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Original Contributions

EPIDEMIOLOGY OF SEVERE ACUTE DIARRHEA IN PATIENTS REQUIRING HOSPITAL ADMISSION

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□ **Abstract—Background: Information on the epidemiology and susceptibility patterns of main pathogens causing severe acute diarrhea may help to reduce inappropriate antimicrobial use in emergency departments. Objectives: We sought to investigate the micro-organisms causing severe acute diarrhea in patients requiring hospital admission by means of a commercial multiple polymerase chain reaction system. Methods: Between November 2016 and October 2018 we studied 132 patients with acute diarrhea who required hospital admission at a 250-bed hospital in Spain. Demographic, clinical, analytical, and microbiological data were collected from the medical records. Stool samples were processed using a rapid commercial multiple polymerase chain reaction system (FilmArray Gastrointestinal Panel), stool culture, and standard microbiological procedures. Results: The median age (range) of patients was 45.5 (0.1–92) years, and 50% were male; 46.2% presented with fever, 62.8% presented with vomiting, and 12.9% presented with rectal bleeding. At least 1 enteric pathogen was identified in 93 (70.4%) patients; 28 (21.2%) patients had >1 micro-organism. FilmArray Gastrointestinal Panel results were available in a median (range) of 1 (0–3) days. The micro-organisms most frequently identified were 24 cases of *Campylobacter* species, 20 cases of *Clostridioides difficile* producing toxin A or toxin B, 20 cases of *Salmonella* species, 12 cases of rotavirus, and 30 cases of different types of pathogenic *Escherichia coli.* Among the cases of *C. difficile*, 12 (60%) were community-acquired and 8 (40%) had an undetermined origin. Conclusion: The FilmArray Gastrointestinal Panel system provides fast and reliable results and could be useful to select the most appropriate antimicrobial based on local susceptibilities until the results of the cultures are available.**

□ **Keywords—acute diarrhea; *Campylobacter* species; *Clostridium difficile*; *Salmonella* species; nucleic acid amplification techniques**

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INTRODUCTION

Acute diarrhea is a common disease in humans worldwide, with incidence rates varying from 160 to 250 per 100,000 inhabitants in countries belonging to the European Union (1). While in developed countries the peak incidence of infectious diarrhea is found in children <5 years of age, cases of severe diarrhea leading to hospitalization and resulting in death are most frequently observed in elderly patients (2).

The treatment of choice for severe acute diarrhea is rehydration using a balanced sodium-glucose solution. In severe dehydration, intravenous rehydration should

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be continued until pulse, perfusion, and mental status normalize and the patient awakens, has no risk factors for aspiration, and has no evidence of ileus. The remaining deficit can be replaced by using oral rehydration solutions. Infants, children, and adults with mild to moderate dehydration should receive oral rehydration solution until clinical dehydration is corrected (3,4). Antibiotic therapy is often started empirically in the emergency department (ED) in severe cases, pending the results of stool cultures. In a few retrospective studies, the causative enteropathogen is only found in 38–58% of all patients, leaving a considerable diagnostic gap (5–7). Traditional culture-based methods usually provide identification of the pathogen and susceptibility tests results in 3–4 days (8). Recently, many microbiology laboratories have incorporated the use of multiple polymerase chain reaction (PCR) to identify micro-organisms. Multiple PCR allows for the amplification of several different DNA sequences simultaneously (as if performing many separate PCR reactions all together in 1 reaction), saving reagents and time by performing a single test run.

In the present study, we analyzed the etiology of cases of severe acute diarrhea that were treated in our ED and required hospital admission. For this, we used a fast, commercial test based on a nucleic acid amplification system using a multiple PCR against 22 intestinal pathogens (FilmArray Gastrointestinal [GI] Panel; Bio Fire Diagnostics, LLC, Salt Lake City, Utah, USA) together with traditional diagnostic methods. We also evaluated the appropriateness selection of the empirical antimicrobial therapy chosen.

MATERIAL AND METHODS

Type of Study, Study Period, and Setting

We carried out a retrospective observational study from November 2016 to October 2018 at the ED of a 250-bed hospital that belongs to the National Health System and that serves a population of 190,000 inhabitants on the east coast of Spain. During the study period, the average visits to our ED were 70,000 per year, with 17% of patients admitted to the hospital (approximately 12,000 admissions per year).

