MAYO CLINIC LABORATORIES

Test Definition: URNS

Bacterial Culture, Aerobic, with Antimicrobial Susceptibilities, Urine

Overview

Useful For

Diagnosing urinary tract infections

May be helpful in discriminating contamination, colonization, and infection

Determining the in vitro antimicrobial susceptibility of potentially pathogenic aerobic bacteria, if appropriate

This test is **not intended for** medicolegal use.

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
COMM	Identification Commercial Kit	No, (Bill Only)	No
RMALD	Ident by MALDI-TOF mass spec	No, (Bill Only)	No
GID	Bacteria Identification	No, (Bill Only)	No
REFID	Additional Identification Procedure	No, (Bill Only)	No
STAP	Identification Staphylococcus	No, (Bill Only)	No
STRP	Identification Streptococcus	No, (Bill Only)	No
SALS	Serologic Agglut Method 1 Ident	No, (Bill Only)	No
EC	Serologic Agglut Method 2 Ident	No, (Bill Only)	No
SHIG	Serologic Agglut Method 3 Ident	No, (Bill Only)	No
SIDC	Ident Serologic Agglut Method 4	No, (Bill Only)	No
ISAE	Aerobe Ident by Sequencing	No, (Bill Only)	No
PCRID	Identification by PCR	No, (Bill Only)	No
BLA	Beta Lactamase	No, (Bill Only)	No
MIC	Susceptibility, MIC	No, (Bill Only)	No
SUS	Susceptibility	No, (Bill Only)	No
MECAB	mecA PCR Test, Bill Only	No, (Bill Only)	No

Testing Algorithm

When this test is ordered, the reflex tests may be performed at an additional charge. Antimicrobial agents appropriate to the organism and specimen source will be tested according to Mayo Clinic's practice and the laboratory's standard operating procedures.

The following tables list the antimicrobials routinely tested in the laboratory as well as antimicrobials that may be tested upon request. These tables are organized by isolate groups and are not all inclusive. Call 800-533-1710 and ask to speak to the Bacteriology Antimicrobial Susceptibility Testing Laboratory if the organism or antimicrobial of interest are not listed in these tables.

-Aerobic Gram-Negative Bacilli Antimicrobials
-Additional Gram-Negative Bacteria Antimicrobials
-Staphylococcus, Enterococcus, Bacillus, and Related Genera Antimicrobials
-Additional Gram-Positive Bacteria Antimicrobials

Special Instructions

- Aerobic Gram-Negative Bacilli Antimicrobials
- Additional Gram-Negative Bacteria Antimicrobials
- Staphylococcus, Enterococcus, Bacillus, and Related Genera Antimicrobials
- Additional Gram-Positive Bacteria Antimicrobials

Method Name

Conventional Quantitative Culture Technique/Identification of Pathogens with Minimal Inhibitory Concentration (MIC) (Agar Dilution or Broth Microdilution or Gradient Diffusion) or Disk Diffusion, (if appropriate)

NY State Available

Yes

Specimen

Specimen Type

Urine

Shipping Instructions

Specimen must arrive within 72 hours of collection.

Necessary Information

Specimen source is required.

Specimen Required

Supplies: Boric Acid Urine Preservative Tube, 4 mL (T996)
Collection Container/Tube: Clean, plastic urine collection container
Submission Container/Tube: Commercially available transport system intended for the collection and transport of urine

samples for culture and sensitivity testing of bacteria (4 mL of lyophilized maintenance formula; BD Vacutainer C and S Preservative and BD Vacutainer C and S Boric Acid Sodium Borate/Formate)

Specimen Volume: 4 mL

Collection Instructions:

1. Collect a random urine specimen.
2. Transfer 4 mL into the boric acid transport tube.
3. Send ambient in transport tube. **Do not aliquot from transport tube.**

Additional Information: Aliquots from transport tube and frozen specimens are **not acceptable.**

Specimen Stability Information: Ambient 72 hours

Specimen Minimum Volume

See Specimen Required

Reject Due To

Frozen specimens	Reject
Aliquots from transport tubes	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Varies		

