D-208

Early Experience with a Multiplex PCR Gastrointestinal (GI) Pathogen Panel: Implications for Infection Control

M. Sidlak[1], J.Platts-Mills[2], S.Hutter[3], E.Giannetta[3], C.Sifri[2,3], S.Ensinger[1], J.Carroll[1], M.Poulter[1,4], A.Mathers[1,2,3]

Clinical Microbiology Laboratory University Of Virginia Health System (UVaHS)[1], Division of Infectious Diseases and international Health University of Virginia (UVa)[2], Hospital Epidemiology UVaHS[3], Department of Pathology UVa[4]. Charlottesville, VA

University of Virginia Health System
Mjs4qy@virginia.edu
434-924-8051

Abstract

Background: Infectious gastroenteritis (IGE) is associated with a wide range of viral enteropathogens rarely tested outside of epidemiologic studies. Our institution introduced a multiplex PCR gastrointestinal (GI) pathogen panel in March 2015. We learned how newly identified pathogens impact infection control (IC) practices.

Methods: Stool specimens submitted in Cary Blair Transport Medium from 3/23 to 5/18/2015 were tested with the FilmArray® GI Panel (BioFire Diagnostics, Salt Lake City, Utah) (FA) for 23 bacterial, viral and protozoal pathogens. Patient location and age was recorded. Inpatient testing was limited to those hospitalized ≤ 48 hr. *Clostridium difficile* was not routinely reported.

Results: Specimens from 262 patients were tested, including adult inpatients (IP) (n=65; 25%), outpatients (OP) (n=161; 61%) and pediatric patients (Ped) (n=36; 14%). Excluding *C.difficile,* 21% of patients (n=56) had one or more pathogens. Pathogen detection was more common in Ped (n=19; 53%) than in adult IP/OP (n=37; 16%) (Fischer's exact test p<0.0001). Viral pathogens predominated across all groups (n=35; most common: norovirus n=20, sapovirus, n=8) compared to bacterial (n=25) and protozoal pathogens (n=6). As a result, IC precautions were altered for 11 patients (4 – Ped, 7 – IP) based on pathogens identified by the FA panel.

Conclusions: Our experience with the FA showed that viral pathogens were the predominant etiologic agent of IGE across patient groups. Detection of viral agents of IGE is beneficial as it may reduce unnecessary antibiotic use and mitigate risks for secondary transmission by implementing appropriate IC measures for hospitalized patients. IC policies were adapted to reflect the ability to detect a larger array of IGE pathogens. Staff education materials were created, IC guidelines were updated, and results from the panel were integrated into IC decision support software. Collaboration between clinical laboratories, hospital IC programs, and public health is needed to develop policies that will optimize control of newly detectable pathogens.

Methods

- Announcements of test availability were sent electronically and through mailings to clinics and hospital staff
- Hospital Epidemiology and the State Public Health Lab were also notified about the changes
- Testing for hospitalized patients was restricted inpatients who had been in the hospital <48 hours in the ICU or acute care nursing unit
- The Clostridium difficile target was not reported
- Outpatient testing was not restricted and included ER, Clinics, and Outreach Physician practices.
- Testing was performed on 0.2 mL stool from Cary-Blair transport media according to the manufactures recommendations
- Stool that was not in Cary-Blair when it arrived to the lab was transferred to Cary-Blair before testing and these specimens were part of the validation
- Location of collection and date of birth was tracked though specimen management system

