Montefiore’s Clinical Microbiology Lab: Taking Aim at an ‘Urgent Threat’

Protecting patients and the community at large from life-threatening microbial pathogens is a mission of Montefiore’s Clinical Microbiology Laboratory, directed by Michael H. Levi, ScD, and Wendy Szymczak, PhD, along with their staff of dedicated laboratory supervisors and technologists. A current focus of their expertise: helping control and prevent the spread of Clostridium difficile, a common – and often life-threatening -- healthcare-associated infection.

Long recognized as a global public health challenge, C. difficile has become more prevalent in many countries around the world, over the last decade. A major cause of the uptick: overuse of antibiotics. In 2011, the Centers for Disease Control (CDC) reported nearly 500,000 cases and nearly 30,000 deaths a year caused by the C. difficile bacterium. Two years later, the CDC designated C. difficile as an “urgent threat.”

The Microbiology Lab plays a pivotal role in the multidisciplinary initiative now underway at Montefiore to develop and implement an effective protocol targeting C. difficile. Spearheaded by Sarah Baron, MD, a hospitalist and Director of Inpatient Quality Improvement for the Department of Medicine, and Belinda Ostrowsky, MD, MPH, director of Epidemiology, Antimicrobial Stewardship and Infection Prevention for the Montefiore Medical Center, the project kicked into high gear in 2015.
“The real problem with *C. difficile* is that it’s a highly infectious, very transmissible diarrheal illness caused by an organism that is very difficult to kill in the environment. In turn, *C. difficile* is hard to prevent and hard to stop from spreading,” Dr. Baron explains. She reports that a multipronged approach that she and Dr. Ostrowsky are undertaking is starting to make headway. “The team in the Microbiology Lab has been crucial to any success we’ve been having,” Dr. Baron says.

**What is *C. Difficile***?

*Clostridium difficile* is a spore-forming bacterium that can be part of the normal intestinal flora. When a patient is treated with an antibiotic that kills off beneficial bacteria in the colon, the resulting disruption provides the ideal environment for the *C. difficile* bacterium to thrive. *C. difficile* spores are typically found in human feces; the infection is spread on hands that have touched a contaminated surface or item.

Symptoms range from watery diarrhea, fever, nausea and abdominal pain to severe inflammation of the colon. Patients 65 years or older, especially nursing home patients, are particularly vulnerable to this infection. These patients make up a large portion of the adult patient population at Montefiore.

**Testing for *C. Difficile***
Since there is no specific test for disease caused by *C. difficile*, laboratories must test for the presence of the organism, its toxin or the toxin gene. At Montefiore Medical Center, the three-test method has proven to be clinically accurate and cost-effective.

“Time is of the essence in identifying and reporting cases of *C. difficile*,” says Dr. Levi. “A patient whose diagnosis is delayed won’t get the appropriate treatment and they may be spreading *C. difficile* to other patients.” The faster patients truly infected can be identified, he says, the faster they can be isolated from other patients, hospital staff can be cued to wear the appropriate personal protective equipment (e.g., gowns and gloves), and the patient can be treated.

The Microbiology Lab has tried several ways to hasten results. Reviewing the lab’s testing methodologies and switching the order of the tests by performing the first and second tests at the same time, Dr. Levi says, helped reduce the analytic testing time from 5 hours to 2.5 hours.

“The Microbiology Lab’s willingness to work with us and to listen to what we thought was needed made all the difference,” says Dr. Baron. “They found an elegant solution.”

The time-saving new testing process allowed the lab to add an additional afternoon run. This reduced overall turnaround time (from ordering the test to getting results) from 38 hours to 29 hours in the first year. In the second year, the Microbiology Lab increased testing frequency from two to three times a day, reducing the turnaround time to less than 24 hours, a 37% reduction. In fact, because of the more frequent testing and faster analytic testing time, results can sometimes be available to clinical teams in as little as 5 hours from the time of the order.

To speed the delivery of specimens to the lab, the *C. difficile* team is experimenting with transporting them via the medical center’s pneumatic tube system.
“Our ability to make test results available faster can make a big difference in infection control and patient care,” says Philip Gialanella, MS, manager of the Microbiology Lab, who has been instrumental in implementing many facets of the new *C. difficile* protocol.

The Microbiology team and their partners in the *C.difficile* project are currently conducting a comprehensive analysis to determine whether the changes they’ve made so far are working, and to identify areas that can be improved.

**Curbing Overuse of Antibiotics**

Limiting antibiotic use is another critical factor in preventing and controlling the spread of *C. difficile*. “We want to make sure antibiotics are used only when appropriate, Dr. Szymczak says, “and that we’re not over-testing or over-reporting.”

To that end, the Microbiology Lab works closely with Dr. Ostrowsky and with all members of the Infectious Diseases faculty and the specialized Antimicrobial Stewardship Program (ASP) in supporting responsible antibiotic use throughout the medical center. This includes a yearly hospital-specific antibiogram that is distributed widely as an aide to all Montefiore clinicians in prescribing antibiotics.

![Antibiogram](image)

*The Antibiogram, prepared each year for Montefiore clinicians by the Microbiology Lab in collaboration with the Department of Medicine’s Division of Infectious Diseases/Pharmacy Antimicrobial Stewardship Program.*


Drs. Baron and Ostrowsky along with Audrey Adams, RN, MPH, Director of Infection Prevention and Control, implemented a new Infection Prevention and Control strategy for *C. difficile* patients called “Contact Plus.” Contact Plus status highlights important prevention and control policies relating to clinical care of patients with *C. difficile:*
• wearing gowns and gloves during every contact with patients;
• handwashing with soap and water, not just alcohol-based hand rub (antibiotic hand sanitizer is insufficient to remove *C. difficile* spores);
• bleach cleaning of patient rooms and treatment areas;
• providing all patients with a private commode or bathroom.

Signs posted on nursing floors and in patient treatment areas inform staff about *C. difficile* infection-control procedures.

The *C. difficile* initiative is a cross-campus collaboration that includes the departments of Pathology, Medicine, Nursing, Environmental Services and Housekeeping, the Network Performance Group, Infection Prevention and Control, the Antimicrobial Stewardship Program and Performance Excellence. The Learning Network is educating staff about the new protocol and the vital role every Montefiore associate is expected to play in implementing it, and members of the Infection Prevention team are working to heighten awareness while demonstrating best practices. **Carol A. Sheridan, MSN, RN, OCN**, Administrative Nurse Manager, Montefiore Einstein Center for Cancer Care, and **Lisa LaFalce, RN**, Administrative Nurse Manager, Nursing Resource Center, also are playing key roles in bringing staff on board.
Controlling and preventing the spread of *C. difficile* requires the participation and vigilance of the entire Montefiore community. “If we continue to pull together,” says Dr. Baron, “our success will continue to belong to all of us.”

The project’s promising results so far, Dr. Baron notes, “have been completely predicated on the Microbiology Lab’s willingness to work with us to experiment and make changes.” Without such a willing partnership, she says, “we’d be in the same place we were two years ago.”