Clinical & Interpretive

Clinical Information

Urinary tract infection (UTI) encompasses a broad range of clinical entities that vary in their clinical presentation, degree of tissue invasion, epidemiologic setting, and antibiotic therapy requirements. There are 4 major types of UTIs: urethritis, cystitis, acute urethral syndrome, and pyelonephritis. UTIs may also be classified as uncomplicated or complicated. *Escherichia coli* is the leading cause of uncomplicated community-acquired UTI. Risk factors that predispose one to complicated UTIs include underlying diseases that are associated with kidney infection (eg, diabetes); kidney stones; structural or functional urinary tract abnormalities and indwelling urinary catheters. Another classification of UTIs is as upper UTI (related to the kidney, renal pelvis, or ureter) or lower UTI (urinary bladder and urethra). The classic symptoms of upper UTI are fever (often with chills) and flank pain. Frequent painful urination, urgency, and dysuria are more often associated with lower UTI.

Antimicrobial susceptibility testing determines the minimal inhibitory concentration (MIC) value of selected antimicrobial agents against isolated potentially disease-causing bacteria. The MIC is the lowest antimicrobial concentration (of a series of increasing concentrations) that inhibits growth of the bacterium. Agar dilution MIC testing

is performed by testing for growth of bacteria on agar plates containing varying concentrations of antimicrobial agents.

For each organism-antimicrobial agent combination, the Clinical and Laboratory Standards Institute and/or the European Committee on Antimicrobial Susceptibility Testing provides interpretive criteria for determining whether the MIC should be interpreted as susceptible, susceptible-dose dependent, intermediate, nonsusceptible, resistant, or epidemiological cutoff value.

Reference Values

No growth, Organism present less than 10,000 cfu/mL or urogenital microbiota.

Identification of probable pathogens with colony count ranges.

Susceptibility results are reported as minimal inhibitory concentration (MIC) in mcg/mL. Breakpoints (also known as clinical breakpoints) are used to categorize an organism as susceptible, susceptible-dose dependent, intermediate, resistant, or nonsusceptible according to breakpoint setting organizations, either the Clinical and Laboratory Standards Institute (CLSI) or the European Committee on Antimicrobial Susceptibility Testing (EUCAST), as applicable.

In some instances, an interpretive category cannot be provided based on available data; therefore, the following comment will be included in the report: There are no established interpretive guidelines for agents reported without interpretations.

For information regarding CLSI and EUCAST susceptibility interpretations, see Susceptibility Interpretative Category Definitions.

Interpretation

In general, the isolation of more than 100,000 colony forming units (cfu)/mL of a urinary disease-causing organism is indicative of urinary tract infection (UTI) however, pediatric patients (< or =2 years of age) may have symptomatic UTI at a lower threshold, or more than 50,000 cfu/mL. Isolation of 2 or more organisms with more than 10,000 cfu/mL may suggest specimen contamination. For specimens contaminated with the usual bacterial urogenital microbiota, bacteria that are potentially disease-causing are identified.

A "susceptible" category result and a low minimal inhibitory concentration value indicate in vitro susceptibility of the organism to the antimicrobial tested.

Refer to the Reference Values section for interpretation of various antimicrobial susceptibility interpretive categories (ie, susceptible, susceptible-dose dependent, intermediate, nonsusceptible, resistant, or epidemiological cutoff value.

Cautions

Although urine is normally sterile, contamination by organisms normally present in the urethra or on periurethral surfaces can allow a proliferation of these organisms yielding misleading urine culture results.

Urine held at ambient temperature for more than 30 minutes supports the growth of both disease-causing organisms and contaminants, leading to potentially inaccurate colony counts.

Urine obtained from catheter bags at the bedside and Foley catheter tips are unacceptable for culture.

When antimicrobial susceptibilities are performed, in vitro susceptibility does not guarantee clinical response. Therefore, the decision to treat with a particular agent should not be based solely on the antimicrobial susceptibility testing result.