Participants

We included pediatric patients and adults with acute diarrhea who required admission to the hospital. We excluded patients who had diarrhea lasting >14 days, those who started with symptoms after 48 h of hospital admission, and patients with incomplete data. Patients were identified after searching the Clinical Microbiology electronic databases for patients with stool samples for processing.

Definitions

Acute diarrhea was defined as the sudden onset of ≥3 liquid stools that lasted fewer than 14 days (3,4).

Severe acute diarrhea was defined as an acute diarrhea episode in a patient requiring hospital admission.

Community-acquired *Clostridioides difficile* infection was defined as an onset of diarrhea before admission to the hospital or in the first 48 h of admission as long as the onset of symptoms occurred 12 weeks after the last day of discharge. Indeterminate origin of *C. difficile* infection was defined as a community onset of symptoms when they appeared 4–12 weeks after the last hospital discharge (9).

Acute renal failure was defined as a creatinine elevation ≥1.5 times the baseline creatinine values known or presumed to have occurred in the previous 7 days (10).

We assessed the severity of diarrhea using a validated score published by Porter et al. that included objective signs, subjective symptoms, and maximum number of bowel movements in 24 h. The score has a range from 1 point (mild disease) to a maximum score of 8 points (disease more serious) (11).

We considered the initial treatment with an effective antibiotic according to in vitro susceptibility testing as appropriate empirical therapy. The use of antimicrobial therapy for patients with severe acute diarrhea caused by no pathogens, viruses, or resistant pathogens to the empirical treatment was considered as inappropriate therapy. Antibiotic therapy for patients with infections caused by pathogenic *Escherichia coli* is debatable because of insufficient evidence of benefit, and in such cases we considered either antibiotic therapy or no therapy as appropriate (4).

Variables

We collected the following information from the review of electronic medical records: age, sex, date of admission, days of evolution of symptoms before admission, number of comorbidities according to the Charlson score, presence of fever (body temperature >38°C), nausea, vomiting, maximum number of stools per day, presence of hemorrhagic diarrhea, blood pressure, creatinine and estimated glomerular filtration rate according to the Chronic Kidney Disease Epidemiology Collaboration formula, use of empirical antibiotics, use of antibiotics directed according to microbiological results, days of hospitalization, outcome, and microbiological results (12).

Microbiological Studies

FilmArray GI Panel. The FilmArray GI Panel is approved by the U.S. Food and Drug Administration as a laboratory

test for detecting enteric pathogens. It has been used in the routine workload of our laboratory for hospitalized patients since November 2016. The estimated cost is €90 (approximately $102) per sample. The FilmArray GI Panel can detect 22 pathogens, including: *Campylobacter* (*jejuni, coli,* and *upsalensis*), *C. difficile* (toxin A/B), *Plesiomonas shigelloides, Salmonella, Yersinia enterocolitica, Vibrio* (*parahaemolyticus, vulnificus,* and *cholerae*), *E. coli* 0157, enteroagregative *E. coli* (EAEC), enteropathogenic *E. coli* (EPEC), enterotoxigenic *E. coli* (ETEC), Shiga toxin–producing *E. coli* stx1 or stx2, *E. coli* O157 (STEC), *E. coli*/enteroinvasive Shigella (EIEC), Adenovirus F40/F41, Astrovirus, Norovirus GI/GII, Rotavirus A, Sapovirus (I, II, IV and V), *Cryptosporidium* spp., *Cyclospora cayetanensis*, *Entamoeba histolytica*, and *Giardia lamblia.* The system incorporates all the necessary reagents for extraction, PCR amplification and detection of the microorganisms mentioned. During the processing of the sample, the manufacturer's instructions were followed. Results of the FilmArray GI Panel were available approximately 1 h after processing. We only studied 1 FilmArray GI Panel per patient.

