Microbiology Clinical Brief: The Gastrointestinal Pathogen (GIP) Panel

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KEY POINTS/LABORATORY POLICY

1. The Gastrointestinal Pathogen (GIP) panel, a rapid multiplex PCR assay for the 22 most common pathogens responsible for gastroenteritis and colitis, has replaced Stool Pathogen Culture, Giardia/Cryptosporidium Direct Immunofluorescence, and Virus Electron Microscopy.
2. Order the GIP panel only if identifying an etiologic agent will impact clinical management.
3. Send raw stools for patients at the Anschutz Campus. Send stools in Cary-Blair media if delivery to the Anschutz Campus will be longer than 2 hours.
4. Specimens should not be sent for testing within 2 weeks of a previous GIP result because a pathogen’s nucleic acid can persist for prolonged periods, even after successful treatment. Resolution of diarrhea is the best test of cure.

Infectious gastroenteritis (IGE) is the second leading cause of death in children under 5 years of age, with an estimated 2,200 deaths a day. Although diarrheal diseases disproportionately affect developing nations, IGE still remains a significant problem in the U.S. The CDC estimates that every year roughly 1 in 6 Americans get sick, 128,000 are hospitalized, and 3,000 die due to a food-borne disease. IGE is associated with a diverse array of bacterial, parasitic, and viral agents. Clinical presentation cannot reliably distinguish between these differing etiologies as diarrhea is the predominant symptom regardless of cause. Previously, the laboratory had to offer several tests that varied in sensitivity, specificity, comprehensiveness, and turn-around times to detect all of these pathogens.

The new multiplexed, molecular assay, the Film Array™ Gastrointestinal Pathogen Panel (GIP, BioFire), circumvents these limitations. The GIP Panel is a highly sensitive and specific assay for 22 of the most common bacterial, viral, and parasitic (see chart below) causes of gastroenteritis. Results are typically available within 5 hours of specimen receipt daily.

As with all diagnostic testing, order the GIP only when results will change clinical care. For example, viruses cause most cases of acute gastroenteritis, but the illnesses are usually self-limited and no antiviral treatment is available. IGE due to certain bacteria require antibiotic treatment only in special circumstances (severe presentation, young infants, underlying medical conditions, immunocompromised conditions, etc.). Antibiotic therapy for Shiga-like toxin- producing E. coli (STEC) is not beneficial and may increase the risk of developing or worsen Hemolytic Uremic Syndrome (HUS), so should not be routinely prescribed. Parasitic causes of IGE, however, usually require specific therapy. Consult the AAP Red Book or call Infectious Disease for treatment recommendations or other guidance to manage infections caused by the individual pathogens.

The GIP panel has several limitations. It does not detect all IGE pathogens, so other testing such as "Complete Ova and Parasite Exam" may be necessary for some patients, particularly in patients with a history of international travel. Because the GIP Panel is a highly-sensitive PCR, it can detect low pathogen loads that may persist after recovery or are carried asymptomatically. This issue is most relevant for Clostridium difficile and some enteropathogenic E. coli's, which can be carried for long periods of time without symptoms. Therefore the laboratory will not routinely release C. difficile results on children less than one year of age or EAEC, EPEC, and ETEC results regardless of patient age unless specifically requested. Contact the CHCO Microbiology Laboratory (720-777-6703) for further information.
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<tr>
<th>Organism</th>
<th>Presentations and Epidemiology</th>
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<tr>
<td><strong>Bacteria</strong></td>
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| Campylobacter                   | Disease: Diarrhea; abdominal pain; fever; bloody diarrhea in young infants. Severe disease can mimic inflammatory bowel disease (IBD), post-infectious Guillain-Barré, or reactive arthritis  
Risks: Improperly cooked poultry; untreated water; unpasteurized dairy products |
| *Clostridium difficile* toxin A/B | Disease: Ranges from asymptomatic carriage to pseudomembranous colitis  
Risks: Antimicrobial therapy; gastric acid suppression therapy; chemotherapy; G-tube, underlying IBD or malignancy |
| Plesiomonas shigelloides        | Disease: Prolonged watery diarrhea  
Risks: Seafood (particularly shellfish); contaminated water |
| **Salmonella**                  |                                                                                                |
| **Vibrio**                     |                                                                                                |
| Yersinia enterocolitica         | Disease: Young age - fever, bloody diarrhea; Older age -pseudo-appendicitis; post-infectious complications – erythema nodosum, reactive arthritis, glomerulonephritis  
Risks: Contaminated food or water; or surfaces. Infections have been associated with cross contamination after handling chitterlings (pork intestines) |
| **Diarrheagenic E. coli/Shigella** |                                                                                                 |
| Enterotoxigenic E. coli (ETEC)  | Disease: Watery diarrhea  
Risks: Undercooked seafood (oysters, crabs, shrimp); marine and estuarine environments |
| Enteropathogenic E. coli (EPEC)  | Disease: Acute and chronic watery diarrhea  
Risks: Contaminated food and water, mostly in <2 yr. old children in resource-limited countries |
| Shiga-like toxin-producing E. coli (STEC) | Disease: Bloody or non-bloody diarrhea, fever, abdominal pain; hemorrhagic colitis and HUS  
Risks: Contaminated food and water |
| E. coli O157                    | Disease: Bloody or non-bloody diarrhea, fever, abdominal pain; hemorrhagic colitis and HUS  
Risks: Food or water contaminated by cattle, sheep, deer, other ruminants |
| Shigella/Enteroinvasive E. coli (EIEC) | Disease: fever with bloody or non-bloody diarrhea; dysentery  
Risks: Contact with contaminated objects; food or water; sexual contact |
| **Parasites**                   |                                                                                                |
| Cryptosporidium                 | Disease: Profuse, watery diarrhea  
Risks: Contaminated water; |
| *Cyclospora cayetanensis*       | Disease: Profuse watery diarrhea; anorexia; nausea; vomiting; cramping; fatigue. Relapsing  
Risks: Resource-limited countries; foodborne and waterborne outbreaks; fresh produce |
| Entamoeba histolytica           | Disease: Bloody or non-bloody diarrhea; abdominal pain; tenesmus; chronic illness mimicking IBD; liver abscess  
Risks: Contaminated food and water; most common in resource-limited countries |
| *Giardia lamblia*               | Disease: Watery diarrhea; foul smelling stools; can be protracted and intermittent  
Risks: Contaminated food and water; most common intestinal parasite; found worldwide. At highest risk: children in day care; hikers; immunocompromised |
| **Viruses**                     |                                                                                                |
Rotavirus: Burden of disease lower due to the vaccine. Assay can detect the vaccine virus for a week or two after administration  
Risks: Daycare and other closed settings; contaminated food or water (esp. norovirus) |
| Astrovirus                      |                                                                                                |
| Norovirus GI/GII                |                                                                                                |
| Rotavirus A                    |                                                                                                |
| Sapovirus                      |                                                                                                |
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