ADSP
Antimicrobial and Diagnostic Stewardship Program

BioFire® FilmArray® Gastrointestinal Identification Panel: Clinician Guidance for Testing and Empiric Therapy

The BioFire® FilmArray® Gastrointestinal Panel is an FDA-approved multiplex PCR assay that rapidly detects a limited number of commonly-identified gastrointestinal pathogens from a stool sample. While detection of organisms and resistance markers can serve as a guide for empiric antimicrobial selection, culture-based identification and susceptibility testing is required for directed antimicrobial therapy. When the GI Panel is ordered as an initial test for diarrhea work-up, it is seldom necessary to order a stool culture simultaneously.

When best to order this test: (See Community Onset Diarrhea Work Up Algorithm)

Inpatient Use: Best ordered for patients who present with a diarrheal illness that is present upon admission. There is limited utility of this test for inpatient use as recent literature demonstrated that *inpatient* implementation of BioFire GI PCR led to an increase in antibiotic use with no difference in length of stay, safety outcomes, mortality, intensive care unit admission, or readmission. When antibiotics were indicated, however, use of the BioFire resulted in reduction in time to appropriate antibiotic therapy.[1]

Inpatient restriction criteria:

- Because organisms identified by the GI BioFire Panel are not common nosocomial infections, this panel should not routinely be ordered for inpatients beyond 72 hours from initial presentation.
    - Orders placed >72 hours after admission will be cancelled
    - Please contact your local Antimicrobial and Diagnostic Stewardship Program (ADSP) (M-F 8 AM to 4 PM) or the on-call Infectious Diseases clinician if an exemption is requested

Outpatient Use: Best ordered for patients with the following:

- **Diarrhea for 7 or more days.** Diarrheal illnesses of less than 7 days in normal hosts often resolve without diagnosis or treatment.
- Risk factors for which antimicrobial treatment might be indicated: patients with persistent fevers, bloody stools, severe abdominal pain, concern for sepsis, or immunocompromising conditions.
- Recent international travelers with (1) prolonged diarrhea or (2) moderate/severe diarrhea with fever or significant dehydration

Result Interpretation & Approach to Antimicrobial Use:

Note: Positive panels do NOT always warrant therapy as most infections are self-limiting in nature. All management decisions should be made with consideration of the test result, the patient's clinical status and risk factors for severe disease, travel history, medication allergies, and recent culture/susceptibility results. Please review guidance carefully for recommendations to withhold therapy.

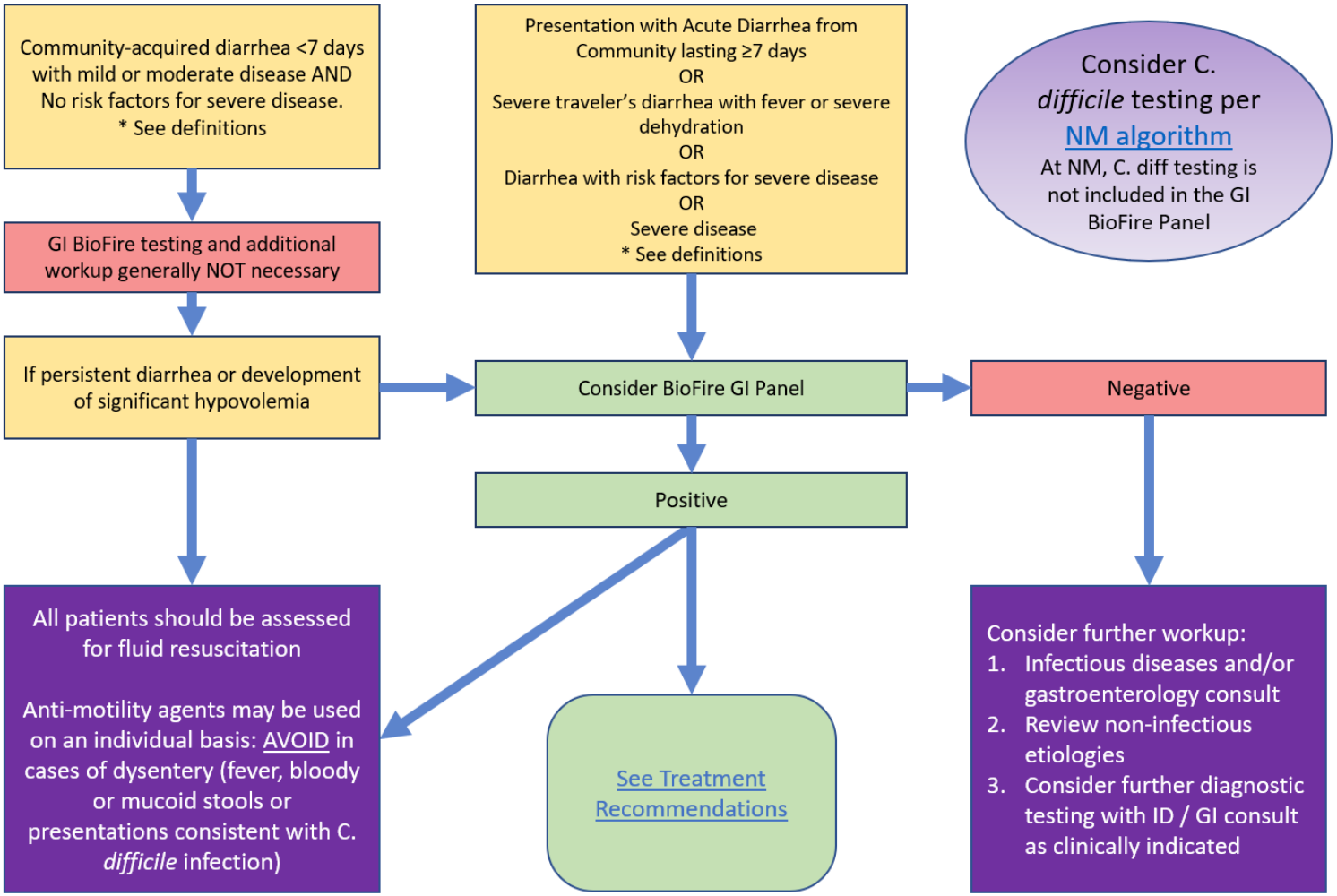
- Please contact ADSP/ID pharmacist or consider ID consultation for other questions related to interpretation and management. For non-urgent questions email adsp@nm.org
- Consider broad therapy and/or obtaining ID consultation for patients with the following presentations:
    - Critical illness and/or recent history of multi-drug resistant organisms
    - Positive blood cultures
    - Immunocompromised host

