Many Pathogens, One Test: The Gastrointestinal Infection Array

NATIONWIDE CHILDREN'S

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The Importance of Identifying Gastrointestinal Pathogens

A wide spectrum of pathogens causes infectious gastroenteritis. Identification of the pathogen (or pathogens) contributing to a patient's gastroenteritis can be crucial to case management, infection control, and in some instances, public health interventions.

Because diarrhea is the primary symptom of GI infection regardless of etiology – and because a number of other symptoms are common to many pathogens – clinical presentation is not helpful for making a specific diagnosis. That leaves physicians with a choice of traditional detection methods, such as fecal examination, bacterial culture and antigen detection.

Those methods are not always specific and selective, however, and primary care providers may not always understand each method's intended use. For example, a 2015 multicenter study found that pathogens most commonly associated with GI infection would not be detected by routine stool culture.

Common Pathogens Causing Diarrhea

Pathogen	Fever	Nausea/Vomiting	Bloody Stool	Fecal Inflamation
Campylobacter spp.	Common	Occurs	Occurs	Common
Salmonella spp.	Common	Occurs	Occurs	Common
Shigella spp.	Common	Common	Occurs	Common
Enterohemorrhagic Escherichia coli	Atypical	Occurs	Common	Often not found
Clostridium difficle	Occurs	Not Characteristic	Occurs	Common
Yersinia enterocolitica	Common	Occurs	Occurs	Occurs
Entamoeba histolytica	Occurs	Variable	Variable	Variable
Cryptosporidium spp.	Variable	Occurs	Not Characteristic	None to mild
Cyclospora	Variable	Occurs	Not Characteristic	Not Characteristic
Giardia lambilia	Not Characteristic	Occurs	Not Characteristic	Not Characteristic
Viruses	Variable	Common	Not Characteristic	Not Characteristic

Modified from Thielman NM, Guerrant RL: Clinical practice. Acute infectous diarrhea, N Engl J Med 350:38, 2004

The Gastrointestinal Infection Array

The Gastrointestinal Infection Array solves many of the problems associated with the traditional GI pathogen detection methods. This multiplex molecular test identifies 20 common GI pathogens, including four protozoa, five viruses and 11 bacteria. It is ordered in the place of conventional testing such as routine stool culture, ova and parasite examinations and antigen testing.

The 2015 multicenter study found that the array's specificity was ≥ 97.1% for all panel targets and selectivity was ≥ 94.5% for almost all panel targets (three pathogens were not prevalent enough for selectivity to be quantified). Among its other benefits, the array can detect co-infections that are not always caught with the conventional tests.

Pathogens Detected by the GI Infection Array

Bacterial	Diarrheagenic E. Coli/Shigella	Viruses	Protozoa
Campylobacter spp.(C. jejuni/C.coli/ C. upsaliensis)	Enterotoxigenic E. coli (ETEC)	Adenovirus F 40/41	Cryptosporidium
Clostridium difficle (Toxin A/B)	Shiga-like toxin producing E. coli (STEC)	Astrovirus	Cyclospora cayetanensis
Plesiomonas shigelloides	E. coli 0157	Norovirus GI/GII	Entamoeba histolytica
Salmonella	Shigella/Enteroinvasive E. coli (EIEC)	Rotavirus A	Giardia lamblia
Vibrio (V. parahaemolyticus/ V. vulnificus)		Sapovirus	
Vibrio cholerae			
Yersinia enterocolitica			

The GI Infection Array Testing Process

Stool specimens should be collected in a Cary-Blair collection container with media and transported to a Nationwide Children's Laboratory Service Center. For optimal results, transportation should happen within 24 hours if the specimen is at room temperature, or within 72 hours if the specimen is refrigerated.

Testing is performed around the clock every day. Results are reported approximately eight hours after receipt of the specimen.

Results for analytes listed above will be reported as "Detected" or "Not Detected." Positive results for *Plesiomonas, Vibrio, Salmonella/Shigella, and Yersinia* will result in a culture and susceptibilities if the bacterium is recovered.

Note that *Clostridium difficile* will not be reported on patients younger than 3 years of age, because asymptomatic carriage in this age group is common.

Additional Stool Tests

Conventional stool testing should not be ordered in addition to the GI Array testing. If the GI Array is ordered alongside a stool culture, ova and parasite exam or parasite/viral antigen tests, the GI Array will be performed instead of the individual assays.

Some tests should be utilized with or instead of the GI Array as described below.

Tests Used With/Instead of the GI Infection Array

Test Name	Aeromonas Culture	Shigella Test of Cure	C. difficille	O&P Exam
Test Code	AERMC	SHIGC	CDIFTN	OAP
Additional Testing	Aeromonas is not included in the array panel. If this bacterium is suspected, a separate culture order and specimen is required.	Array testing should NOT be used for test of cure.	For individual patients where only C. difficile is highly suspected, the GI Array should not be used. Order the single analyte C. difficile molecular test.	To be used if the GI Array test is negative and the patient has a recent travel history or is immunocompromised.

For more information regarding test availability or specimen requirements, please call (800) 934-6575 or visit NationwideChildrens.org/Lab.

Reference:
1.Buss SN, Leber A, Chapin K, Fey PD, Bankowski MJ, Jones MK, Rogatcheva M, Kanack KJ, Bourzac KM. Multicenter evaluation of the BioFire FilmArray gastrointestinal panel for etiologic diagnosis of infectious gastroenteritis. Journal of Clinical Microbiology. 2015 Mar; 53(3):915-25.

Contact Us:

Online: NationwideChildrens.org/Lab
Phone: (614) 722-5477 or (800) 722-5478 | Fax: (877) 722-5478

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