FilmArray™ Gastrointestinal (GI) Panel: Implications for Infection Control

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Introduction

The CDC has reported an increase of >50% in non-specific gastroenteritis in hospitalized older adults between 1996–2007 and suggested Norovirus as responsible for much of this increase (1). Without more comprehensive diagnostic testing, the contribution of infectious agents is hard to assess. We report the use of the FilmArray GI Panel in patients with diarrhea testing negative for *C. difficile* and Rotavirus to estimate the overall level of infectious agents causing gastroenteritis in hospitalized patients.

Methods

Study Population

Stool specimens that had tested negative in standards tests for *C. difficile* and Rotavirus or both from 180 adults and children admitted to the UF Health Shands Hospital between February-December 2013 were frozen at – 70°C until studied.

Standard Methods

Standard testing for *C. difficile* was done by GeneXpert (Cepheid, Sunnyvale, CA) performed according to instructions and training from the manufacturer. Rotavirus was tested by the ImmunoCardStat! Rotavirus assay (Meridian Biosciences, Cincinnati, OH). The laboratory maintains a consistent and rigid policy of rejection of non-liquid stools.

FilmArray GI Panel

The FilmArray GI Panel (IUO version) was performed according to instructions and training from the manufacturer. The stool specimen was thoroughly mixed in transport media then added to the Sample Injection Vial. The FilmArray pouch was rehydrated with Hydration Solution and the sample. The pouch was then inserted into the FilmArray Instrument and results were displayed in approximately 1 hour. The FilmArray GI Panel (IUO version) detects the following infectious agents:

Bacteria/Toxin genes

Aeromonas
Campylobacter (jejuni, coli and *upsaliensis)*
Clostridium difficile (toxin A/B)
Plesiomonas shigelloides
Salmonella
Yersinia enterocolitica
Vibrio (parahaemolyticus, vulnificus, and *cholerae*
Vibrio cholerae

Parasites

Cryptosporidium
Cyclospora cayetanensis
Entamoeba histolytica
Giardia lamblia

Diarrheagenic E. coli/Shigella
Enteroaggregative *E. coli* (EAEC)
Enteropathogenic *E. coli* (EPEC)
Enterotoxigenic *E. coli* (ETEC) *lt/st*
Shiga-like toxin-producing *E. coli* (STEC) *stx1/stx2*
E. coli O157
Shigella/Enteroinvasive E. coli (EIEC)

Viruses

Adenovirus F 40/41
Astrovirus
Norovirus GI/GII
Rotavirus A
Sapovirus (I, II, IV and V)

Results

Distribution of Pathogens in *C. difficile* and Rotavirus Negative Stool Specimens

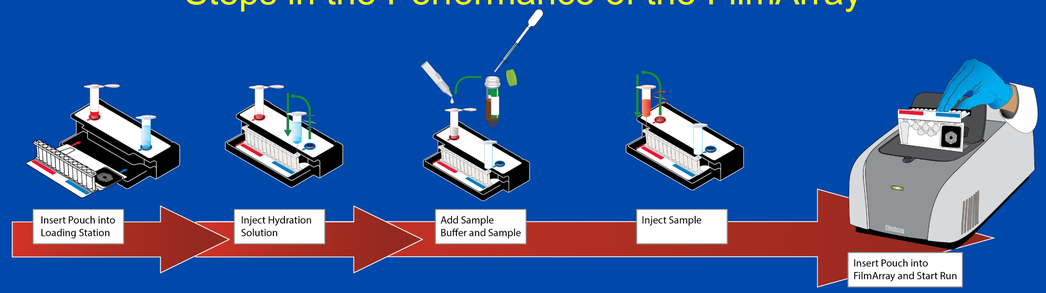
	C. difficile Negative N = 157	Rotavirus Negative* N = 23	Total Negative N = 180
Norovirus	10(2)**	2(1)	12
Rotavirus	8(2)		8
EPEC	7(3)	2(1)	9
EIEC/*Shigella*	1(1)	2(1)	3
EAEC	2		2
ETEC	2(1)		2
Astrovirus		2(1)	2
Salmonella		1	1
Cryptosporidium	1		1
Aeromonas	1		1
C. difficile	2	1(1)	3
Adenovirus		2(1)	2
Total Specimens	34/157 (21.7%)	12/23 (52.2%)	46/180 (25.6%)
Total Patients	29/157 (18.5%)	9/23 (39.1%)	38/180 (21.1%)

*Includes 8 patients testing negative for both Rotavirus and *C. difficile*. ** Number in parentheses = number with ≥ 2 positive results

Hospital Acquisition

Present on Admission	23
Hospital Acquired	15
Mean ± SD	8.3 ± 5.7 days
Median (IQR)	5 (4-11)

Steps in the Performance of the FilmArray



Discussion

1. Overall a large number of patients 38/180 (21%) had at least one unsuspected GI pathogen detected.
2. 15/38 (39.5%) were “hospital acquired” a median of 5 days after admission. The majority of these were Norovirus (N=5), Rotavirus (N=4) and EPEC (N=3).
3. There were no differences in length of stay for those with unsuspected pathogens versus those without.
4. There was no space-time clustering but the study was not designed to look for this.
5. Despite the fact that all our patients had liquid stools and infection was suspected enough to test for *C. difficile* and Rotavirus in the laboratory, only 4/38 (11%) actually were on appropriate isolation.

Conclusions

There are a large number of unsuspected infectious GI pathogens in patients testing negative for *C. difficile* and Rotavirus.

Multiplex GI panels will lead to greater recognition of these agents and provide critical data both for appropriate patient isolation as well as clinically appropriate discontinuation.

References and Acknowledgement

1. Lopman B. et. al. CID 2011:52. 466 – 474.

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