Results

	Total Patients		INPATIENTS		OUTPATIENTS		PEDIATRIC	
No. of Patients	262		65		161		36	
No agent detected	206		55		134		17	
No. Patients Positive	56	21%	10	15%	27	17%	19	53%
No. Patients with 2 or more pathogens	10		0		6		4	
List of TARGETS DETECTED								
Norovirus	20	7.6%	5	7.7%	10	6.2%	5	13.9%
Sapovirus	8	3.1%	2	3.1%	3	1.9%	3	8.3%
Adenovirus	2	0.8$	0	0.0%	0	0	2	5.6%
Rotavirus	2	0.8%	0	0	1	0.6%	1	2.8%
Astrovirus	3	1.1%	0	0	1	0.6%	2	5.6%
VIRAL TARGETS	35		7		15		13	
Enteroaggregative E.coli	6	2.3%	0	0	4	2.5%	2	5.6%
Enteropathogenic E.coli	9	3.4%	1	1.5%	6	3.7%	2	5.6%
Salmonella	4	1.5%	1	1.5%	2	1.2%	1	2.8%
Campylobacter	4	1.5%	0	0	1	0.6%	3	8.3%
E.Coli 0157	2	0.8%	0	0	0	0	2	5.6%
BACTERIAL TARGETS	25		2		13		10	
Cryptosporidium	2	0.8%	1	1.5%	1	0.6%	0	0
Giardia	4	1.5%	0	0	4	2.5%	0	0
PARASITIC TARGETS	6		1		5		0	

Discussion

- Use of the FilmArray® GI Panel led to identification of viral, bacterial, and protozoal agents of gastroenteritis for which routine testing has not previously been performed. Detection of these agents has implications for clinical management and infection control.
- The GI Panel detects 5 viral targets causing gastroenteritis, many of which were previously not routinely detected outside of outbreak investigations. We believe the implementation of this testing detected additional viral pathogens which were likely present and circulating in the population, but previously went undetected.
- Using an electronic notification system, we were able to alert hospital epidemiology in real time about patients with detected pathogens
- Norovirus and sapovirus are the most common etiological agents of viral gastroenteritis outbreaks including settings such as hospitals, are relatively resistant to disinfection, and represent an infectious transmission risk for patients in and outside of the hospital.
- Sapovirus, first detected in 1977, had not yet been addressed in current CDC guidelines (HICPAC last updated in 2007). The implementation of this GI panel prompted the need to update our Infection Prevention & Control (IP&C) isolation policies regarding this organism.
- IP&C policy updates included the following for Norovirus and Sapovirus:

  1) Contact precautions for inpatients, family, and visitors, 2) Disinfection procedures for rooms and supplies, 3) Outpatient education sheet describing contact precautions and disinfection procedures, and 4) Staff Education information sheet (not pictured)

INPATIENT Contact Precautions Policy Update

1. Hand washing with soap and water. Gels are not effective against Norovirus / Sapovirus.
2. All patients are admitted into a private room with CONTACT PRECAUTIONS.
3. All medical devices (stethoscopes, blood pressure cuffs, thermometers) remain in the room.
4. Patients were restricted to their rooms with limited access to common areas.
5. Any surface affected by procedures or therapies outside the room were disinfected with bleach wipes.
6. Family and visitors were subject to the same Contact Precautions as patients. Rooming in individuals were restricted to common areas, including family lounge, cafeteria, or gift shop.

OUTPATIENT Contact Precautions Policy Update

1. Hand washing with soap and water.
2. All surfaces touched by patient must be disinfected with Bleach wipes.
3. Contact Precautions & surface disinfection may be discontinued by patients with Norovirus after 72 hours of last episode of vomiting and/or diarrhea.
4. Contact precautions and disinfection of surfaces may be discontinued by patients with Sapovirus after 24 hours of the last episode of vomiting and/or diarrhea.

DISINFECTION – Policy Update

1. After discharge, patient room and equipment is disinfected with an approved bleach wipe.
2. Curtains in the room are replaced and all contact surfaces are disinfected with bleach.
3. Disposable supplies essential for patient care are removed and discarded.

CONCLUSION: We recommend that clinical microbiology laboratories, with hospital epidemiology/infection prevention and control programs, local and state health departments, and state public health laboratories coordinate implementation of multiplex GI pathogen panel for clinical use. Issues to consider include Infection Control policy updates, increased volume of reportable disease, and laboratory requirements for forwarding isolates for confirmation and further characterization.

References

1. Journal of Medical Virology, August, 2008
2. Norovirus / Sapovirus Staff Information Sheet, Policy XII.B10 – 1, Hospital Epidemiology, University of Virginia Medical Center, rev 5/2015.