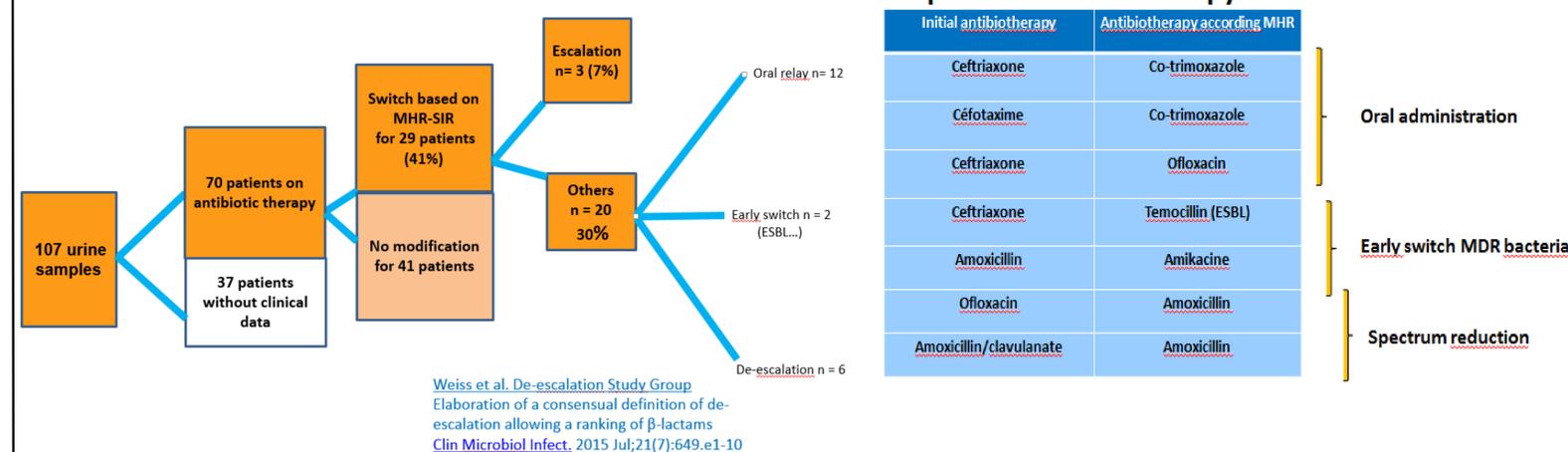


Figure 1. Antibiotic therapies modification according to MHR-SIR results

Conclusion

This study based on rapid AST MHR-SIR showed an important **time saving (40h)**. The rapidity of the results impacts the therapeutic management of patients as it enables not only the prescription of **the most relevant antibiotic**, but also the **reduction of the spectrum of the antibiotic therapy**.

The method is affordable, with an average of **6 USD/sample for 16 antibiotics chosen by microbiologist**. The **added value of the rapid AST MHR-SIR** increases when combined with the **action of the antimicrobial stewardship team**.

References

- 1) Périllaud-Dubois C, Pilmis B, Diep J, Péan de Ponfilly G, Perreau S, Ruffier d'Epenoux L, Mizrahi A, Couzigou, Vidal B, Le Monnier A, Nguyen Van JC. Performance of rapid antimicrobial susceptibility testing by disk diffusion on MHR-SIR agar directly on urine specimens. *Eur J Clin Microbiol Infect Dis.* 2019 Jan;38(1):185-189.
- 2) Wootton, "BSAC Methods for Antimicrobial Susceptibility Testing," 2013
- 3) Weiss et al. De-escalation Study Group. Elaboration of a consensual definition of de-escalation allowing a ranking of β-lactams. *Clin Microbiol Infect.* 2015 Jul;21(7):649.e1-10. doi: 10.1016/j.cmi.2015.03.013.].