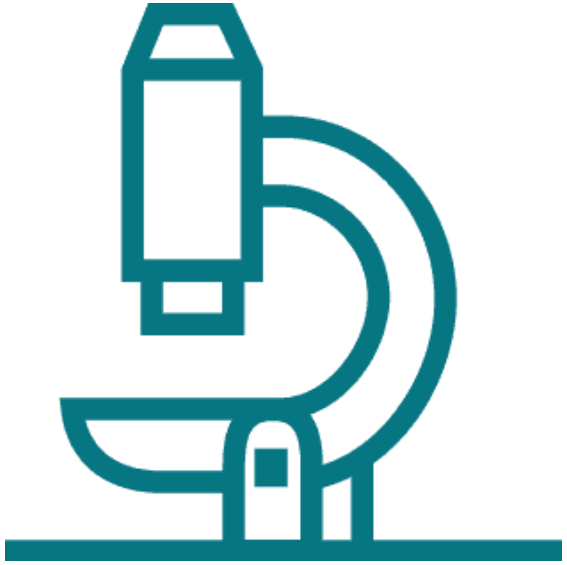
Integrating laboratory stewardship to reduce inappropriate management of common hospital acquired infections (HAIs)



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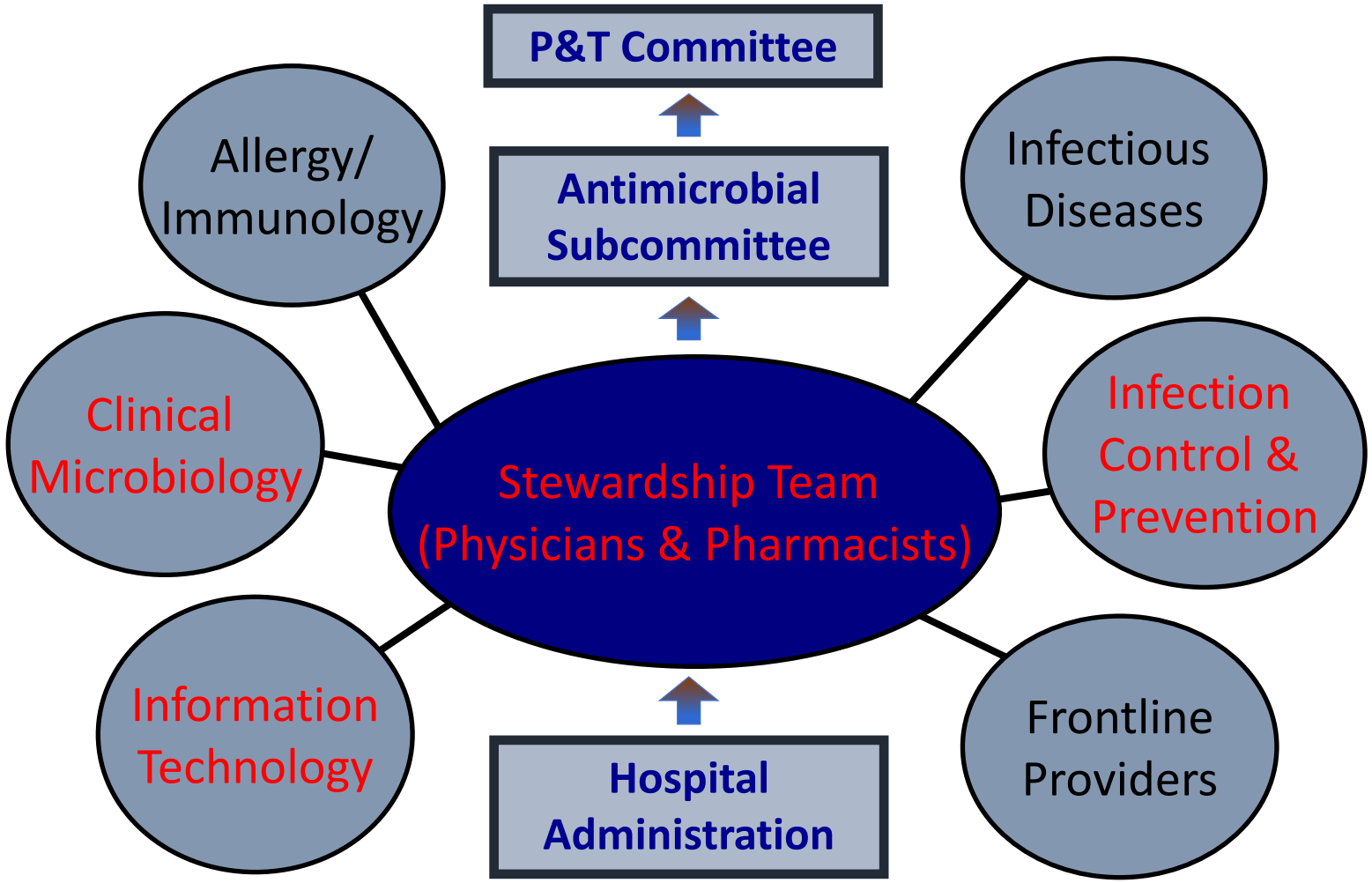
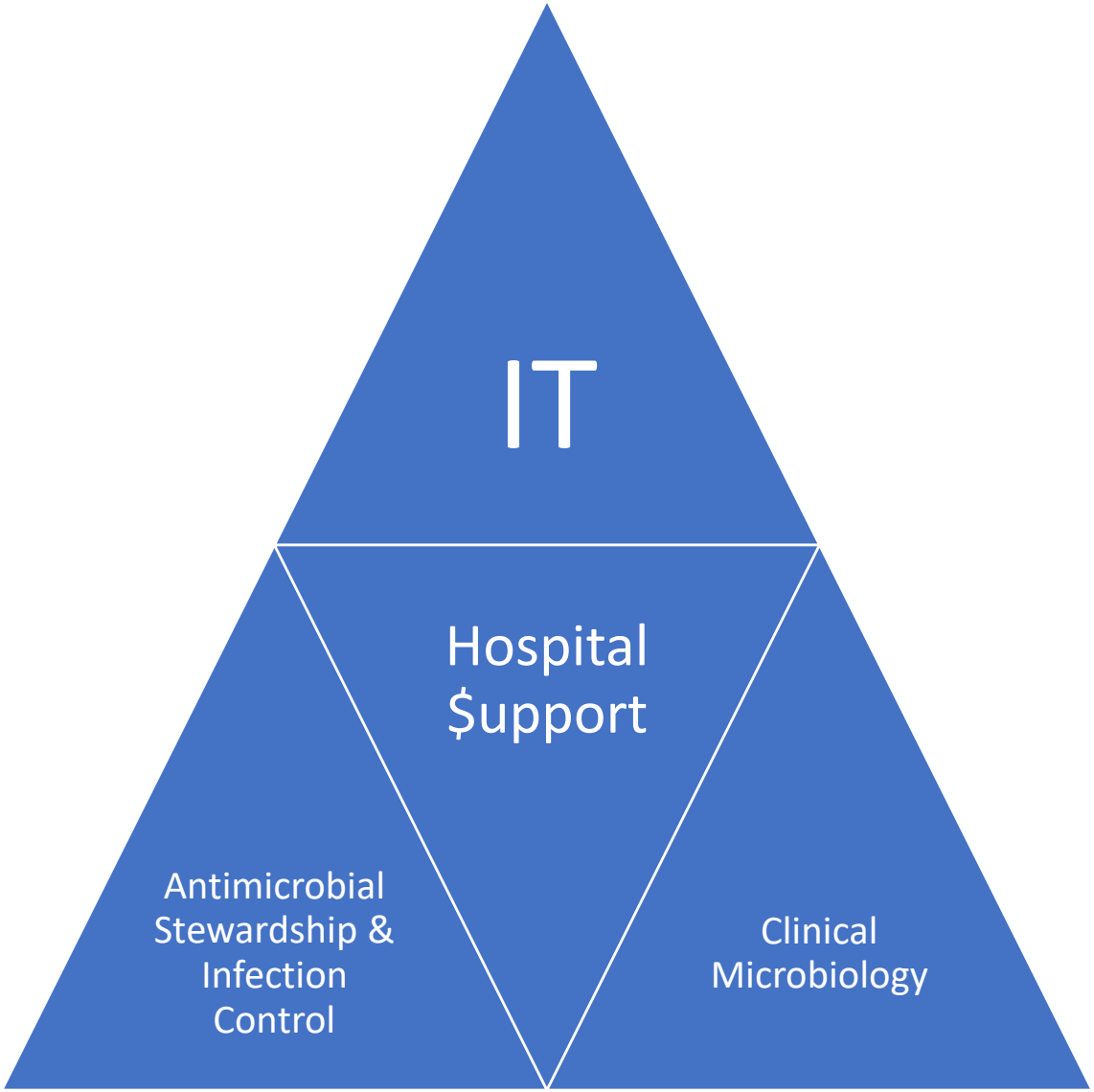
Disclosures

