In the Loop

UnityPoint Health
Des Moines

*The Newsletter of UnityPoint Health – Des Moines Laboratories*

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# Stool Testing for Infectious Diarrhea – IMPORTANT CHANGES

**Effective Monday May 2nd: The Clinical Laboratories of UnityPoint Health – Des Moines will be utilizing the Biofire Filmarray Gastrointestinal Panel, a Multiplex Molecular test, as our primary stool diagnostic testing methodology and eliminate offering routine stool culture testing. This is an exciting time for the field of medical microbiology in which we will be able to provide a more comprehensive, rapid diagnosis for patients with presentations of infectious diarrhea.**

Welcome to ***In the Loop,*** the newsletter from UnityPoint Health – Des Moines Laboratories.

The purpose of this newsletter is to distribute valuable information to our service area, including new test availability, test updates regarding methodology, specimen collection, and normal values.

We may also include feature topics related to laboratory diagnostics and test utilization.

If you have suggestions for topics you would like to read about in the newsletter, please email Kimberly.VonAhsen@unitypoint.org

## Background

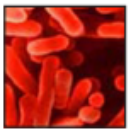
The classical stool culture used as an aid in the diagnosis of bacterial gastroenteritis has remained unchanged for decades. This testing offers great specificity but varying degrees of sensitivity (depending on the pathogen present). We have historically screened bacterial stool cultures for the presence of *Salmonella*, *Shigella*, and *Campylobacter species.* More recently, we have expanded the culture to also screen for the presence of Shiga-toxin producing *E. coli*, and specifically *E. coli* O147:H7. This method is limited due to several factors: *Campylobacter species* are very fastidious and somewhat difficult to grow in culture, *Salmonella, Shigella* and *E. coli* O157:H7 grow readily, but must be distinguished from the abundant presence of normal stool bacteria. There is also the issue of transport time and transport media necessary to suppress the overgrowth of normal stool flora, but still allow the pathogens to survive until the sample reaches the laboratory.

Upon reaching the Microbiology Laboratory, the sample must then be plated onto selective media, in appropriate environmental conditions to allow the bacterial colonies to grow, for at least 24 hours, but up to 72 hours, so the turn-around-time for resulting could mean several days pass before a definitive result can be given to the patient's provider. Testing for additional pathogens (e.g.*Vibrio* and *Yersinia species*), has been available only by special request and is subject to the same limitations as any culture method. Additionally, the stool culture offers absolutely no information about any viruses which may be present as the cause of the diarrheal illness. This includes many co-infections (bacterial and viral or parasitic).

Along with stool culture requests, the lab often receives a request for the Ova and Parasite Screen (Cryptosporidium and Giardia) and due to limited resources, as well as low prevalence, testing for any additional parasite(s), has necessitated sending the sample to our State Hygienic Laboratory for further analysis.

## Rationale

With the evolution of clinical diagnostic technology, we are now able to offer a molecular test that would not only include all of the above potential etiologies of a diarrheal illness but several additional pathogens. The Filmarray Biofire GI panel uses highly sensitive and specific molecular technology along with a rapid turnaround time (the on-board testing time is less than two hours to screen) for the following pathogens:

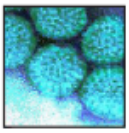


**Bacteria**

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

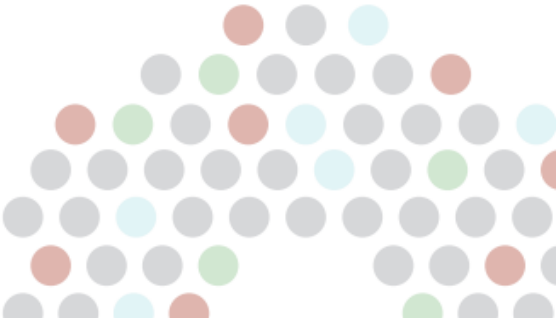
**Parasites**

*Cryptosporidium*
*Cyclospora cayetanensis*
*Entamoeba histolytica*
*Giardia lamblia*



**Viruses**

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



In the process of performing laboratory validation of this testing method, we performed a small side-by-side study performing the GI panel testing on 35 stools that were negative by standard stool culture (including shiga toxin testing), Cryptosporidium/Giardia Screening (our standard O&P screen), and *C. difficile* toxin testing.

- **34% of these "negative" specimens were found to be positive using the Biofire GI panel.**
  - **Five (5) Viral targets were detected (including 3 Norovirus)**
  - **One (1) *Salmonella species* was detected**
  - **Two (2) *Yersinia enterocolitica* targets were positive**
  - **Four (4) Enteroaggregative *E. coli* (EAEC) or Enteropathogenic *E. coli* (EPEC) were found.**

In addition to this study, we have offered the Filmarray GI panel as a testing option for several months now, and looking back at our results we have been able to add additional evidence for moving to a molecular test for all of our stool cultures:

Of 447 total Biofire tests, 169 samples (38%) were positive. There were 241 total targets detected, with 52 samples showing co-infections. **There were a total of 210 pathogens that would not have been detected with a routine culture**. The targets detected are as follows (those marked with an asterisk would not have been detected in a routine stool culture):

61 *C. difficile**, 44 Enteropathogenic *E. coli**, 32 Rotavirus*, 21 Norovirus*, 13 Enteroaggregative *E. coli**, 12 Adenovirus*, 10 *Campylobacter* , 8 *Shigella*, 8 *Salmonella*, 7 Sapovirus*, 6 Enterotoxigenic *E coli**, 6 Astrovirus*, 4 Shiga toxin producing *E. coli* (not O157), 3 *Plesiomonas**, 2 Giardia*, 2 *Yersinia**, 1 Cryptosporidium*, 1 *E coli* O157.

We will still offer stand-alone testing for *Clostridium difficile* toxin, Rotavirus, *Microsporidia* PCR, and a full Ova and Parasite Screen (if additional parasites beyond what is part of the Filmarray panel are suspected).

Any samples which test positive for *Salmonella*, *Shigella*, or *Campylobacter* species will be plated in the Microbiology laboratory and if these organisms are recovered, susceptibility testing will be performed. In addition, any organisms required to be sent to the State Laboratory for epidemiology or typing, will have an aliquot of the sample forwarded to the State Lab for recovery of the pathogen.

**To assist with this change, a Laboratory Testing for Infectious Causes of Diarrhea Algorithm has been developed [Algorithm]**

If you have questions about this testing, please contact: Kathie Rogers, PhD, Microbiology Manager at kathie.rogers@unitypoint.org and/or Dr. Timothy Drevyanko, MD, MS Laboratory Medical Director at timothy.drevyanko@unitypoint.org