
The Role of Diagnostics in the Management of Antibiotic Resistance

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Identification and Antimicrobial Susceptibility Testing

■ Objectives

- Rapid confirmation of infection and causative agent
- Reliable and fast detection of resistance mechanisms → rapid tailoring of antimicrobial therapy

Challenges	Barriers in developing/implementing new diagnostic tools	Next steps in the development of new diagnostic tools
Time to result too long	<p>Culture methods are still THE reference</p> <p>Direct diagnosis methods on specimen</p> <p>→ risk of lower performance (sensitivity, specificity)</p> <p>→ higher costs</p>	<p>Mass spectrometry, molecular methods for identification</p> <p>Innovation needed for AST</p> <p>Direct diagnosis on specimen required</p>
	<p>Reduce the specimen transportation time</p> <p>Reduce the reporting time</p>	<p>Near patient testing</p> <p>POC testing</p> <p>Automation</p>
True infections without diagnosis	<p>Antibiotic interference</p> <p>Low number of bacteria in the specimen</p> <p>Non-growing bacteria</p>	<p>Sequencing</p> <p>→ Time to result still too long</p> <p>→ Still high price</p> <p>→ Specimen preparation is still an issue</p> <p>→ Interpretation of data still complex</p>

Screening of Multi-Drug Resistant Organisms (MDRO)

■ Objectives

- Containment of the MDRO spread (MRSA, VRE, ESBL, carbapenemases...) through patients isolation (infection control programs)

Challenges	Barriers in developing/implementing new diagnostic tools	Next steps in the development of new diagnostic tools
Culture methods → time to result is long or time consuming		Automation (inoculation, reading)
Molecular methods → expensive or not easy to use		New generation of molecular methods: multiplexing, fully automated systems Near patient testing
Menu still too limited : missing carbapenemases, Multi-R P aeruginosa/ Acineto.	Fast evolution of resistance mechanisms Time for product development Regulation (FDA) delay developments	
Screening not enough implemented in hospital (benefits still unknown)	Missing knowledge Limited budgets in hospitals for screening. No global vision in hospitals on the benefits of screening and cost of diseases	Education Guidelines
Don't know what to do with a positive result	Missing knowledge	Education Guidelines

Host markers

■ Objectives

■ Direct access to host response

- Infection or not, type of infection
- Severity/predisposing factors

Challenges	Barriers in developing/ implementing new diagnostic tools	Next steps in the development of new diagnostic tools
Fast results		Near patient testing, POC testing,
Few biomarkers are available (PCT, interferon, cytokines..)	Exploratory/fundamental research phase...still discovering host markers Comprehensive, heavy and long clinical studies	Development of sequencing should help Increase research activities (funding)
The use of the existing biomarkers (PCT) is still limited in clinical wards	Not enough knowledge Get more proofs	Training Integration in guidelines

Point Of Care Testing / Rapid Testing

■ Objectives

- Immediate confirmation of the infection and causative agent and make the right medical decision (AB or not)

Challenges	Barriers in developing/ implementing new diagnostic tools	Next steps in the development of new diagnostic tools
Medical/nursing staff very busy and not used with diagnostic tests	Compromise between easiness and performance	Extreme ease of use (medical/ nursing staff)
Limited menu (Strep A, RSV, Influenzae, Rota...)	Extend menu	
Performance too low for some of them	Difficult and costly validation studies	Fund new studies
Clinical utility not enough demonstrated	Get proofs (publications)	Fund new studies
Accreditation	Manage QC and epidemiology aspects	Extend data management