- Astellas Pharma: Consultant
- Cidara Therapeutics: Consultant
- AVIR Pharma: Speaker
- Shionogi, Inc.: Research funding

Antimicrobial Stewardship Team

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HAIs that have fee-for-service implications

- Five chart-abstracted measures of HAIs, submitted to CDC NHSN:
  - Central Line-Associated Bloodstream Infection (CLABSI)
  - **Catheter-Associated Urinary Tract Infection (CAUTI)**
  - Surgical Site Infection (SSI) for abdominal hysterectomy and colon procedures
  - Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia
  - ***Clostridioides difficile* Infection (CDI)**

https://www.cms.gov/medicare/medicare-fee-for-service-payment/hospitalacqcond

Clinical Infectious Diseases
MAJOR ARTICLE

Optimal Urine Culture Diagnostic Stewardship Practice—Results from an Expert Modified-Delphi Procedure

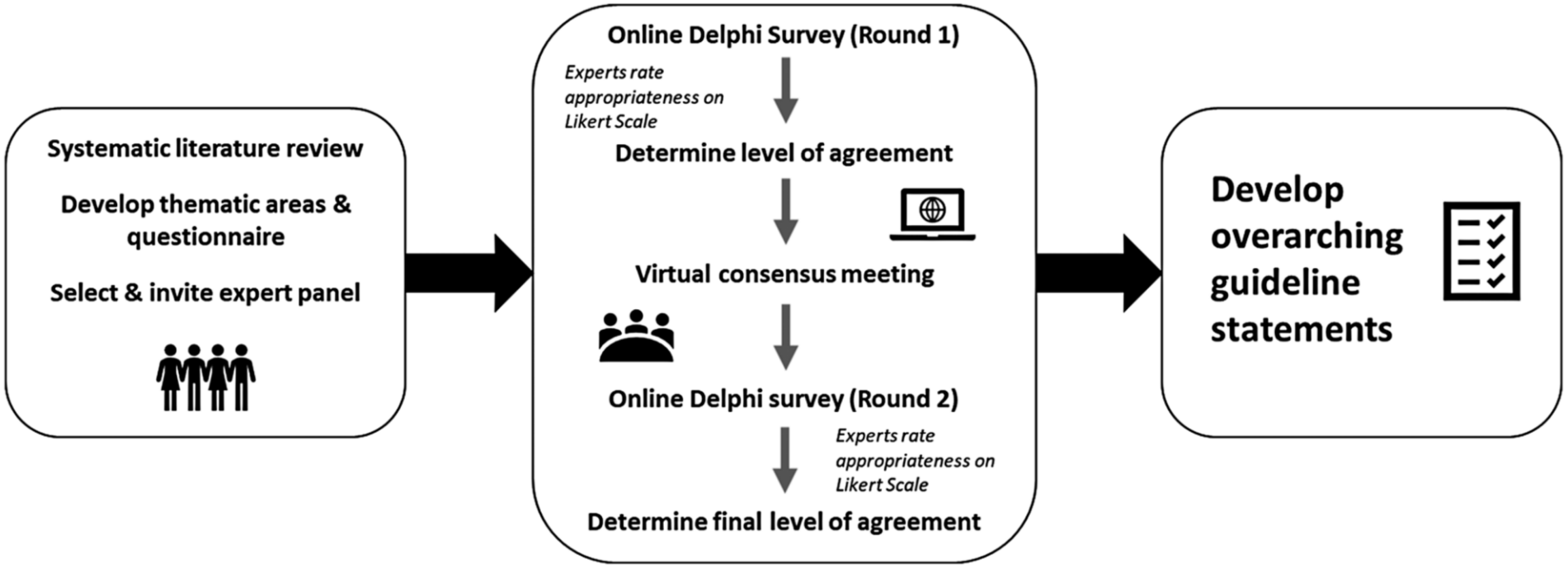


Figure 1. Key steps in the modified Delphi RAND/UCLA appropriateness method, including initial literature review and panel selection, survey distribution and initial meeting, and final agreement determination.

Claeys KC, et al. Clin Infect Dis. 2022 Aug 31;75(3):382-389.

Which urine cultures should be processed?

Table 2. Processing Urine Culture: Best Practices for Diagnostic Stewardship of Urine Culture Processing Included These Recommendations

Appropriate practices
• Use elevated urine white blood cell count as a criterion to reflex to urine culture when a clinician orders a urine culture (all settings)
• Require documentation of collection site method (eg, clean catch) prior to processing urine cultures
Inappropriate practice
• Automatically reflex routine urinalyses to urine cultures for abnormal findings when a urine culture was not specifically requested by the ordering clinician

Guidance is for all healthcare settings unless noted specifically. These recommendations apply to symptomatic patients only. Patients who do not have symptoms of urinary tract infection should not be cultured.

Claeys KC, et al. Clin Infect Dis. 2022 Aug 31;75(3):382-389.

How should results be relayed to clinicians?

Table 3. Reporting Urine Culture: Best Practices for Diagnostic Stewardship of Urine Culture Reporting Included These Recommendations

Appropriate practices
• For urine culture reports, to:
○ Inform clinicians that even high colony counts (ie, >100 000 CFU/mL) may not represent true infection in the absence of symptoms or signs[a]
○ Nudge clinicians to not treat asymptomatic bacteriuria[a]
