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camo centre for antimicrobial optimisation

Optimising antimicrobial prescribing: Challenges and solutions in diagnostic stewardship

Novel diagnostics for infectious diseases

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Dr Timothy Miles Rawson, BSc (hons), MBBS, MRCP (UK), FRCpath, PDME, DTM&H, PhD
Health Protection Research Unit for Healthcare Associated Infections and Antimicrobial Resistance
Centre for Antimicrobial Optimisation, Imperial College London

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Microbiological diagnostics

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- Novel technologies to support the diagnosis and management of infectious diseases are emerging at an exponential rate.
- Diagnostics are important to help preserve the value of antimicrobials.
- Globally, the adoption of novel diagnostics within antimicrobial stewardship programmes is low.
- Generally, novel diagnostics remain undervalued.

Antimicrobial decision making

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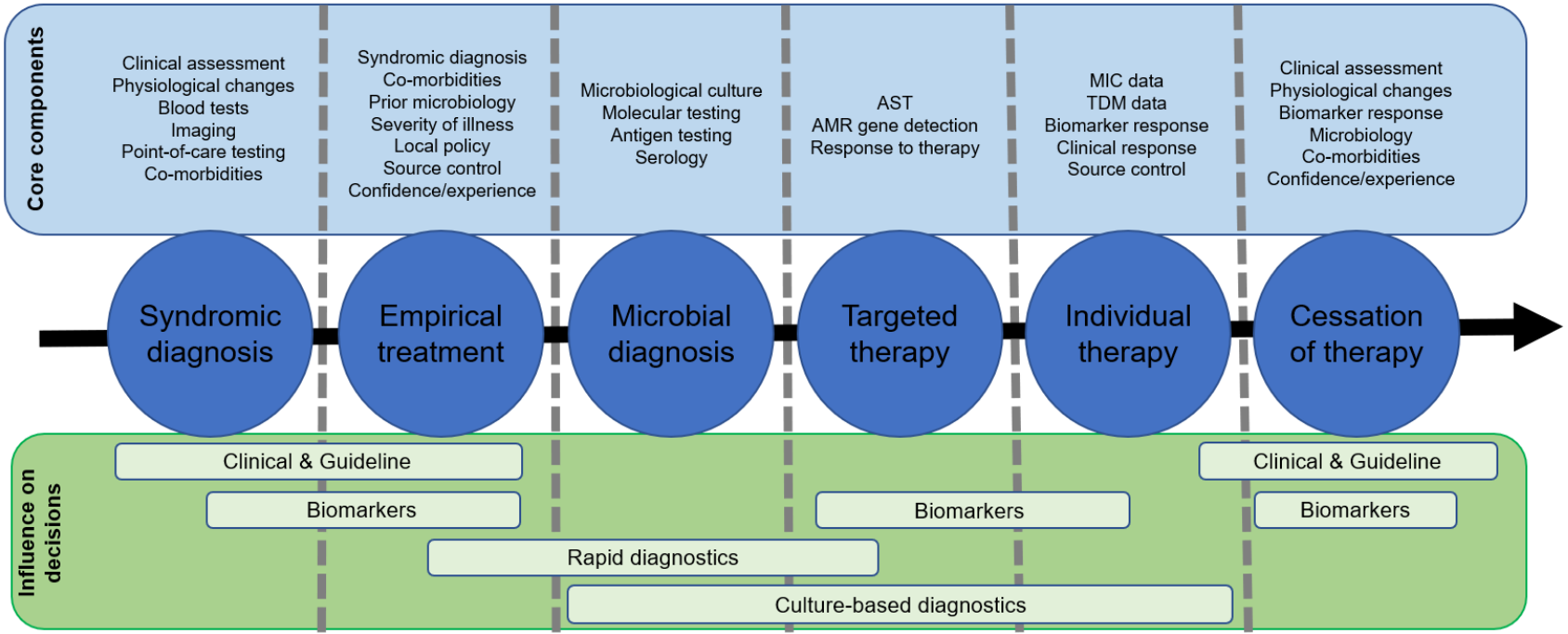

Rawson & Moore. Clinical Microbiology & Infection, 2023
Rawson et al. BMC Medicine; 2016

