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

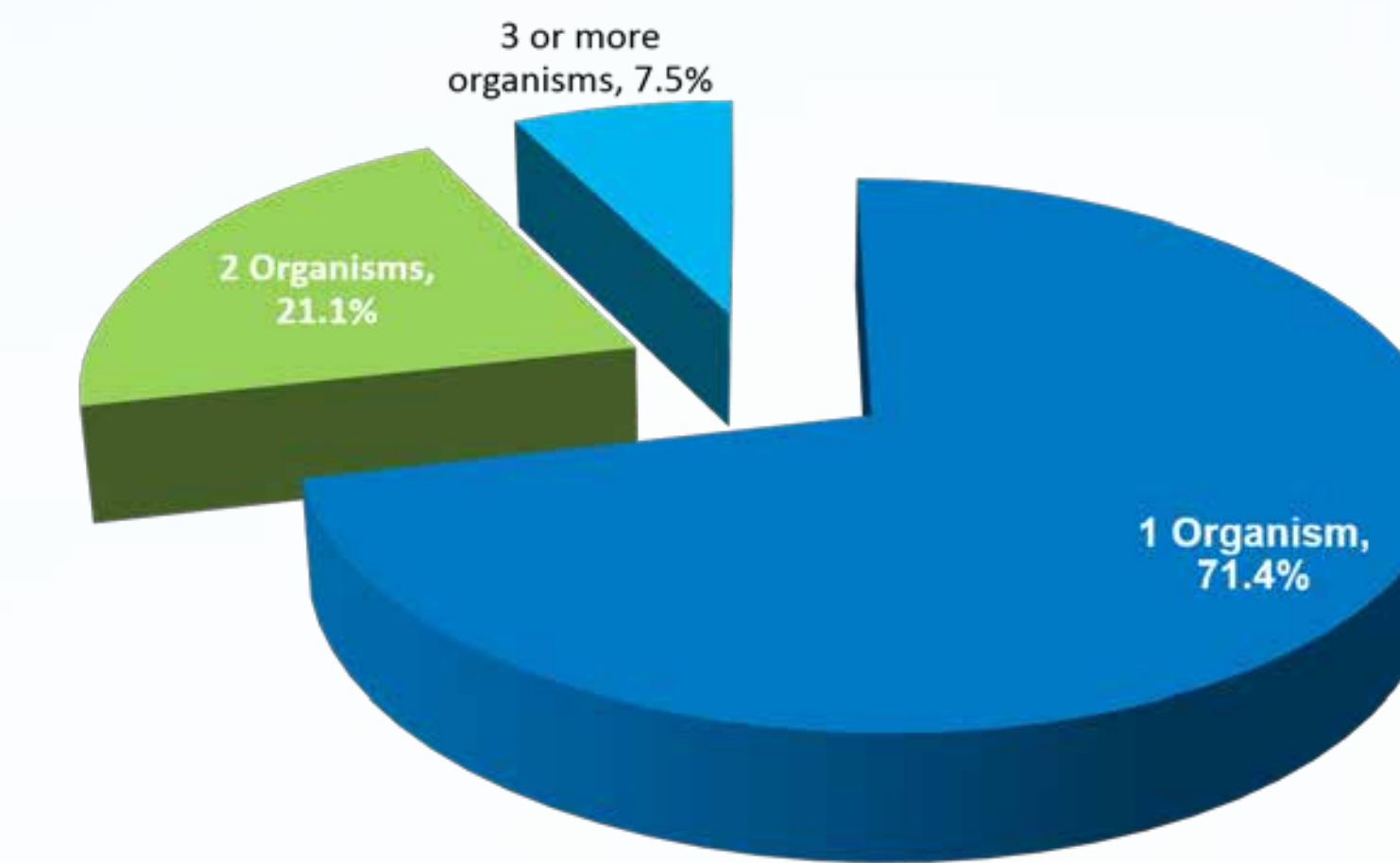### Distribution of the Number of Organisms Isolated from Stool Samples