Stool Cultures

All stool samples were seeded on plates with the following culture media: MacConckey agar, Campylosel agar, Salmonella-Shigella agar, and selenite broth (Beckton-Dickinson, Eysins, Switzerland). All media were incubated at 35–37°C in ambient air, except Campylosel agar, which was incubated at 42°C under microaerobic conditions. The plates were incubated for 2 days before being reported as negative. The microbiological isolates were identified by the Microscan Beckman Coulter System (Beckman Coulter Eurocenter, Nyon, Switzerland). Antimicrobial sensitivity tests were performed using the Microscan Beckman Coulter system. In the case of *Campylobacter* isolates, the identification was made by biochemical methods and phenotypic analysis and the sensitivity tests were carried out using Etest test strips (Biomerieux, Lyon, France). No culture or sensitivity test was carried out for pathogenic *E. coli* or *C. difficile.*

Statistical Analysis

Categorical variables are expressed as frequency and percentage. Continuous variables are expressed as mean and standard deviation, or median and range when they do not have a normal distribution. The comparisons between groups were made by analysis of contingency tables, with the χ^2 test or by the Kruskal-Wallis test. In the case of multiple comparisons, the Bonferroni correction was applied. All analyses were calculated for 2 tails; p values < 0.01 were considered significant for multiple comparisons.

RESULTS

Patients

In the study period, a total of 519 stool samples were evaluated with the FilmArray GI Panel. Only 1 panel sample was included for each patient. Finally, 132 patients were included for analysis (Figure 1). Sixty-six (50%) samples came from male patients and 66 (50%) from female patients. The median age (interquartile range [IQR]) was 45.5 (8.5–74) years. A total of 72 (54.5%) patients had ≥1 point in the Charlson comorbidity classification (IQR 0–4); 13 (9.8%) suffered from immunosuppression. The median (IQR) of the maximum number of bowel movements per day was 6 (5–10); the median duration (IQR) of the symptoms was 3 days (1–5) before going to the ED. A total of 61 (46.2%) presented with fever higher than 38°C, 83 (63.9%) patients reported vomiting, and 17 (12.9%) reported hemorrhagic diarrhea. Regarding the severity of diarrhea, the median (IQR) score of severity observed was 5 (4–6) points. A total of 33 (34.1%) of the patients suffered an acute renal failure (Table 1).

A total of 62 (47%) patients initiated antimicrobial therapy in the ED. The empirical antimicrobials most commonly used were ciprofloxacin (35.6%), metronidazole (3.8%), meropenem (3.0%), and ceftriaxone (2.3%). Patients received a median (IQR) of days of antimicrobial therapy of 3 (0–5.5) days.

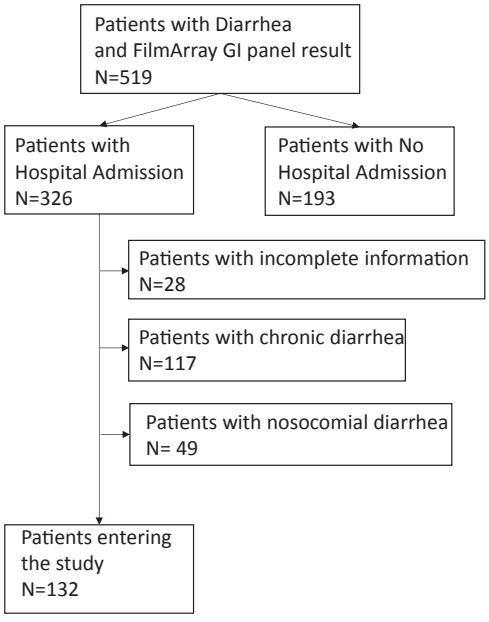

Fig. 1. Flowchart of patients with diarrhea and FilmArray panel results. GI = gastrointestinal.