Traditional focus of diagnostics in antimicrobial stewardship

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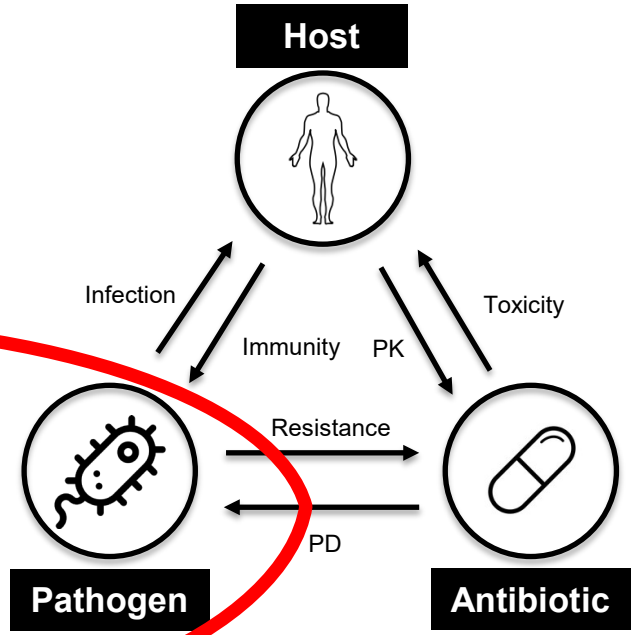
Challenge for microbiology:
How do we deliver appropriate information in timely fashion to help influence decision making?

Organism identification
Phenotypic antimicrobial susceptibility

Optimal antimicrobial prescribing



Antimicrobial stewardship

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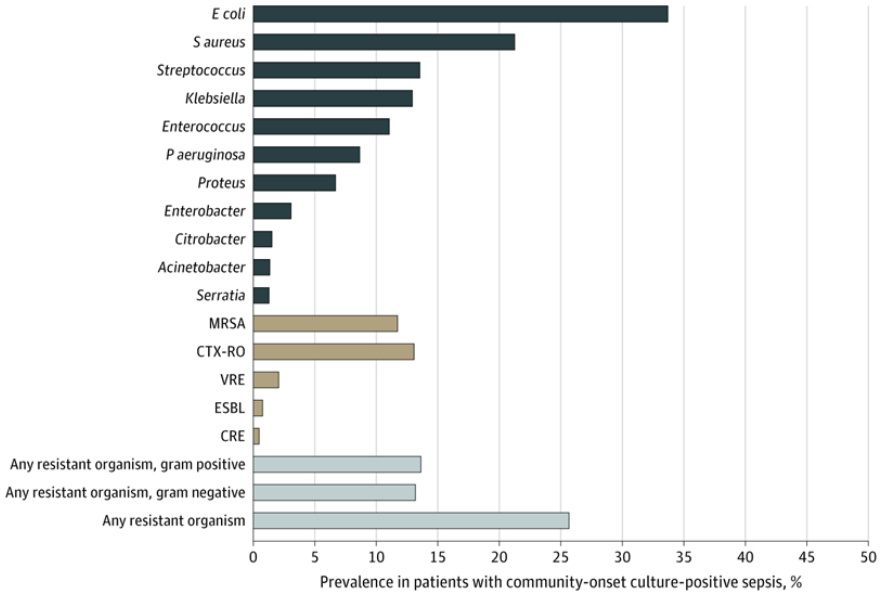
Community onset sepsis in the USA



17,430 patients admitted to hospital with culture confirmed sepsis in the USA.

Inadequate spectrum:

- In-hospital death increased (aOR:1.19; 95%CI:1.03-1.37)

Unnecessarily broad spectrum:

- In-hospital death increased (aOR:1.22; 95%CI:1.06-1.40)
- *C.difficile* risk increased (aOR:1.26; 95%CI:1.01-1.57)
- AKI risk (aOR:1.12; 95%CI:1.00-1.26)

