

Rapid diagnostics with Cognitor® Minus to support antimicrobial stewardship – integrating laboratory testing with clinical review.

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INTRODUCTION

Antimicrobial stewardship is an essential part of clinical care to reduce selection pressure on bacteria and reduce antibiotic-associated complications. Approximately 10% of blood culture samples submitted for microbiological testing are found to be positive. The remaining 90% of samples are generally reported as negative after 5 days of incubation, during which time clinicians may continue to prescribe broad-spectrum antibiotics to the patient with suspected bacterial infection. This overuse of antimicrobials leads to increased pharmacy and clinical costs, the promotion of antimicrobial resistance and an increased risk of antimicrobial-associated disease.

We evaluated a novel enzyme template generation and amplification technique (ETGA®), the Cognitor® Minus (Momentum Bioscience Ltd., UK) test, which has a 99.5% negative predictive value for bacteraemia and fungaemia, as an aid for antimicrobial stewardship.¹

STUDY OBJECTIVES

Antimicrobial review is an important part of antimicrobial stewardship. This observational study asked two questions:

- 1) Does a negative ETGA®, indicating no bacteraemia or fungaemia, aid antimicrobial review within 48 hours of admission?
- 2) In this real-life clinical setting, does a negative ETGA® mean no bacteraemia or fungaemia?

OUTCOME MEASURES:

The provision of the ETGA® result to the clinical team's decision on patient's antimicrobial review were classified as:

- Positive Stewardship, when empirical antimicrobials were changed or not started.
- Negative Stewardship, when empirical antimicrobials were continued.



METHODS

We developed a laboratory working pattern for Cognitor® Minus by ETGA® technique to deliver a result with optimum accuracy at a useful time for clinical review.

The study was carried out at the Royal Hampshire County Hospital, Winchester and the North Hampshire Hospitals, Basingstoke between December 2015 and May 2016.

The Cognitor® tests require the blood culture (BCs) to be incubated for 12 hours. Any BCs received in the laboratory by 8pm were added to the Cognitor® run for the next morning.

Samples from both aerobic and anaerobic adult blood culture bottle (0.5mL from each bottle), or from paediatric bottle (1mL that were negative at the time of collection, were tested by ETGA® technique. A senior BMS prepared the sample (2hours), and analysed using real-time PCR (1 hour).

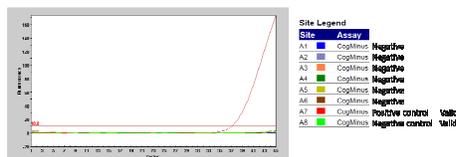


Figure 1: Example result screen from PCR analysis using the SmartCycler, Cepheid.

The ETGA® result (Figure 1) was then recorded and ready for the clinical teams by 12pm-1pm in time for antimicrobial review. Negative results indicating an absence of bacteraemia or fungaemia were reviewed.

RESULTS

It was regarded as a positive stewardship outcome (Table 1), if the ETGA® result supported a decision not to start antimicrobials in a patient who had not received empirical antimicrobials.

Table 1: 197 patients with negative ETGA® tests the day after blood cultures were collected.

Suspected clinical focus	No.	Negative outcome of Cognitor® Minus result		Antibiotics not started	Empirical antibiotics stopped	IV oral switch	Patient discharged
		No. on antibiotics at consult	Positive result ie antibiotics continued				
Urine	63	61	6	57	2	6	49
Chest	61	55	12	49	6	8	35
Skin/soft tissue	26	25	11	15	1	2	12
Intra-abdominal/biliary	21	17	12	9	4	0	5
Endocarditis	1	1	1	0	0	0	0
Central nervous system	6	2	0	6	4	2	0
Unknown	19	14	5	9	4	3	2
Total (%)	197 (100)	175 (88.8)	47 (23.9)	145 (73.6)	21 (10.7)	21 (10.7)	103 (52.2)

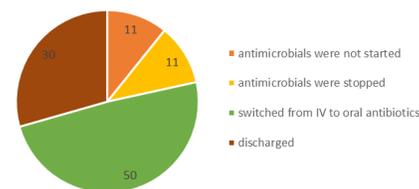
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1. Can rapid negative exclusion of blood cultures by a molecular method, Enzyme template generation and amplification technique (Cognitor® Minus), aid in antimicrobial stewardship? *Matthew Dryden, Agnes Sitjar, Zoe Gunning, Sophie Lewis, Richard Healy, et al. International Journal of Pharmacy Practice 2017*
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RESULTS cont...

A total of 246 blood culture samples were tested by ETGA® technique. In all cases, results (negative bacteraemia / fungaemia) were available the next day by 1 pm at the latest. 197 out of 246 samples yielded a negative result by ETGA®. The ETGA® result had a positive stewardship (antimicrobial intervention) outcome in 145 of 197 (73.6%) and negative stewardship outcome (empirical antimicrobials continued) in 47 (23.9%).

% of patients where ETGA® supported a positive stewardship decision, n=197.



ETGA® results were consistent with blood culture (BC) findings and gave an earlier negative result. The challenge was integrating laboratory testing with clinical review, as timing to deliver a clinically relevant result was crucial.



CONCLUSIONS

- ETGA® results delivered at an early stage is helpful in the management of antimicrobial therapy.
- This novel technology supports early antimicrobial review and equated to a true-negative bacteraemia and fungaemia.
- The Cognitor® Minus assay can be integrated into the laboratory and clinical schedule to provide expedient results to support clinical review and is crucial to antimicrobial stewardship.