Table 1. Characteristics of Patients Included in the Study

	All Patients (N = 132)	Age 0–14 y (n = 43)	Age 15–65 y (n = 38)	Age >65 y (n = 51)	*p* Value
Age (y), median (IQR)	45.5 (8.5–74.0)	4 (1.5–8.0)	40.5 (27.2–54.7)	75 (72–84)	0.000
Male sex, n (%)	66 (50.0)	26 (60.4)	17 (44.7)	23 (45.1)	0.420
Charlson comorbidity, score, median (IQR)	1 (0–4)	0 (0–0)	0 (0–2)	5 (4–7)	0.000
Immunosupression, n (%)	13 (9.8)	0	4 (10.5)	9 (17.6)	0.016
Fever, n (%)	61 (46.2)	29 (67.4)	15 (39.5)	17 (33.3)	0.014
Severity of diarrhea (score), median (IQR)	5 (4–6)	3 (4–6)	4.5 (4–6)	5 (4–6)	0.111
Duration of diarrhea (days), median (IQR)	3 (1–5)	3 (1–3.5)	3 (1–6)	3 (2–5)	0.078
Maximum number of stools per day, median (IQR)	6 (5–10)	6 (4–11)	6 (5–10)	6 (5–10)	0.819
Vomiting, n (%)	83 (62.8)	36 (83.7)	21 (55.3)	26 (50.9)	0.004
Vissible blood, n (%)	17 (12.9)	7 (16.3)	8 (21.0)	2 (3.9)	0.04
Acute renal failure, n (%)	33 (25)	0	4 (10.5)	29 (56.8)	0.000
Treatment with antibiotics, n (%)	87 (65.9)	13 (30.2)	28 (73.7)	46 (90.2)	0.000

IQR = interquartile range.
Continuous variables are expressed as median (IQR) and categorical variables are expressed as frequency (%).

Most patients (96.2%) improved or cured after a median (range) of 4 (3–30) days of hospitalization; however, 4 patients were readmitted to the hospital, 3 of them because of unrelated conditions and 1 with recurrent diarrhea without identified pathogen. An elderly patient died during hospitalization because of complications of *C. difficile* infection.

Results of FilmArray GI Panel and Stool Cultures

The results of the FilmArray GI Panel were available to physicians in a median (range) of 1 (0–3) days. We identified ≥1 enteropathogen in 93 (70.5%) stool samples; 28 (21.2%) stool samples had >1 pathogen. The most commonly detected microorganisms were 24 cases of *Campylobacter* spp., 20 cases of *C. difficile*, 20 cases of *Salmonella* spp., 12 cases of rotavirus, and 30 cases of different pathogenic *E. coli* (Figure 2). Among the cases of acute diarrhea caused by *C. difficile*, 12 (60%) were acquired in the community and 8 (40%) were of undetermined acquisition.

The distribution of gastrointestinal pathogens by age group is presented in Table 2. Children <15 years of age had predominantly viral GI infections, with rotavirus being the most frequently isolated pathogen mainly in children <5 years of age (Table 2). In patients 15–65 years of age and in those ≥65 years of age, *Campylobacter* spp., *Salmonella* spp., and *C. difficile* were the most common gastrointestinal pathogens found. Overall, the microorganisms detected by FilmArray GI Panel in patients entering the study had a similar distribution to those found in the total population of 519 patients with diarrhea analyzed (Table 3).

A total of 28 patients had >1 GI pathogen detected by the Film Array GI panel (Table 4). Patients <15 years of age showed multiple pathogens more frequently (37.2%) compared with patients aged 15–65 years (13.1%) or patients ≥65 years of age (13.7%) ($p = 0.007$).

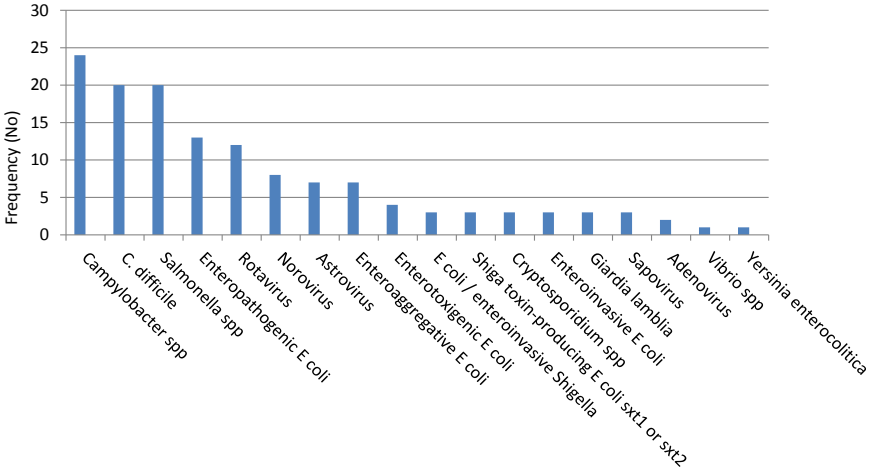

Fig. 2. Enteropathogens detected by FilmArray Gastrointestinal (GI) panel in 132 patients.