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

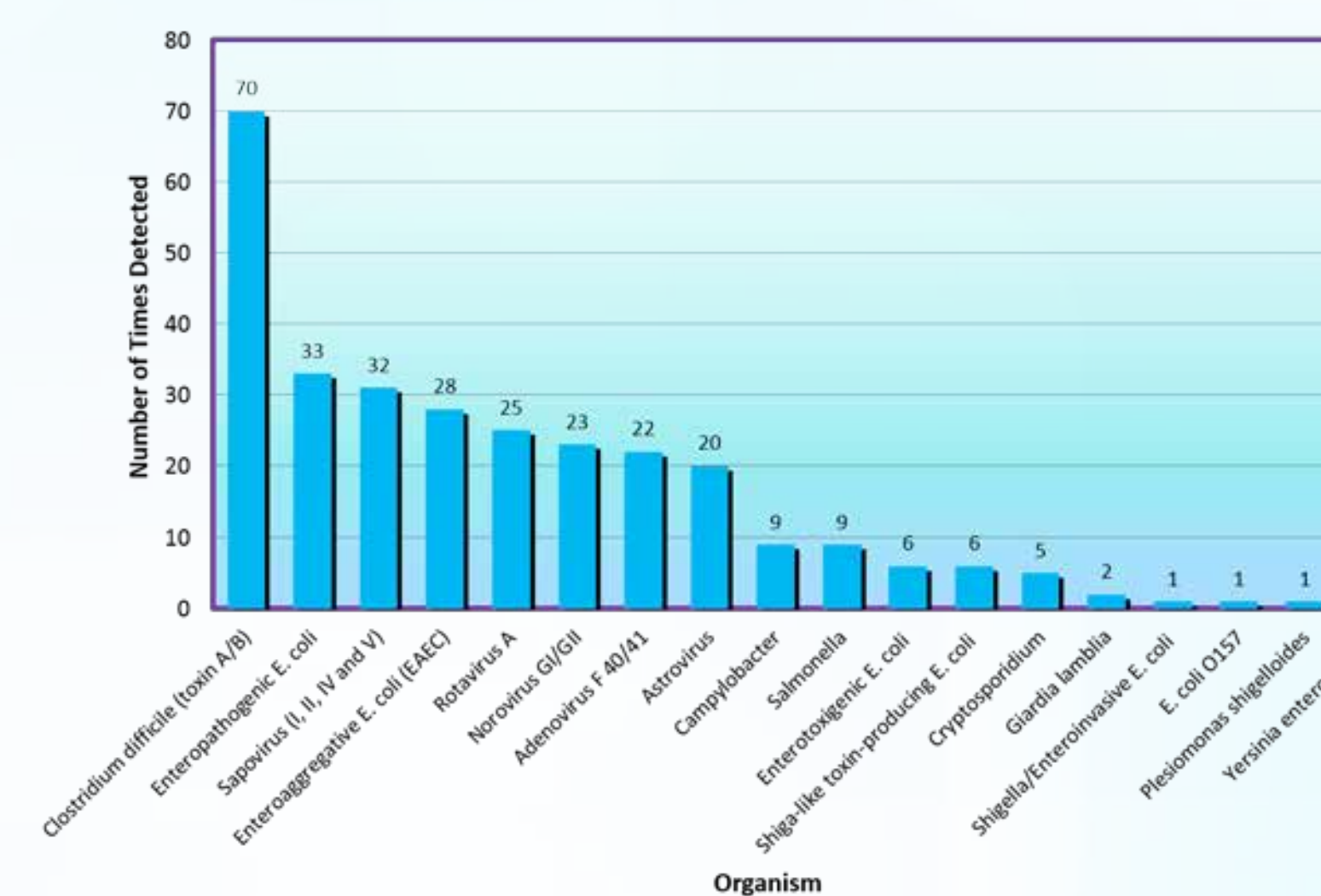Figure 2: A total of 294 organisms were detected collectively in all of the positive FilmArray™ panels. C. difficile was the most commonly isolated organism.