○ Nudge clinicians to not treat mixed flora[a]
○ Differentiate typical uropathogens vs contaminants[a]
• Withhold urine culture results (including organism identification and antibiotic susceptibilities) when there are more than 2 unique bacterial strains identified in culture
• Preferentially report only Infectious Disease Society of America–recommended antibiotics if organism is susceptible
• Withhold fluoroquinolone susceptibilities unless there is resistance to preferred oral antibiotics
Inappropriate practices
• Nudge clinicians to not treat if there are <100 000 CFU/mL of bacteria
• Withhold information about urine culture organism identification or antibiotic susceptibilities unless the clinician contacts the clinical microbiology laboratory

Guidance is for all healthcare settings unless noted specifically. These recommendations apply to symptomatic patients only. Avoid unnecessary urine culturing in patients who do not have symptoms of true urinary tract infection.

Abbreviation: CFU, colony forming units/mL..

[a]Due to expert disagreement, this recommendation does not extend to those undergoing a urological procedure.

Claeys KC, et al. Clin Infect Dis. 2022 Aug 31;75(3):382-389.

The approach at my institution

- Urine cultures ordered **via "Urinalysis with reflex urine culture"**
  - Simultaneously specimen collected, and urine culture will be run only when urinalysis shows ≥10 WBC/hpf
  - Microbiology cancels urine culture when UA ≤24 hours of urine culture has <10 WBC/hpf
- Standalone urine cultures allowed for:
  - Documented pyuria (≥10 WBC/hpf) ≤3 days
  - Pregnancy
  - Impending urological procedure
  - Neutropenia (ANC < 1000)
  - Infant (Age < 3 years)
  - Renal transplant within the preceding 6 months
  - Infectious diseases request
  - Research Protocol

Clostridioides difficile Infection (CDI) Testing

- No current laboratory test alone that can distinguish between CDI and *C. difficile* colonization
- Highly sensitive molecular diagnostic tests w/o clinical correlation will lead to over-diagnosis of CDI and increased facility CDI rates
- Diagnostic stewardship approaches with highest success include:
  - Multidisciplinary team, computerized clinical decision support, interventions, face-to-face feedback, and real-time evaluations
- Current guidelines recommend a two-step, algorithmic approach for testing

Boly FJ, et al. Curr Infect Dis Rep. 2020 Mar;22(3):7.
McDonald LC, et al. Clin Infect Dis. 2018 Mar 19;66(7):987-994.