Rhee et al. JAMA Net Open, 2020

Diagnostics support stewardship

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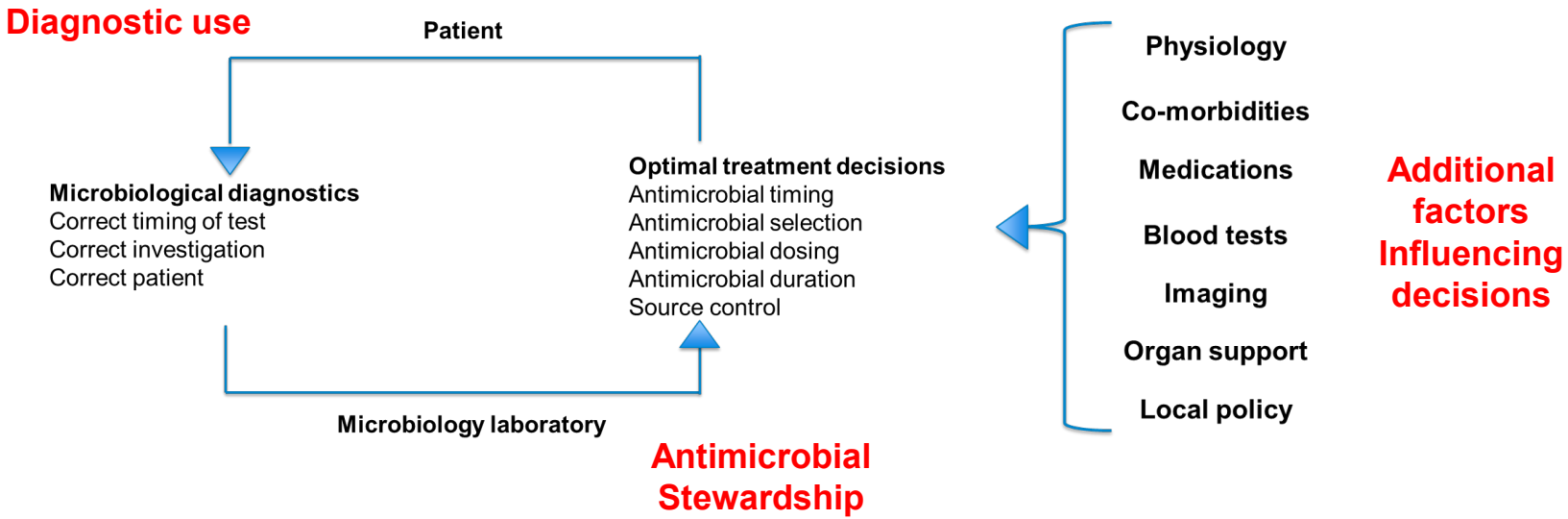
- Interventions are unlikely to be used in isolation.
- Numerous factors influence decisions on optimal treatment.
- Understanding integration with current decision pathways is key to adoption and impact.



Messacar et al. J Clin Micro 2017

Molecular diagnostics

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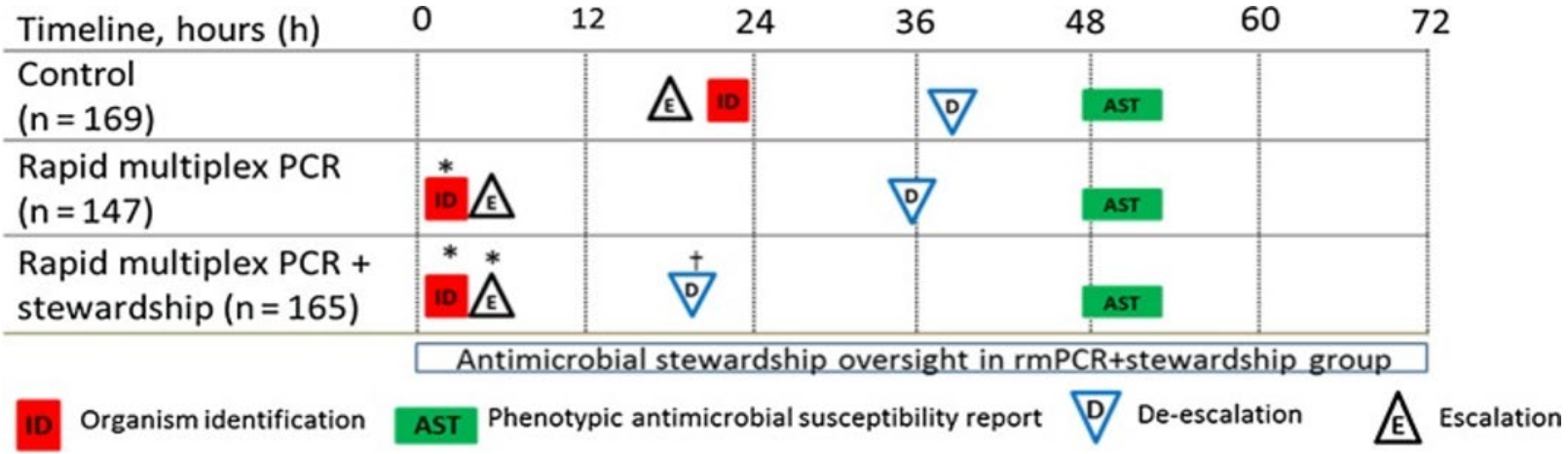
Blood stream infection management using rapid multiplex PCR