Age Distribution of all C. difficile Isolates

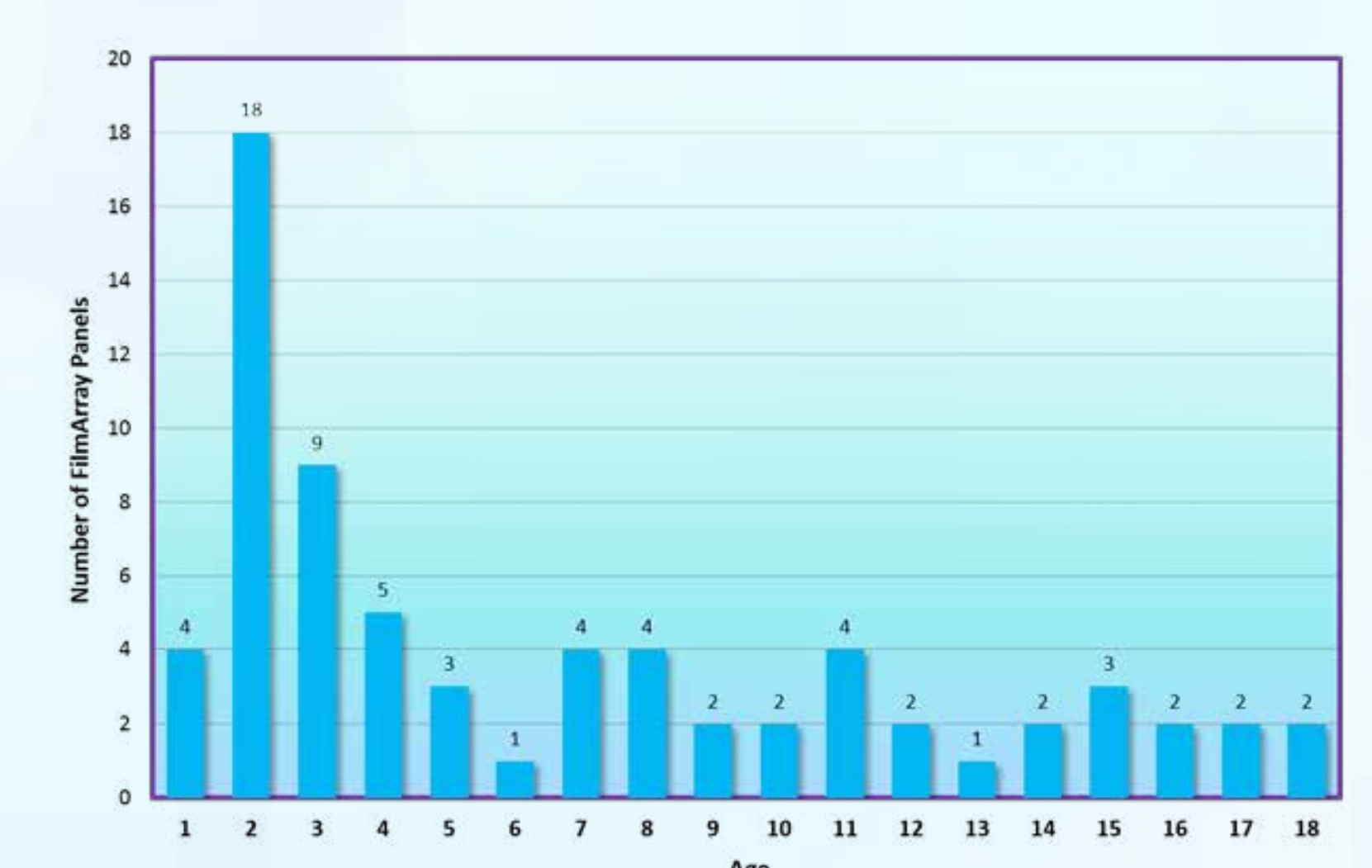
Figure 3: The age distribution of patients with C. difficile detected on the FilmArray™ panels. This includes instances when C.difficile was the only isolate and when it was detected along with other organisms.