Table 2. Results of FilmArray Gastrointestinal Panel by Age Group

	Age 0–14 y (n = 43)	Age 15–65 y (n = 38)	Age >65 y (n = 51)
Negative	7 (16.3)	12 (31.6)	20 (39.2)
Adenovirus	1 (2.3)	0	0
Astrovirus	6 (13.9)	0	1 (1.9)
Norovirus	4 (9.3)	3 (7.9)	1 (1.9)
Rotavirus	10 (23.4)	0	2 (3.8)
Sapovirus	3 (6.9)	0	0
Campylobacter spp.	8 (18.6)	7 (18.4)	9 (17.6)
Clostridioides difficile toxin A or B	8 (18.6)	4 (10.5)	8 (15.6)
Enteroaggregative *Escherichia coli*	3 (6.5)	1 (2.6)	3 (5.9)
E. coli/enteroinvasive *Shigella*	1 (2.3)	2 (5.3)	0
Enteropathogenic *E. coli*	5 (11.6)	3 (7.9)	5 (9.8)
Enterotoxigenic *E. coli*	3 (6.9)	0	1 (1.9)
Shiga toxin–producing *E. coli* sxt1 or stx2	0	1 (2.6)	2 (3.8)
Salmonella spp.	6 (13.9)	8 (21.0)	5 (9.8)
Vibrio spp.	0	0	1 (1.9)
Yersinia enterocolitica	0	1 (2.6)	0
Crypstosporidium spp.	3 (6.9)	0	0
Giardia lamblia	1 (2.3)	0	2 (3.8)

Results are expressed as frequency (%).

We found several discrepancies between the results of the stool cultures and the FilmArray GI Panel. Stool cultures were negative in 1 (4%) cases of *Campylobacter* spp., in 8 (40%) of *Salmonella* spp., and in 1 (100%) of *Y. enterocolitica* infection that were detected by the FilmArray GI Panel. All patients with discrepancy results had received empirical antimicrobial agents in the ED before collecting the stool sample.

The results of the susceptibility testing in *Campylobacter* spp. isolates showed 100% susceptibility to erythromycin, 14% susceptible to ciprofloxacin, and 14% susceptible to tetracycline. With regard to *Salmonella* spp. isolates, the results of the susceptibility testing showed 43% susceptibility to ampicillin, 100% susceptibility to amoxicillin-clavulanate, 100% susceptibility to cefotaxime, 100% susceptibility to ciprofloxacin, and 100% susceptibility to trimethoprim-sulfamethoxazole.

A total of 31 (56%) of patients with FilmArray GI Panel negative results or with severe acute diarrhea caused by viruses received inappropriate treatment with antibiotics. Twenty (86%) patients with *Campylobacter* spp. identified by FilmArray GI Panel received inappropriate treatment with ciprofloxacin or levofloxacin based on our antimicrobial susceptibility results. Finally, 9 (75%) adult patients with *C. difficile* as the sole pathogen causing infection did not receive appropriate empirical antimicrobial therapy in the ED. Overall, 72 (54.5%) patients received inappropriate empirical therapy.

Table 3. Results of FilmArray Gastrointestinal Panel in 519 Patients With Diarrhea

Micro-organism	Frequency (%)
No micro-organism identified	117 (22.5)
Enteropathogenic *Escherichia coli*	65 (12.5)
Campylobacter spp.	63 (12.1)
Clostridioides difficile toxin A or B	55 (10.6)
Salmonella spp.	39 (7.5)
Rotavirus	32 (6.2)
Norovirus GI/GII	30 (5.8)
Enteroaggregative *E. coli*	26 (5)
Adenovirus F40/41	16 (3.1)
Giardia lamblia	13 (2.5)
Sapovirus I, II, IV, or V	11 (2.1)
E. coli/*Shigella* enteroinvasive	10 (1.9)
Astrovirus	10 (1.9)
Cryptosporidium spp.	9 (1.7)
Shiga toxin–producing *E. coli* sxt1 or sxt2	7 (1.3)
Vibrio spp.	2 (0.4)
Yersinia enterocolitica	2 (0.4)
Plesiomonas shigelloides	1 (0.2)

