Polymicrobial UTI: Could Lodestar DX be used to differentiate between contamination or true infection?

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Introduction

As much as one third of urine samples which are sent for culture are commonly reported as heavy mixed growth[1] (Figures 1 and 2), in line with current guidelines on UTI reporting[2]. However, it is possible that these may be representative of true polymicrobial infection[3], especially in symptomatic at-risk patient populations.

Lodestar DX UTI (Figure 3) is a novel LAMP-based molecular test designed for point of care UTI diagnosis, consisting of a panel of seven uropathogens: *E. coli*, *Enterococcus sp.*, *S. aureus*, *S. saprophyticus*, *Proteus mirabilis*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*.

Following previous evaluation of the Lodestar DX UTI test, It was hypothesised that microbial DNA identification using LAMP may be able to accurately identify clinically relevant levels of uropathogens in mixed growth samples and may aid in improving diagnosis[4].
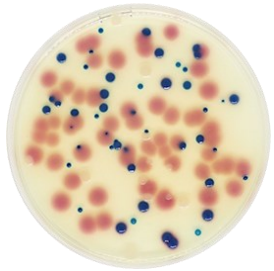

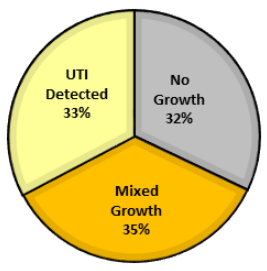**Figure 1.** An example of polymicrobial growth on chromogenic UTI agar

Figure 2. Results from all cultured samples, Cardiff, 2022.[1]

Objective

To determine whether Lodestar DX could be used to accurately detect clinically relevant uropathogens from urine cultures designated as 'heavy mixed growth'.

Methods

This work was part of a larger performance evaluation comparing Lodestar DX with standard laboratory culture (flow cytometry and culture) at Norwich and Norfolk University Hospital - Microbiology.

Samples reported as heavy mixed growth by culture had the initial inoculum culture plate reviewed by the evaluation team, to assess whether the Lodestar DX test had accurately identified *visible* relevant uropathogens within the polymicrobial growth.

Figure 3. The Llusern Scientific Lodestar DX analyser

Results

Of the 241 samples selected for analysis 35 were reported as heavy mixed growth (Table 1). 23 of these had the inoculum culture plate successfully reviewed and the remaining 12 could not be reviewed, in most cases this was due to the plates being discarded prior to review. Lodestar DX correctly identified at least one relevant uropathogen visible within the growth in 20 of the 23 reviewed culture plate samples.

Of the remaining 3 samples; 1 contained *E. coli* which was not detected by Lodestar, 1 contained an unknown coliform not detected by Lodestar and one sample contained no significant uropathogen growth on the culture review but Lodestar detected *E. coli*, *Enterococcus/S. aureus* and *Klebsiella*.

Table 1. Results of the 35 mixed growth samples

Culture Review Outcomes		Result Interpretation	
Lodestar accurately detected 3 pathogens	1	True Positive	20
Lodestar accurately detected 2 pathogens	9		
Lodestar accurately detected 1 pathogen	10		
Lodestar negative - 2 pathogens present in culture review	1	False Negative	2
Lodestar negative - 1 pathogen present in culture review	1		
Lodestar positive for 3 targets - No significant growth	1	False Positive	1
Unreviewed culture & Lodestar positive	7	Inconclusive	12
Unreviewed culture & Lodestar negative	5		
Total	**35**		**35**

Discussion and Conclusion

From the polymicrobial infections which were able to be reviewed as part of this evaluation, Lodestar DX correctly identified clinically relevant uropathogens in 87% of the mixed growth cultures. Whether this represents a true infection or a heavily contaminated sample is not clear, but in clinical scenarios where the growth is deemed significant, Lodestar DX is able to accurately identify the common uropathogens present. Identification of the organisms in mixed samples may help guide subsequent therapy and facilitate narrow spectrum prescribing.

References

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