IDSA/SHEA endorses a multistep algorithm for CDI testing

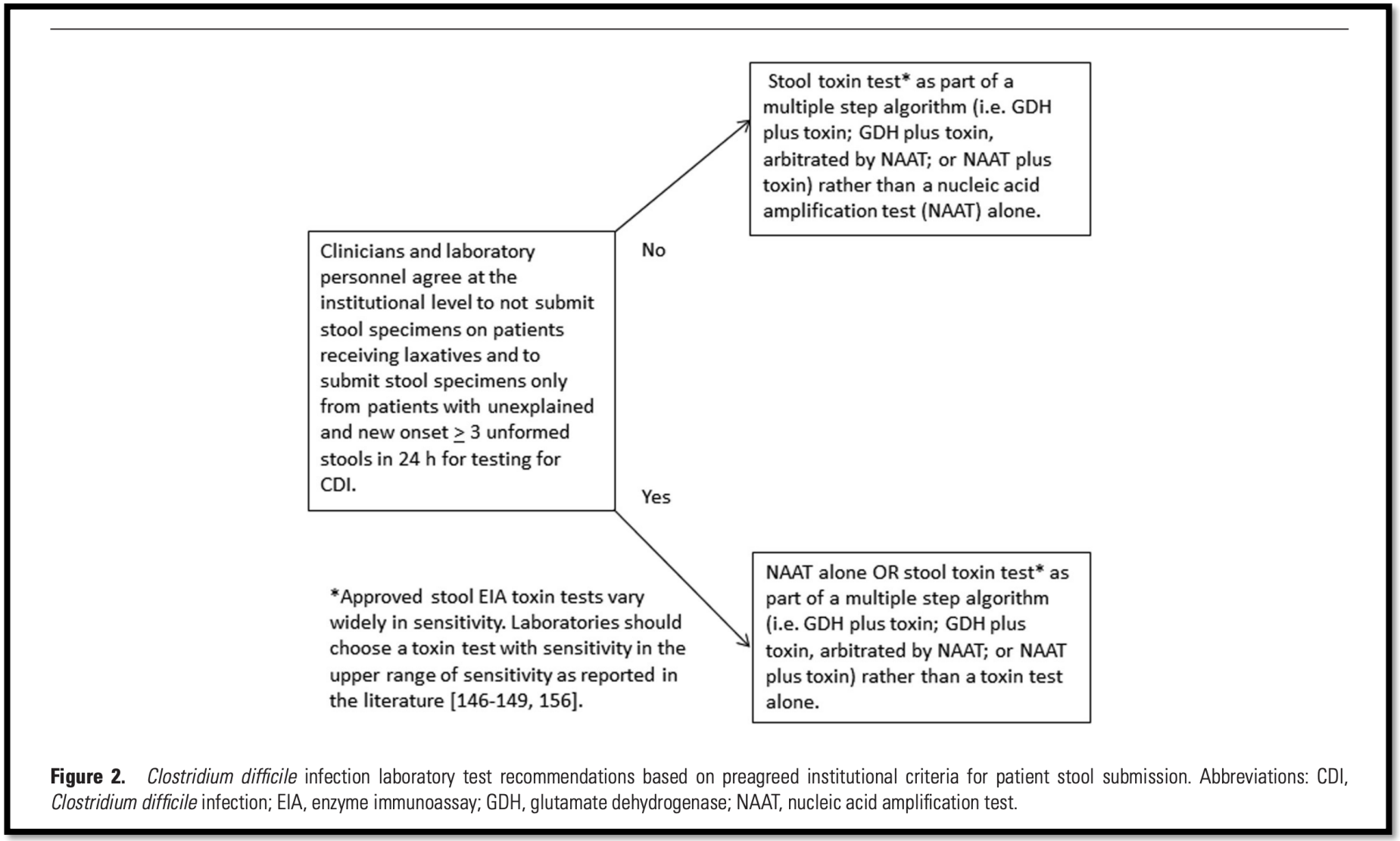


Figure 2. *Clostridium difficile* infection laboratory test recommendations based on preagreed institutional criteria for patient stool submission. Abbreviations: CDI, *Clostridium difficile* infection; EIA, enzyme immunoassay; GDH, glutamate dehydrogenase; NAAT, nucleic acid amplification test.

McDonald LC, et al. Clin Infect Dis. 2018 Mar 19;66(7):987-994.

We limit C diff PCR testing on discordant results

Component	Value
C. diff GDH	Positive
C. DIFFICILE TOXIN	Negative

A message from BWH Infectious Diseases:
Toxin Negative, Antigen Positive for C.difficile: Treatment usually not indicated (see below).
The C.difficile antigen test does not distinguish between asymptomatic colonization and clinical disease. The negative toxin assay makes active disease unlikely.
If your patient has signs of active C.difficile disease (severe diarrhea, fever, leukocytosis, and/or abdominal pain), PCR testing can help rule out C.difficile if negative but, like the antigen, a positive test does not distinguish between colonization and infection.
If you wish to get a PCR please call the Clostridium difficile Approval pager (30880) unless ID has been consulted, in which case you can discuss with the ID consult team.

C diff PCR Approval pager = Antimicrobial Approval Pager

MRSA Nasal Screening

› Ann Pharmacother. 2019 Jun;53(6):627-638. doi: 10.1177/1060028018823027. Epub 2019 Jan 2.

Systematic Review of the Clinical Utility of Methicillin-Resistant Staphylococcus aureus (MRSA) Nasal Screening for MRSA Pneumonia

Melanie N Smith [1], Amy L Brotherton [2], Katherine Lusardi [3], Carrie A Tan [4], Drayton A Hammond [4]