DISCUSSION

Using a commercially available system (FilmArray GI Panel) we identified the cause of acute severe diarrhea in 70.4% of patients attending to our ED. The most frequently identified pathogens were *Campylobacter* spp., *C. difficile*, *Salmonella* spp., rotavirus, and various types of pathogenic *E. coli*. Moreover, the FilmArray GI Panel identified bacterial enteropathogens in 10 patients whose stool culture results were negative because of previous use of antibiotic therapy. Pediatric patients showed greater proportion of viral infection and also diarrhea caused by multiple pathogens compared with other group patients. According to the micro-organism identified and the susceptibility pattern found, 72 (54.5%) patients received inappropriate empirical antimicrobial therapy.

In other studies, the FilmArray GI Panel identified a pathogen in only 50% of the samples analyzed, although

Table 4. Patients With >1 Pathogen Identified by Film Array Gastrointestinal Panel

	Age Group		
No. of Pathogens	<15 y of age; 16 of 43 (37.2%)	15–65 y of age; 5 of 38 (13.1%)	>65 y of age; 7 of 51 (13.7%)
2	Astrovirus plus rotavirus (n = 1) Astrovirus plus *Clostridioides difficile* (n = 1) Norovirus plus *C. difficile* (n = 1) Rotavirus plus enterotoxigenic *Escherichia coli* (n = 2) Sapovirus plus *C. difficile* (n = 1) *Campylobacter* spp. plus *C. difficile* (n = 1) *Campylobacter* spp. plus EPEC (n = 1) *Campylobacter* spp. plus *Salmonella* spp. (n = 1)	Norovirus plus EAEC (n = 1) *Salmonella* spp. plus adenovirus (n = 1) Salmonella spp. plus *C. difficile* (n = 1) *Salmonella* spp. plus EPEC (n = 1) *Yersinia enterocolitica* plus *C. difficile* (n = 1)	Norovirus plus *Giardia lamblia* (n = 1) Rotavirus plus EAEC (n = 1) *Campylobacter* spp. plus enterotoxigenic *E. coli* (n = 1) *C. difficile* plus STEC sxt1 or stx 2 (n = 1) EAEC plus EPEC (n = 1) *Salmonella* spp. plus EPEC (n = 1)
3	Adenovirus plus rotavirus plus sapovirus (n = 1) Astrovirus plus EPEC plus *C. difficile* (n = 1) Norovirus plus EAEC plus *G. lamblia* (n = 1) Rotavirus plus EPEC plus *C. difficile* (n = 1) *E. coli*/enteroinvasive *Shigella* plus EPEC plus enterotoxigenic *E. coli* (n = 1)		*Salmonella* spp. plus EPEC plus EAEC (n = 1)
4	Astrovirus plus sapovirus plus EAEC plus *Cryptosporidium* spp. (n = 1) EAEC plus EPEC plus *Salmonella* spp. plus *Cryptosporidium* spp. (n = 1)		

EAEC = enteroaggregative *Escherichia coli*; EPEC = enteropathogenic *Escherichia coli*; STEC = Shiga toxin producing *Escherichia coli*.

in patients with hemorrhagic diarrhea the percentage reached 70% (13). Regarding the distribution of pathogens, our study shows patterns similar to those found in other studies conducted in Europe (14,15). Specifically, in adult patients, the predominant pathogens were enteropathogenic *E. coli*, *Campylobacter* spp., and *C. difficile.* These results have implications for selecting the most appropriate therapy in cases of severe diarrhea once the results of the FilmArray GI Panel are available. We found that a significant proportion of patients were treated with intravenous ciprofloxacin, being the first dose given in the ED. In addition, a substantial proportion of patients with severe acute diarrhea not amenable to treat with antibiotics received inappropriate antibiotics therapy. We have also confirmed the widespread resistance of *Campylobacter* spp. to fluoroquinolones in Spain as has been observed in many other European countries, making ciprofloxacin an invalid choice at our setting (16,17). Azithromycin might be a better choice than ciprofloxacin because it has the advantage of showing in vitro activity not only to *Campylobacter* spp. but also against most *Salmonella* spp., *Shigella* spp., and *Y. enterocolitica* isolates as well as against enteropathogenic *E. coli* (18–21).

