Rate of Detection of Multiple Organisms with Multiplex PCR Gastrointestinal Panel in Pediatrics

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The Rate of Detection of Multiple Organisms with Multiplex PCR Gastrointestinal Panel in Pediatrics

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BACKGROUND

Infectious gastroenteritis/colitis is a significant cause of morbidity and mortality in children around the world, with an estimated 2,195 deaths daily, and it is associated with multiple etiologic organisms.[4] There are several traditional methods of testing stool for bacterial, parasitic, and viral causes of gastroenteritis/colitis with varying sensitivities. The turnaround times for results range from one hour to 2-4 days[1,3,4] which can limit a timely diagnosis, increase hospital length of stay, and lead to unnecessary use of antimicrobials.[1] New multiplex molecular assays have been developed that are faster and have a higher sensitivity, 94.5-100%, and specificity, 97.1%.[1] One disadvantage of the multiplex assays is the detection of multiple organisms simultaneously, with rates as high as 31.5%[1] to 16.4%[2], which makes it difficult to differentiate true pathogen versus colonization. In January 2015, our institution switched from traditional testing methods to a multiplex polymerase chain reaction (PCR) detection test (FilmArray™ Gastrointestinal Panel. BioFireDX, Salt Lake City, Utah).

Table 1: The 22 Organisms That Can be Detected by the FilmArray™ Gastrointestinal Panel

Bacterial	Diarrheagenic E. coli/Shigella	Parasites	Viruses
Campylobacter (jejuni, coli and upsaliensis)	*Enteroaggregative E. coli* (EAEC)	*Cryptosporidium*	Adenovirus F 40/41
Clostridium difficile (toxin A/B)	*Enteropathogenic E. coli* (EPEC)	*Cyclospora cayetanensis*	Astrovirus
Plesiomonas shigelloides	*Enterotoxigenic E. coli* (ETEC) *lt/st*	*Entamoeba histolytica*	Norovirus GI/GII
Salmonella	*Shiga-like toxin-producing E. coli* (STEC) *stx1/stx2*	*Giardia lamblia*	Rotavirus A
Yersinia enterocolitica	*E. coli O157*		Sapovirus (I, II, IV and V)
Vibrio (parahaemolyticus, vulnificus and cholerae)	*Shigella/Enteroinvasive E. coli* (EIEC)		
Vibrio cholerae			

STUDY OBJECTIVES:

- Determine the number of FilmArray™ panels that detected one organism vs. multiple organisms in pediatric patients.

METHODS:

- Retrospective review of stool samples received from both inpatient and outpatient facilities at Health Network Laboratories from January 2015 to December 2015.
- Age: patients 18 years and younger

EXCLUSION CRITERIA:

- Any patient older than 18 years.

RESULTS:

- Overall there were 353 FilmArray™ panels that were performed (from January 2015 to December 2015). Of those, 213 panels detected presence of at least one organism (60.3%).

DISCUSSION:

- Although the BioFireDX FilmArray™ Gastrointestinal Panel is a useful single modality for determining the etiology of infectious gastroenteritis, more than one organism is frequently found. Caution should be used when interpreting these results.
- Further studies are underway to establish the role of colonization versus true pathogens in the pediatric population, especially in children younger than 5 years.

RESULTS

Distribution of the Number of Organisms Isolated from Stool Samples

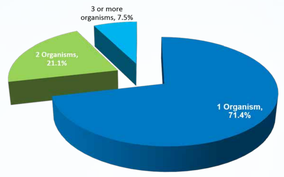

Figure 1: Among the panels that detected organisms, 152 panels (71.4%) detected one organism, 45 panels (21.1%) detected 2 organisms and 16 panels (7.5%) detected 3 or more organisms. No more than 4 organisms were detected in a single panel.

Distribution of the Organisms Isolated on Stool Panels

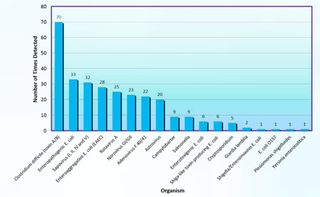

Figure 2: A total of 294 organisms were detected collectively in all of the positive FilmArray™ panels. C. difficile was the most commonly isolated organism.

Age Distribution of all C. difficile Isolates

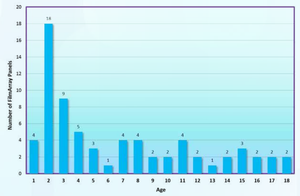

Figure 3: The age distribution of patients with C. difficile detected on the FilmArray™ panels. This includes instances when C.difficile was the only isolate and when it was detected along with other organisms.

Distribution of Ages When Only C. difficile is Isolated

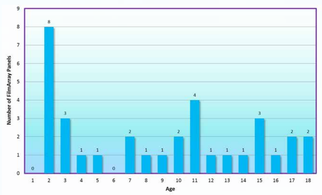

Figure 4: The age distribution of FilmArray™ panels when C.difficile was the only isolate.

Distribution of Ages When C. difficile is Isolated with Another Organism

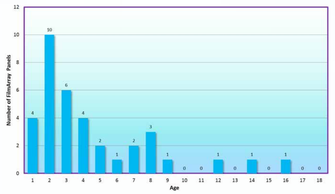

Figure 5: The distribution of ages when C.difficile is detected with another organism(s).

Organisms Isolated Along with C. difficile

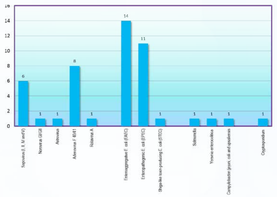

Figure 6: The distribution of organisms that were detected in combination with C.difficile.

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