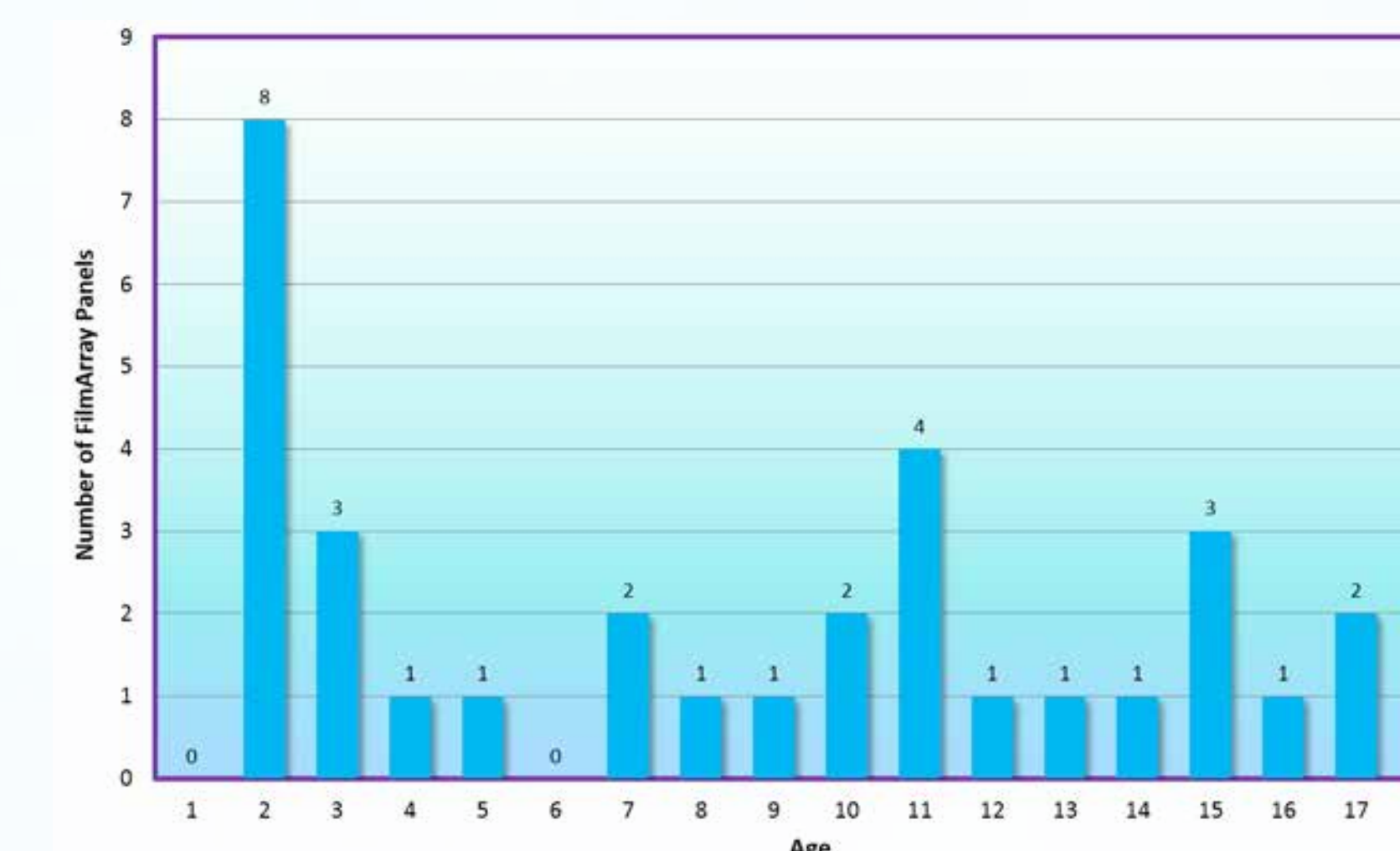### Distribution of Ages When Only C. difficile is Isolated