C. difficile was the second most common pathogen identified in adult outpatients with severe diarrhea. After reviewing the patients' electronic medical record, we determined that 60% of cases of *C. difficile* diarrhea were acquired in the community and 40% had undefined origin (community or health care–related acquisition). Compared with studies carried out 10 years ago in other European countries, *C. difficile* has moved from the eighth to the second position as one of the most common gastrointestinal pathogens causing acute severe diarrhea (22). In our study, a significant proportion of patients with *C. difficile* infections were not suspected in the ED. For patients at risk of suffering from diarrhea caused by *C. difficile,* a fast result of FilmArray GI Panel could be extraordinary useful to place the patient in an isolation room and to start early with an effective antimicrobial treatment. In a first episode of *C. difficile* diarrhea either vancomycin or fidaxomicin is preferred over metronidazole, according to the current guidelines (23).

The strengths of the present study are based on a significant sample of patients with acute severe diarrhea studied over a 2-year observation period. We used a well validated commercial method based on multiple PCR analysis of a sample of feces and we confirmed the results by standard culture methods. Moreover, we noticed that some patients testing positive with FilmArray GI Panel had negative stool cultures if they received previous antibiotic therapy. FilmArray GI Panel can be considered an expensive test for some laboratories. A more restrictive use of FilmArray GI Panel could be focused to patients who are severely ill, with immunodeficiencies, in cases of travelers' diarrhea or in those patients at risk of having *C. difficile* infection.

Limitations of the Present Study

First, there is a limitation on the generalizability of our results to other settings and other countries. The spectrum

and relative frequency of enteropathogens we found was similar to other studies carried out in patients from European countries, but results may differ in other areas with different antibiotic usage in farming and humans. In addition, the relatively low number of patients with diarrhea caused by GI parasites might not extrapolate to other areas. Second, we did not carry out antimicrobial susceptibility studies in pathogenic *E. coli* identified by the FilmArray GI Panel. Antimicrobial susceptibility for *E. coli* in stool samples is a cumbersome procedure usually carried out with research purposes; in that case, we relied in the susceptibility patterns found in *E. coli* found in other samples at our institution. Finally, cost of FilmArray GI Panel could constitute a limitation, but in several cases it will be possible to avoid unnecessary antibiotic therapy.

CONCLUSIONS

We described the FilmArray GI Panel epidemiology of acute severe diarrhea in patients requiring hospital admission in eastern Spain. We could identify the causative pathogen in a greater proportion of patients than that reported with traditional culture-based methods. We found a high proportion of inappropriate use of ciprofloxacin as empirical therapy because most cases of severe diarrhea were caused by *Campylobacter* spp. resistant to fluoroquinolones. In addition, we found a significant proportion of cases of severe acute diarrhea caused by *C. difficile* that were not clinically suspected. Based on our local epidemiology, azithromycin constitutes the most active antimicrobial agent for most bacterial enteric pathogens. Empirical therapy against *C. difficile* infection should be considered in patients who are at risk. The use of FilmArray GI Panel has proven to be a valuable tool to provide a fast and reliable results on the etiology of acute severe diarrhea.

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ARTICLE SUMMARY

1. Why is this topic important?

The epidemiology of hospitalizations associated with severe acute diarrhea has not been well investigated so far. The causative pathogen is identified in only 38–58% of patients.

2. What does this study attempt to show?

We wanted to test the diagnostic performance of a commercial polymerase chain reaction–based system (FilmArray GI Panel) in patients with severe acute diarrhea. We also evaluated the antibiotic used as empirical therapy at our emergency department.

3. What are the key findings?

We identified the causative pathogen in 93 (70.4%) patients. *Campylobacter* species, *Clostridioides difficile*, and *Salmonella* spp. were the 3 main enteric pathogens found. Ciprofloxacin was commonly used even though most *Campylobacter* spp. were resistant to fluoroquinolones. Antibiotics were inappropriately used when diarrhea was caused by viruses, no causative pathogen was identified.

4. How is patient care impacted?

FilmArray GI Panel provided fast results to assess the local epidemiology of severe acute diarrhea. FilmArray GI Panel results might impact the selection of the most appropriate antimicrobial therapy, reducing excess antimicrobial use.