Bacteria	Diarrheagenic *E. coli*	Viruses	Parasites
Campylobacter species (C. *jejuni* / C. *coli* / C. *upsaliensis*)	*Enteroaggregative E. coli* (EAEC)	Adenovirus F40/41	*Cryptosporidium*
Plesiomonas shigelloides	*Enteropathogenic E. coli* (EPEC)	Astrovirus	*Cyclospora cayetanensis*
Salmonella species (*S. typhi*, *S. paratyphi*, and non-typhi species)	*Enterotoxigenic E. coli lt/st* (ETEC)	Norovirus GI/GII	*Entamoeba histolytica*
Vibrio species	*Shiga-like toxin-producing E. coli* (STEC)	Rotavirus A	*Giardia lamblia*
Vibrio cholerae	stx1/stx2 [*E. coli O157*]	Sapovirus (I, II, IV, and V)	
Yersinia enterocolitica	*Shigella/Enteroinvasive E. coli* (EIEC)		

Back to top

ADSP
Antimicrobial and Diagnostic Stewardship Program

Use of GI BioFire® FilmArray® for Community Onset Diarrhea Work Up



*** Definitions**

Mild Disease: Tolerable and non-distressing, not hypovolemic

Moderate Disease: Distressing to patient but clinically stable without hypovolemia

Severe Disease: Incapacitating and significant hypovolemia; includes dysentery and non-dysentery presentations

Risk factors for severe disease :

- Fever
- New onset bloody diarrhea
- Age ≥ 70 years
- Immunocompromised (organ or bone marrow transplant, AIDS, congenital or acquired immunodeficiency)
- Valvular or endovascular cardiac disease
- Age > 50 with atherosclerosis
- Pregnancy
- Inflammatory bowel disease
- Individual risk factors specific to organisms listed in chart

Chart Modified from: Mayo Clinic Laboratory Testing for Infectious Causes of Diarrhea[6]

