Interpretation & Use of Newer Diagnostics

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UNMC
BREAKTHROUGHS FOR LIFE.

NE ASAP

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Disclosures

- BioMérieux: travel support and speaking payment
- Roon: advisor, stock options
- No AI tools were utilized for this presentation

Objectives

By the end of this lecture, participants should be able to:

1) Identify new diagnostic tests for antimicrobial stewardship and infection prevention teams using a systematic process
2) Describe commonly utilized molecular diagnostic test results

ID Diagnostics Landscape

Culture	Serology	Antigen	Molecular tests	Next generation sequencing
• Moderate sensitivity • Slow TAT • AST • May require invasive sampling • Inexpensive	• Non-specific • Slow TAT • No AST • Non-invasive • Inexpensive	• Low sensitivity • Rapid TAT • No AST • Non-invasive • Inexpensive	• High analytic sensitivity & specificity • Rapid TAT • Limited genotypic AST • May require invasive sampling • Moderately expensive	• Unknown test characteristics • Moderate to slow TAT • No AST • Non-invasive • Very expensive

AST: antimicrobial susceptibility testing; TAT: turn around time

Novel Molecular Syndromic Panels

Sterile Sites	Non-Sterile Sites
Blood culture identification panels	Upper & lower respiratory pathogen panels
Joint infection panels	Gastroenteritis panels
CNS infection panels	Vaginitis panels
Fever in returning traveler panels	UTI panels
Tickborne panels	Wound panels

- Caution with interpretation of panel results from non-sterile sites
  - Increased likelihood of detection of non-pathogenic and/or colonizing organisms
- Many are laboratory developed tests and often due not have significant published data to support their use
  - Clinical data essential for understand how tests are interpreted and utilized

Resistance Genes

Methicillin-resistance	• mecA/C: found in MRSA and MR-CONS • MREJ: only found in MRSA
Vancomycin-resistance	• Van A/B: only found in *Enterococcus* (mostly *E. faecium*)
Cephalosporin-resistance	• CTX-M: most common ESBL
Carbapenem-resistance	• KPC, NDM, IMP, VIM, OXA (carbapenemases)

Stewardship Implications

- Improve patient outcomes
  - Expedite transition from empiric to targeted treatment
  - Recommended by ASM guidelines
    - Defined communication plan
- Rapid identification of antimicrobial resistance
  - Initiate effective therapy

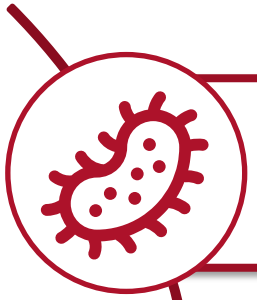
Wolk DW et al. *Clinical Microbiology Reviews*. 2025;38(3):e0013724. PMID: 40522178

Stewardship Implications

- Positive tests drive behavior around antimicrobial use
- Increased testing without stewardship does not improve clinical outcomes
    - Meta-analysis of 88 studies of rapid blood culture panel
        - Improved mortality, decreased LOS, and reduced time to optimal therapy
        - Only seen when ASP involved

Peri AM et al. *Clinical Infectious Diseases*. 2024;79(2):502-515. PMID: 38676943.

Infection Prevention Implications



Rapid detection of transmissible infections

Faster isolation removal

Recognize outbreaks of multidrug-resistant pathogens

Challenges of Molecular Testing

Over-detection

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Over-treatment

Interpretation challenging

Polymicrobial specimens affect accuracy

Added expense

Beware redundant testing

Clinical benefits variable

What's in the ID Diagnostics Pipeline?

NGS

- Detect rare pathogens
- Interpretation of common commensal organisms challenging to impossible
- Black box methodology and test characteristics
- Unclear net benefits to patient care with clear cost increase

Rapid Antimicrobial Susceptibility Testing

- Decreased time to targeted antibiotics
- Clinical outcomes?

NGS Examples
Plasma microbial cell-free DNA
Broad range PCR with reflex NGS with 16S and 28S rRNA
CSF metagenomic NGS

Banzai Pipeline, Oahu
(personal picture)

Banerjee R, et al. *JAMA*. 2026;335(20):1762-1773. PMID: 41999287.
Anton-Vazquez et al. *Cochrane Database Systematic Review*. 2021;2021(5):CD013235. PMID: 34097767.

When a Lab Offers a New Test…

- Multidisciplinary collaboration
- Test feasibility with available resources?
- Turn around time?
  - Does the test remain relevant within this time?
  - Can results be acted upon in a meaningful timeframe?
- Advantages compared to current tests?
- Gaps and limitations?
- Does it improve diagnosis or antibiotic use?
- Does it support current stewardship goals?

Incorporating New Tests

- Education is essential but insufficient
  - Current clinicians may have no experience with this test
- Customized, local guidance
  - Summarize national guidelines
  - Incorporate local antibiogram and formulary
- Must occur PRIOR or concurrent with implementation
- Consider restriction, clinical decision support, and close monitoring after implementation
- If net negative, consider de-implementation

Take Homes

- Novel tests are changing the paradigm
- Diagnostics alone rarely improve antibiotic use
  - Value of incorporating diagnostics in ASPs
- Use a systematic, multidisciplinary approach

Questions?

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