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

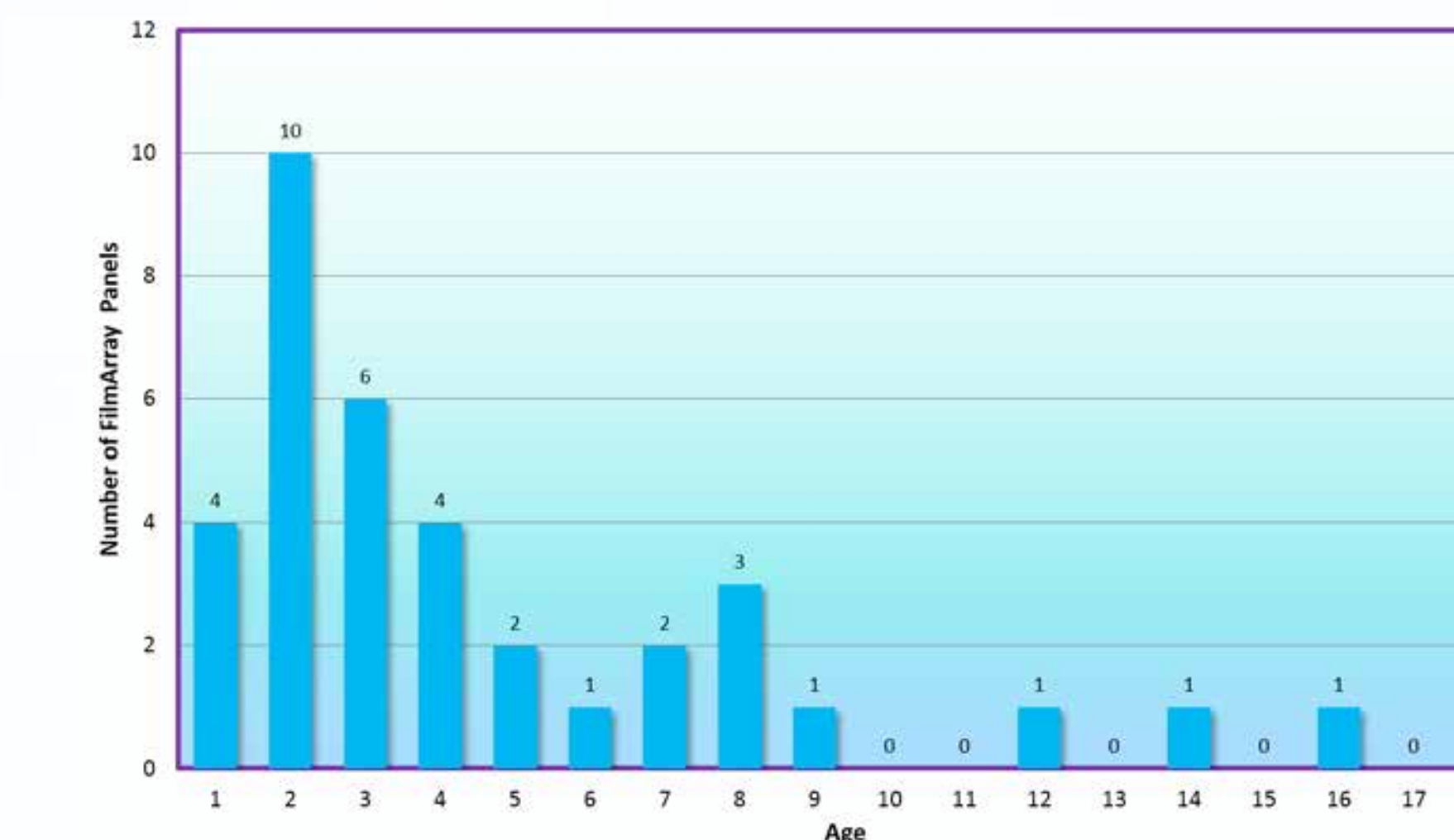### Distribution of Ages When C. difficile is Isolated with Another Organism