Back to top

Updated 11/2023

ADSP
Antimicrobial and Diagnostic Stewardship Program

Bacterial Organisms for which Treatment is NOT Routinely Recommended

Organism	Time to symptom resolution without treatment	Treatment Recommendation	Antibiotics (if indicated) Limited to high-risk patients or severe cases
Campylobacter spp. (C. *jejuni* / C. *coli* / C. *upsaliensis*)	≤ 7 days	**No treatment** – Antibiotics are not routinely indicated for these pathogens due to lack of clinically relevant benefit. Consider treatment in cases of persistent fever, severe or worsening diarrhea (>4-6 stools/day), extremes of age, pregnancy, and immunocompromised hosts	Azithromycin 500 mg PO x 3d OR Ciprofloxacin 750 mg PO BID x 3d
Plesiomonas shigelloides	14 days to 3 months Persistent symptoms may occur		Ciprofloxacin 500 mg PO BID x 3d OR TMP/SMX 800/160 mg PO BID x 3d
Salmonella spp.* If *Salmonella* is detected, IDPH will determine if the sample is *S. typhi, S, para- typhi*, or other *Salmonella* species.	2-14+ days	**No treatment** Consider treatment for patients who are febrile AND a return traveler to a tropical region or immigrant. Consider treatment in other groups at increased risk of invasive infection: such as neonates up to 3 months old, age >50 with atherosclerosis, immunosuppression, cardiac or significant joint disease, HIV, sickle cell disease, thalassemia.	See *Salmonella spp.* below for treatment recommendations if there is increased concern for *S. typhi, S. paratyphi* or presentation consistent with invasive non-typhi infection.
Vibrio spp.* *(V. cholerae, V. parahaemolyticus, V. vulnificus)*	2-5 days	**No treatment** Antibiotics are not routinely indicated for these pathogens due to lack of clinically relevant benefit. Consider treatment in cases of persistent fever, severe or worsening diarrhea (>4-6 stools/day), extremes of age, pregnancy, *or immunocompromised hosts.* **Vibrio vulnificus* is a cause of severe sepsis in selected patients, including those with liver disease, alcoholism, diabetes mellitus. There may or may not be associated necrotic or bullous skin lesions. Urgent empiric treatment with doxycycline is indicated in suspected cases.	Noninvasive disease: Preferred: Doxycycline 100 mg PO BID x 3d Alternative: Ciprofloxacin 750 mg PO BID x 3d Bacteremia or invasive disease: Ceftriaxone 2 g IV daily + doxycycline 100 mg PO BID x 7d
Yersinia enterocolitica	≤ 21 days Persistence of up to one year has been reported		Preferred: TMP/SMX 800/160 mg PO BID x 5d Alternatives: Ciprofloxacin 500 mg PO BID x 5d OR Ceftriaxone 2 g IV daily x 5d
Diarrheagenic E. coli			
Enteroaggregative E. coli (EAEC)	< 7 days May be persistent	**No treatment** Consider treatment for severe/dysentery (>6 stools/day, fever, blood and/or pus in stool)	Azithromycin 1 g PO x 1 dose OR Ciprofloxacin 750 mg PO x 1 dose
Enteropathogenic E. coli (EPEC)	< 7 days May be persistent		
Enterotoxigenic E. coli (ETEC) It/st	1-5 days		
Shiga-like toxin-producing E. coli (STEC) stx1/stx2; *E. coli O157*	5-10 days	***Avoid antibiotics and antimotility agents*** ***Antibiotic use is associated with increased risk of hemolytic uremic syndrome***	

*For tests + for Salmonella spp. and Vibrio spp., NM Clinical Microbiology Lab will send stool for work-up to Illinois Department of Health (IDPH); results from IDPH may take approximately 1 week. Clinical Micro will send also IDPH a stool sample for Shiga-like toxin-producing E. coli and E. coli O15H7 for identification; antibiotic treatment is discouraged.

Back to top

Updated 11/2023

ADSP
Antimicrobial and Diagnostic Stewardship Program

Bacterial Organisms with Recommendations to Treat:

Organism	First-line therapy	Alternative therapy
Salmonella spp.* If febrile or clinically unstable, order blood cultures. If *Salmonella* is detected, IDPH will determine if the sample is *S. typhi, S. paratyphi*, or other *Salmonella* species.	No need to start empiric treatment if the patient is afebrile and clinically stable. If the patient is febrile or not clinically stable, start treatment as below. Consider treatment for patients who are febrile AND a return traveler to a tropical region or immigrant (elevated risk of *S. typhi or S. paratyph*i) Consider treatment in other groups at increased risk of invasive infection: such as neonates up to 3 months old, age >50 with atherosclerosis, immunosuppression, cardiac or significant joint disease, HIV, sickle cell disease, thalassemia. (All *Salmonella* spp. may be extensively antibiotic resistant so infectious disease consultation is recommended when treatment is needed)	
	Ceftriaxone 2 g IV daily x 7d OR Azithromycin 1000 mg PO x 1 then 500 mg PO daily x 4 days	Ciprofloxacin 750 mg PO BID x 7d (if susceptible to nalidixic acid—contact Microbiology) OR TMP/SMX 800/160 mg PO BID x 7d (if susceptible)
*Shigella/*Enteroinvasive *E. coli* (EIEC)*	Azithromycin 500 mg PO daily x 3d (7d if immunocompromised)	Alternatives: (Durations up to 7d may be used if immunocompromised) Ciprofloxacin 750 mg PO BID x 3d [avoid if MIC >0.06] OR Ceftriaxone 2 g IV daily x 5d OR TMP/SMX 800/160 mg PO BID x 3d
Vibrio spp (V. cholerae, V. parahaemolyticus, V. vulnificus)*	Aggressive oral/IV rehydration + Doxycycline 300 mg PO x 1 dose	Azithromycin 1 g PO x 1 dose OR Ciprofloxacin 1 g PO x 1 dose