ELSEVIER

Journal of Critical Care
Volume 38, April 2017, Pages 168-171

Clinical Potpourri

Clinical utility of methicillin-resistant *Staphylococcus aureus* nasal polymerase chain reaction assay in critically ill patients with nosocomial pneumonia ☆

Melanie N. Smith PharmD, BCPS ✉, Michael J. Erdman PharmD, BCPS ✉, Jason A. Ferreira PharmD, BCPS, BCCCP ✉, Petra Aldridge MS ✉, Christopher A. Jankowski PharmD, BCPS ✉

› Am J Health Syst Pharm. 2021 Dec 9;78(24):2236-2244. doi: 10.1093/ajhp/zxab296.

Effect of rapid methicillin-resistant Staphylococcus aureus nasal polymerase chain reaction screening on vancomycin use in the intensive care unit

Calvin Diep [1], Lina Meng [1], Samaneh Pourali [1], Matthew M Hitchcock [2], William Alegria [1], Rebecca Swayngim [3], Ran Ran [4], Niaz Banaei [5 6], Stan Deresinski [7], Marisa Holubar [7]

Affiliations + expand

PMID: 34297040 PMCID: PMC8661079 DOI: 10.1093/ajhp/zxab296

Free PMC article

› Cureus. 2019 Dec 13;11(12):e6378. doi: 10.7759/cureus.6378.

Impact of a Pharmacist-driven Methicillin-resistant Staphylococcus aureus Polymerase Chain Reaction Nasal Swab Protocol on the De-escalation of Empiric Vancomycin in Patients with Pneumonia in a Rural Healthcare Setting

Precious Dadzie [1], Tyson Dietrich [2], John Ashurst [3]

Affiliations + expand

PMID: 31938656 PMCID: PMC6957033 DOI: 10.7759/cureus.6378

Free PMC article

Clinical Infectious Diseases

MAJOR ARTICLE

The Clinical Utility of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nasal Screening to Rule Out MRSA Pneumonia: A Diagnostic Meta-analysis With Antimicrobial Stewardship Implications

