Gastrointestinal Bacterial Panel

Indications for Ordering

Aid in the diagnosis of gastrointestinal (GI) infections caused by pathogenic bacteria

Test Description

Qualitative polymerase chain reaction (PCR)

Tests to Consider

Typical testing strategy

- Stool culture for enteric bacterial pathogens
- Toxin testing by immunoassay for Shiga-toxigenic E. coli

Primary test

Gastrointestinal Bacterial Panel by PCR 2012678

- Use as a sensitive alternative to traditional stool culture to detect the most common GI bacterial pathogens
  - Salmonella
  - Shigella/Enteroinvasive E. coli
  - Campylobacter jejuni/coli
  - Shiga-toxigenic E. coli
- Can also detect Campylobacter upsaliensis, which cannot be readily cultured

Related tests

Stool Culture and E. coli Shiga-like Toxin by EIA 0060134

- Preferred test for suspected bacterial diarrhea evaluation
- Cultures include
  - Salmonella
  - Shigella
  - Campylobacter
  - E. coli O157
- Enzyme immunoassay (EIA) for Shiga-like toxin from E. coli
- Use to rule out Aeromonas and Plesiomonas

Stool Culture, Campylobacter 0060135

- Identify presence of Campylobacter spp in stool as potential cause of diarrhea with appropriate exposure history or risk factors
- Culture is optimized only for C. jejuni/C. coli

Campylobacter Antigen 0058002

- Not recommended
  - Poor positive predictive value

E. coli Shiga-like Toxin by EIA 0060047

- Detects Shiga toxins, sensitive markers of toxigenic E. coli
  - CDC recommends stool specimens also be cultured for E. coli O157:H7 (O157 STEC)
  - Sensitivity is lower than for PCR

Disease Overview

Incidence

- Campylobacter spp
  - Leading cause of bacterial gastroenteritis worldwide, with peak incidence in children <5 years
  - Campylobacter-caused diarrheal cases are sporadic, but most occur in the spring and fall
  - Associated with incorrect food handling practices, consumption of poorly cooked poultry or raw milk, contact with pets, travel
  - Outbreaks are most often associated with raw milk and contaminated water
- Shiga-toxigenic E. coli
  - Virulence is attributable to production of Shiga-like toxin 1 and/or 2
  - Outbreaks from consumption of undercooked meats and produce (washing produce has been shown to be ineffective)
- Salmonella spp
  - Incidence of cases nearly equal to Campylobacter and often outbreak associated
  - Undercooked or uncooked foods, contact with infected animals
  - Nonsymptomatic patients can transmit disease to others
- Shigella spp
  - Common in countries with poor sanitation
  - Accounts for small percentage of reported outbreaks of foodborne illness in U.S.
  - Fecal/oral route
  - Higher-risk groups – daycare personnel and clients, nursing home residents, and men who have sex with men

Diagnostic issues

- Culture can be insensitive due to variables associated with specimen collection and transport
- PCR will not detect all possible enteric bacterial pathogens
- Antigen detection is often not performed and can be insensitive

Treatment issues

- Treatment is rarely indicated
- Most infections are self-limiting
- Spread of infection to close contacts is a concern for some bacterial species
Test Interpretation

Sensitivity/specificity

• Analytical sensitivity
  o Limit of detection
    ▪ Shigella – 36,200 copies/mL
    ▪ Salmonella – 1,520 copies/mL
    ▪ Campylobacter jejuni/coli – 3,780 copies/mL
    ▪ Campylobacter upsaliensis – 1,510 copies/mL
    ▪ Shiga-like toxin 1 – 5,180 copies/mL
    ▪ Shiga-like toxin 2 – 4,080 copies/mL
  
• Analytical specificity
  o No cross-reactivity seen for 43 organisms (bacteria, viruses, and parasites) tested

Results

• Detected – detection of bacterial nucleic acid in stool
• Not detected – no bacterial nucleic acid identified
• Inhibited – stool specimens may contain inhibitors of molecular tests
  o These specimens cannot be resolved

Limitations

• Negative result does not rule out
  o Presence of PCR inhibitors in the patient specimen
  o Test-specific nucleic acid in concentrations below the level of detection
• Molecular assays will not detect rare or unusual enteric bacterial pathogens that are not specifically targeted by the test
  o eg, Aeromonas, Pleisomonas, Yersinia, Vibrio, and enterotoxigenic E. coli
• A bacterial isolate is not obtained if antimicrobial susceptibility testing is indicated