Clinical Performance of Film Array Gastrointestinal Pathogen Panel in Diarrhea

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Introduction

Infective diarrhea is a common problem causing morbidity and mortality worldwide. Multiplex Polymerase chain reaction (PCR) based pathogen diagnostics of diarrheal stool specimens are shown to be highly sensitive and rapid as opposed to conventional diagnostics.

Methods

We analyzed the performance of a multiplex PCR test, FilmArray (FA) gastrointestinal (GI) panel, on stool specimen in patients admitted with acute and chronic diarrhea to our hospital from December 2016 to December 2019 and compared the results with conventional diagnostic tests.

Results

• A total of 98 patients were analyzed, 52 were males and 9 belonged to pediatric age group (age <14 years). 92.9% patients presented with acute diarrhea syndrome, while the rest had a diagnosis of chronic diarrhea syndrome. None were HIV positive.

• Among 98 tested, FA GI pathogen panel was positive for at least one pathogen in 39.8% patients. The yield was low for stool culture. Only 6 out of 77 (7.79%) who had stool culture had a positive result.

• In samples tested by FA GI pathogen panel, a single pathogen was identified in 27 patients (27.5%) while multiple targets were identified in 12 patients (12.2%)

• Majority (76.5%) had normal stool routine examination. Stool routine abnormality and positive GI pathogen panel did not correlate, as only 7 patients with abnormal stool routine had a positive result in FA GI pathogen panel, while 12 patients had negative results.

Table 1: Pathogens in FA GI pathogen panel

FA GI pathogen panel results	Frequency	As part of multiple organisms	Total frequency, (%)
Salmonella	12	5	17 (43.5)
EAEC	5	4	9 (23)
EPEC	3	2	5 (12.8)
ETEC	1	2	3 (7.7)
Norovirus	2	1	3 (7.7)
Shigella/ EIEC	2	0	2
Campylobacter	0	3	3
STEC E coli	1	0	1
EIEC	0	1	1
Plesiomonas shigelloids	1	0	1
Clostridium difficile toxin A and B	0	2	2
More than one organism	12		
Total	39		

• Most common organism isolated in stool culture was *Salmonella* (5) while one patient had *E. coli*. In stool FA GI pathogen panel again *Salmonella* was the commonest isolate, 12 isolates as a single pathogen and 5 as one among the multiple targets identified, making a total of 17 (43.5%) isolates. This was followed by Enteroaggregative *E. coli* (EAEC=9) and Enteropathogenic *E. coli* (EPEC=5). Only two had virus as a single pathogen (norovirus), while no parasitic infection was identified.

• Multiple pathogens were identified by the multiplex panel in 12 patients. *Clostridium difficile* toxin was positive in 2 in whom multiple targets were identified. Among the chronic diarrhea syndrome, none had stool culture positivity while two had positive FA GI pathogen panel results and the organisms were *Campylobacter* and EAEC.

Table 2: Details of multiple organisms identified in a sample by FA GI pathogen panel

1	EPEC, Salmonella,
2	EAEC, Cryptosporidium
3	EAEC, Campylobacter
4	EAEC, EPEC, ETEC
5	EIEC, norovirus, Campylobacter
6	EPEC, ETEC. Campylobacter
7	EAEC, Clostridium difficile toxin A and B
8	Salmonella, Clostridium difficile toxin A and B
9	EAEC, EPEC
10	EPEC, Salmonella
11	EAEC, Salmonella
12	EAEC, Salmonella

• Among the 39 patients with positive FA GI pathogen panel, only 6 had positive stool culture, while culture was negative in 28 patients. Stool culture was not done in 5 patients. All stool culture positive samples also had GI pathogen panel positive result.

Stool culture	Frequency	Percentage
Not done	5	12.8
Positive	6	15.4
Negative	28	71.8
Total	39	100

Conclusions

- FA multiplex PCR panel detects a wide array of GI pathogens. Its has a better yield and quick turn-around-time as compared to conventional tests like stool culture.
- If optimally used it may facilitate treatment decisions, isolation policy and antimicrobial stewardship in patients with diarrhea requiring hospitalization.

References

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