Diane M. Parente,[1] Cheston B. Cunha,[2,3] Eleftherios Mylonakis,[2,3] and Tristan T. Timbrook[4]

[1]Department of Pharmacy, The Miriam Hospital, [2]Infectious Disease Division, Rhode Island Hospital and The Miriam Hospital, and [3]Division of Infectious Diseases, Brown University, Warren Alpert Medical School, Providence, Rhode Island; and [4]Department of Pharmacy, University of Utah Health Care, Salt Lake City

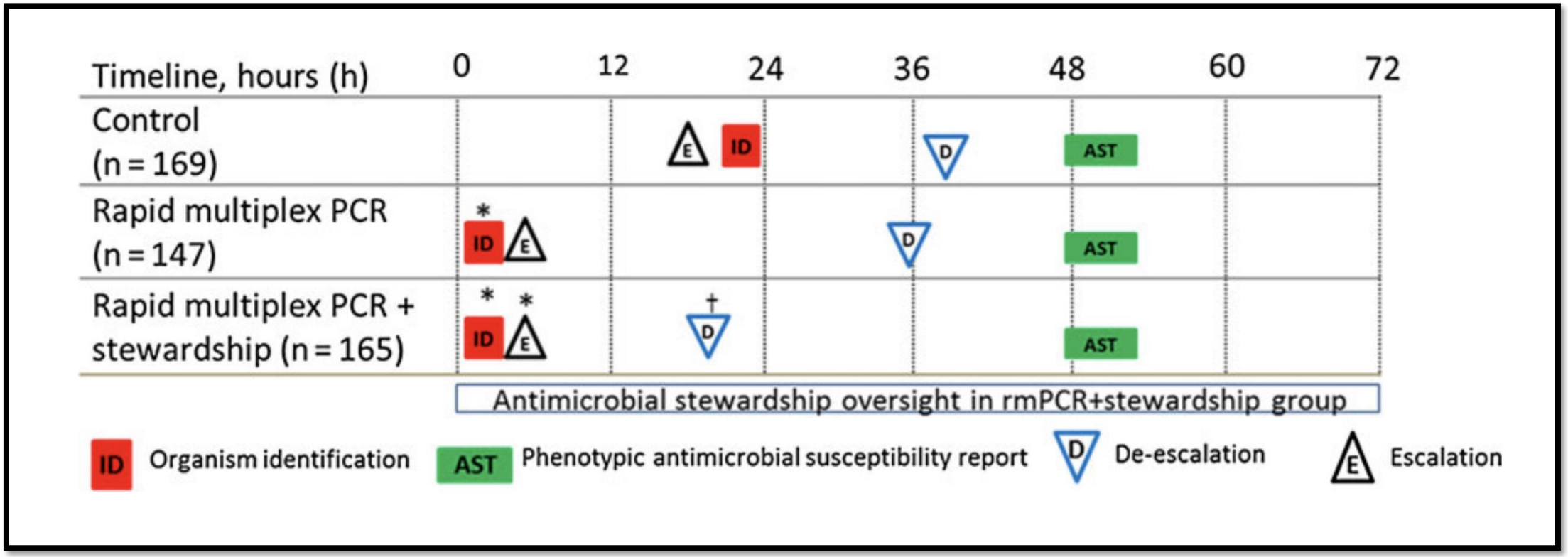
Open Forum Infectious Diseases

BRIEF REPORT

Prospective Nasal Screening for Methicillin-Resistant *Staphylococcus aureus* in Critically Ill Patients With Suspected Pneumonia

Nicholas Raush,[1] Kevin D. Betthauser,[2] Karen Shen,[3] Tamara Krekel,[2] and Marin H. Kollef[4]

Rapid Diagnostic Testing w/o ASP intervention



Banerjee R, et al. Clin Infect Dis. 2015 Oct 1;61(7):1071-80.

Conclusions

- The microbiology lab is an essential member of a multidisciplinary team in the provision of effective antimicrobial stewardship and management of HAIs

- Diagnostic stewardship requires a multimodal approach to decide which diagnostic tests are used, how they are ordered, and how the results relayed to providers and the ASP team