Clinical Reference

1. Forbes BA, Sahm DF, Weissfeld AS. Infections of the urinary tract. In: Bailey and Scott's Diagnostic Microbiology. 12th ed. Mosby; 2007:842-855
2. Miller JM, Binnicker JM, Campbell S, et al. A guide to utilization of the microbiology laboratory for diagnosis of infectious diseases: 2018 Update by the Infectious Diseases Society of America and the American Society for Microbiology. Clin Infect Dis. 2018;67(6):e1-e94. doi:10.1093/cid/ciy381
3. Procop GW, Church DL, Hall GS, et al. Introduction to microbiology part II: Guidelines for the collection, transport, processing, analysis, and reporting of cultures from specific specimen sources. In: Koneman's Color Atlas and Textbook of Diagnostic Microbiology. 7th ed. Wolters Kluwer Health; 2017:66-110
4. Clinical and Laboratory Standards Institute (CLSI): Performance Standards for Antimicrobial Susceptibility Testing. 34th ed. CLSI supplement M100. CLSI; 2024;4-6, 7-9, 338-341

Performance

Method Description

The urine specimen is inoculated onto sheep blood agar and eosin methylene blue agar using a calibrated loop. Following 18 to 24 hours of incubation, semiquantitative colony counts are determined and disease-causing organisms or possible disease-causing organisms are identified using one or a combination of the following techniques: commercial identification strips or panels, matrix-assisted laser desorption/ionization-time of flight mass spectrometry, conventional biochemical tests, carbon source utilization, real-time polymerase chain reaction, and nucleic acid sequencing of the 16S ribosomal RNA gene. Cultures with fewer than 10,000 colony-forming unit (cfu)/mL of a single species are reported as "Organism present <10,000 cfu/mL." The presence of commensal microbiota of the urethra (contaminants) and mixed cultures of organisms present in colony counts below 10,000 cfu/mL are reported as "Urogenital microbiota."(Chan WW. Urine cultures. In: Leber AL, ed. Clinical Microbiology Procedures Handbook. Vol 1. 4th ed. ASM Press; 2016:section 3.12)

When antimicrobial susceptibility testing is performed, an agar dilution method is used for routine testing. The agar dilution method employs the use of antimicrobial agents incorporated in agar plates. The antimicrobial is added to agar in various concentrations depending upon levels attainable in serum, urine, or both. A standardized suspension of the organism is applied to the agar plates, which are incubated for a minimum of 16 to 18 hours at 35 degrees C. Complete inhibition of all but one colony or a very fine residual haze represents the endpoint.(Clinical and Laboratory Standards Institute [CLSI]: Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically. 11th ed. CLSI standard M07. CLSI; 2018)

Daptomycin and tigecycline are tested by agar gradient diffusion.(Clinical and Laboratory Standards Institute [CLSI]: Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically. 11th ed. CLSI standard M07. CLSI; 2018; package insert: Etest Biomerieux;15203E-EN-2016/07. Available at www.biomerieux.com/techlib)

Cefiderocol is tested by disk diffusion.(Clinical and Laboratory Standards Institute [CLSI]: Performance Standards for Antimicrobial Disk Susceptibility Tests. 13th ed. CLSI standard M02. CLSI; 2018)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
2 to 5 days

Specimen Retention Time
1 day

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
87086-Bacterial Culture, Aerobic, Urine
87077-Identification commercial kit (if appropriate)
87077-Ident by MALDI-TOF mass spec (if appropriate)
87077-Bacteria Identification (if appropriate)
87077-Additional Identification procedure (if appropriate)
87077-Identification Staphylococcus (if appropriate)
87077-Identification Streptococcus (if appropriate)
87147 x 1-3-Serologic agglut method 1 ident (if appropriate)
87147-Serologic agglut method 2 ident (if appropriate)
87147 x 4-Serologic agglut method 3 ident (if appropriate)
87147 x 2-6-Serologic Agglut Method 4 Ident (if appropriate)
87153-Aerobe ident by sequencing (if appropriate)

87150-Identification by PCR (if appropriate)
87185-Beta lactamase (if appropriate)
87186-Antimicrobial Susceptibility, Aerobic Bacteria, MIC-per organism for routine battery (if appropriate)
87181-Susceptibility per drug and per organism for drugs not in routine battery (if appropriate)
87150-mec A PCR (if appropriate)
87150 x 5 Carbapenem resistance genes (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
URNS	Bacterial Culture, Aerobic + Susc	630-4

Result ID	Test Result Name	Result LOINC® Value
URNS	Bacterial Culture, Aerobic + Susc	630-4