Organism identification:	Shortened by more than 20-hours
Linked with stewardship:	Quicker treatment de-escalation
Reduced:	Broad spectrum antimicrobial use
	Treatment of contaminants
No impact on:	Mortality, length of stay, or cost

Banerjee et al. CID 2015

Impact of rapid AST on prescribing decisions

Authors	Method	Appropriate therapy	De-escalation	Clinical
Beuving et al. 2015	n = 129 FAST n = 121 SoC RCT GPC & GNR	• 19 hours faster (when used)		• Poor adoption • No difference
Hogan et al 2020	n = 671 GNB Pre – post quasi-exp.	• 10 hours faster	• 10 hours faster	• Improved stewardship • Nil difference on clinical outcomes
Kim et al. 2021	n = 56 rAST n = 60 SOC RCT Haem Malig with BSI	• 34 hours faster	• 80% vs 57% appropriate within 72-hours.	• Not reported
Vazquez et al 2022	n = 93 RAST n = 98 SOC GNB RCT	• 19.5 hours faster to optimal • 18.5 hours faster to appropriate	• AG stopped 22 hours faster	• Nil difference
Christensen et al. 2022	n = 274 enrolled RCT rAST vs. SOC GN-BSI & source control	• 9 hours faster - not significant	• 35-hours faster to oral therapy	• Shorter length of stay – 2 days
Summary		• Faster time to appropriate/optimal therapy	• Reduce inappropriately broad therapy. • Early switching	• Limited data

Global barriers to use

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Rapid Diagnostic Test Value and Implementation in Antimicrobial Stewardship Across Low-to-Middle and High-Income Countries: A Mixed-Methods Review

Luke S. P. Moore · Maria Virginia Villegas · Eric Wenzler · Timothy M. Rawson · Rita O. Oladele · Yohei Doi · Anucha Apisarnthanarak

- Variable regional requirements
- Barriers to implementation
- Lack of high-quality evidence to support use of rapid diagnostics
- Defining added value

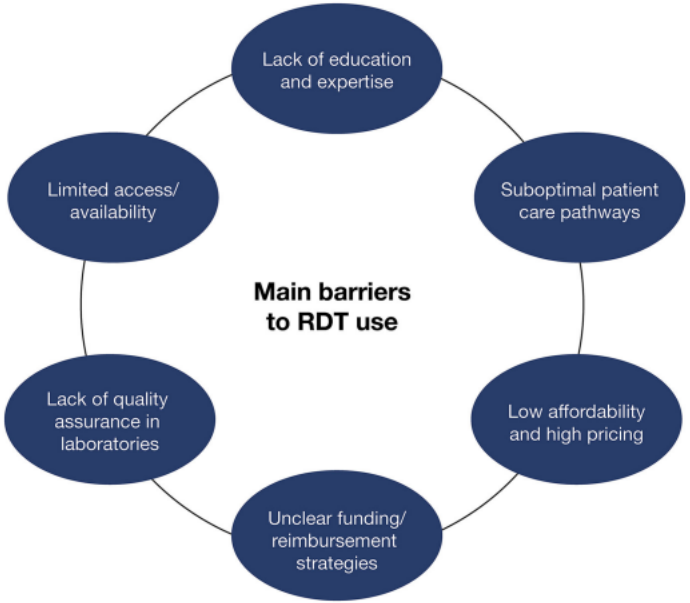

Fig. 1 Main barriers to use of RDTs, derived from EWG semi-structured interviews. *EWG* expert working group, *RDT* rapid diagnostic test

Moore et al. Infect Dis Ther 2023

Defining value beyond the individual

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Value framework modelled on STEDI principles used to evaluate the antimicrobial de-linkage pilot in England and consider value beyond the treated patient.

Value	Definition of benefit
Programme support	Enable specific antimicrobial stewardship interventions and provision of meta-data for delineating key performance indicators
Preserve	Quantifiable changes in antimicrobial consumption, appropriateness of antimicrobial prescriptions, and potential antimicrobial resistance
Practicable	Impact on laboratory and clinical area sample flow (including logistics, information technology, and personnel) and patient flow (including admission avoidance, and length of stay) across LMIC and HIC settings
Population health	Quantifiable impact on population health through both impact on infection transmission and speed of return to work
Precision	Evaluable test performance characteristics which may supersede existing traditional laboratory ‘gold standard’ diagnostics

Moore et al. Infect Dis Ther 2023

Summary

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- Novel diagnostics can potentially add significant value to stewardship programmes.
- Paucity of global high-quality evidence for clinical and economic value.
- Effective implementation strategies required to maximise adoption.
- Evaluation against broader framework (5P) to define value beyond individual impact.

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