*When the BioFire is positive for a *Salmonella* spp., *Shigella*/Enteroinvasive *E. coli,* or *Vibrio* spp. AND antibiotic treatment is deemed necessary, clinicians should check with their Clinical Microbiology lab to ensure culture and susceptibility is performed.

Viruses on GI panel:

Adenovirus F40/41, Astrovirus, Norovirus GI/GII, Rotavirus A, Sapovirus (I, II, IV, V)

No targeted treatment exists for any of the detectable viral pathogens on the BioFire GI panel. Supportive care is recommended with fluids and electrolytes.

Parasites on GI panel:

Organism	First-line therapy	Second-line therapy
Cryptosporidium	**No treatment** unless severely immunocompromised (e.g., AIDS, organ transplant); Explanation: Many patients spontaneously recover; however, severe immunocompromised hosts may have prolonged recovery. Treatment and ID consult is recommended in immunocompromised hosts	Nitazoxanide 500 mg PO BID x 3d OR Paromomycin PO
Cyclospora cayetanensis	TMP/SMX 800/160 mg PO BID x 7d If severely immunocompromised, doses of TMP/SMX 800/160 mg q6h for up to 3-4 weeks have been used. Obtain ID consult in severely immunocompromised patients (e.g., HIV, transplant patients)	Ciprofloxacin 500 mg PO BID x 7d
Entamoeba histolytica	Metronidazole 500 mg PO TID x 7-10d followed by paromomycin 25-35 mg/kg/d PO split in 3 doses for 7 additional days of therapy	Tinidazole 2 g x 3 days followed by paromomycin 25-35 mg/kg/d PO split in 3 doses for 7 additional days of therapy Obtain ID consult if severe or extraintestinal disease (e.g., hepatic abscesses)
Giardia lamblia	Metronidazole 500 mg PO TID x 5d	Tinidazole 2 g PO x 1 dose

Back to top

ADSP
Antimicrobial and Diagnostic Stewardship Program

Resources:

1. Brendish NJ, Beard KR, Malachira AK, et al. Clinical impact of syndromic molecular point-of-care testing for gastrointestinal pathogens in adults hospitalized with suspected gastroenteritis (GastroPOC): a pragmatic, open-label, randomised controlled trial. *Lancet Infect Dis*. 2023;S1473-3099(23)00066-X. doi:10.1016/S1473-3099(23)00066-X
2. DuPont HL. Acute infectious diarrhea in immunocompetent adults. *N Engl J Med*. 2014;370(16):1532-1540. doi:10.1056/NEJMra1301069
3. Shane AL, Mody RK, Crump JA, et al. 2017 Infectious Diseases Society of America Clinical Practice Guidelines for the Diagnosis and Management of Infectious Diarrhea. *Clin Infect Dis*. 2017;65(12):e45-e80. doi:10.1093/cid/cix669
4. The Sanford Guide to Antimicrobial Therapy. Sperryville, VA: Antimicrobial Therapy, Inc., 2021.
5. Connor B. Traveler's Diarrhea. CDC Yellow Book 2024. Travelers' Diarrhea | CDC Yellow Book 2024
6. Laboratory Testing For Infectious Causes of Diarrhea (mayocliniclabs.com). Accessed 7/24/23.
7. Bennet JE, Dolin R, Blaser MJ. Mandell, Douglas, and Bennett's Principles and Practices of Infectious Diseases. Chapter 319: Infections in Returning Travelers. Chapter 216: Campylobacter jejuni and Related Species. Chapter 223: Salmonella Species. Chapter 224: Bacillary Dysentery: Shigella and Enteroinvasive E. coli. Chaper 142: Adenoviruses. Chapter 99: Acute Dysentery Syndromes (Diarrhea with fever). Chapter 100: Typhoid fever, paratyphoid fever, typhoidal fevers. Chapter 101: Foodborne disease. 2019
8. Sanders JW, Frenk RW, Putnam SD, *et al*. Azithromycin and loperamide are comparable to levofloxacin and loperamide for the treatment of traveler's diarrhea in United States military personnel in Turkey. *Clinical Infectious Diseases.* 45 (3) 2007.

Updates:
11/10/23 clarification on micro lab wording
8/2023 P&T approved

Back to top