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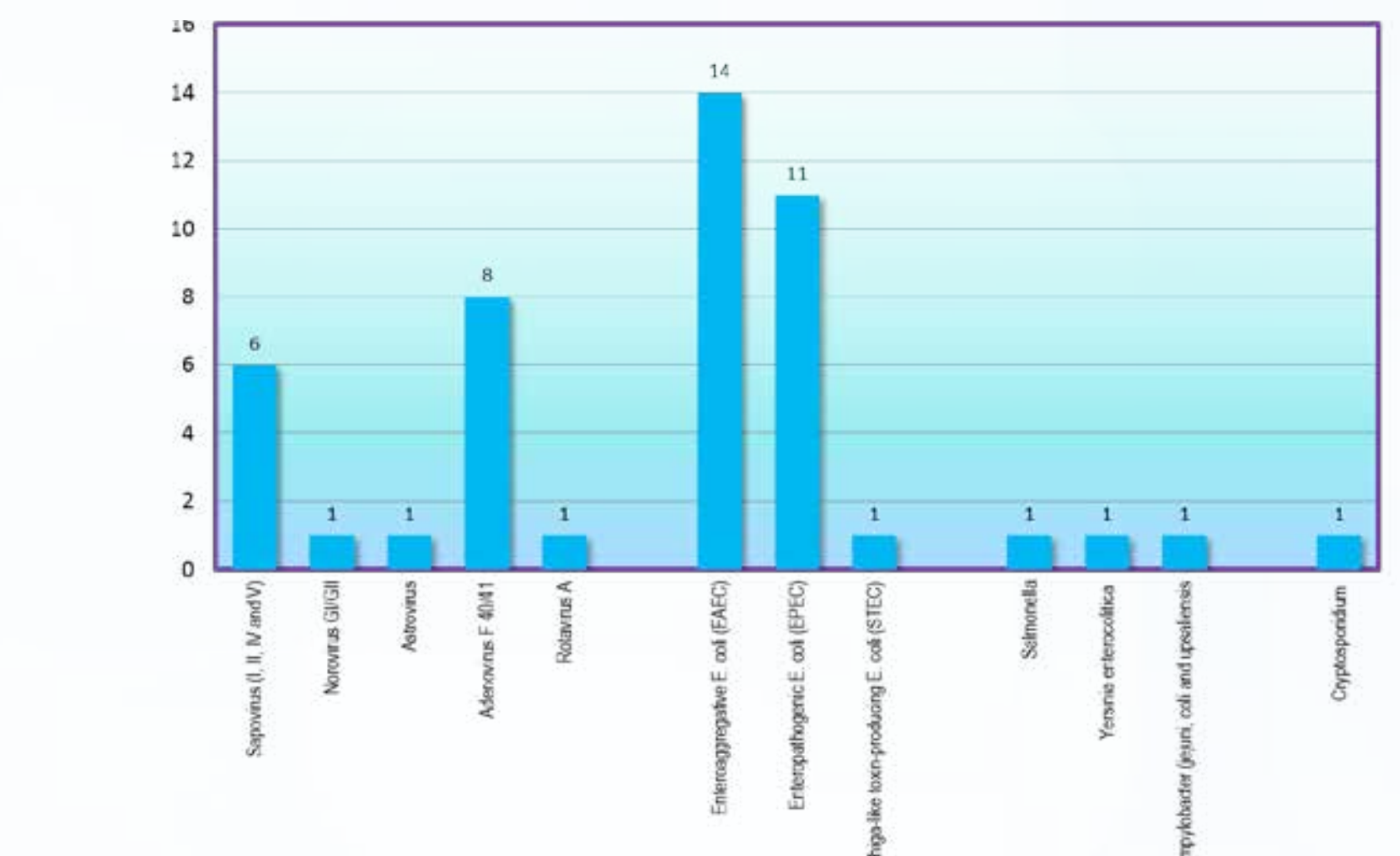
Organisms Isolated Along with C. difficile

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

References:

1. Buss SN, Leber A, Chapin K, et al. Multicenter evaluation of the BioFire FilmArray gastrointestinal panel for etiologic diagnosis of infectious gastroenteritis. *J Clin Microbiol.* 2015 Mar;53(3):915-25. Epub 2015 Jan 14.

2. Spina A, Kerr KG, Cormican M, et al. Spectrum of enteropathogens detected by the FilmArray GI Panel in a multicentre study of community-acquired gastroenteritis. *Clin Microbiol Infect.* 2015 Aug;21(8):719-28. Epub 2015 Apr 20.

3. Stockmann C, Rogatcheva M, Harrel B, et al. How well does physician selection of microbiologic tests identify Clostridium difficile and other pathogens in paediatric diarrhoea? Insights using multiplex PCR-based detection. *Clin Microbiol Infect.* 2015 Feb;21(2):179.e9-15.

4. Zhang H, Morrison S, Tang YW. Multiplex polymerase chain reaction tests for detection of pathogens associated with gastroenteritis. *Clin Lab Med.* 2015 Jun;35(2):461-86.

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