

# BD HealthSight™ Clinical Advisor case study

Hackensack Meridian Health—JFK Medical Center reduces unnecessary quinolone usage by 50% and *Clostridioides difficile* (*C. diff*) rates by 48%, resulting in an estimated 732 days length of stay (LOS) reduction and \$2.7 million in avoided costs

## About Hackensack Meridian Health—JFK Medical Center

Founded in 1967, JFK Medical Center is a nonprofit, 498-bed community hospital serving residents of Middlesex, Union and Somerset counties in central New Jersey. With more than 900 affiliated physicians, JFK offers a complete array of advanced services, including general and specialized surgery, cardiac care, maternity and pediatric care, and emergency medicine. JFK Medical Center is an affiliate of Hackensack Meridian Health and is accredited by the Joint Commission.

*“Our facility was C. diff free in February, 2019—and we have seen a 48% drop in our CDI rates year over year as a result of streamlining manual processes and working across all stakeholders in our facility to develop best practices. By leveraging BD HealthSight™ Clinical Advisor and clinical expertise, we have greatly enhanced our CDI stewardship program.”*

**Judith Leschek, RN, BSN, CIC**

Director, Infection Prevention & Control,  
Hackensack Meridian—JFK Medical Center



Introduction

*C. diff* caused nearly 500,000 infections among patients in the United States in a single year, according to a 2015 study released by the Centers for Disease Control and Prevention (CDC). Approximately 29,000 patients died within 30 days of the initial diagnosis of a *C. diff* infection (CDI) and 15,000 deaths were directly attributable to CDI. More than 80% of the deaths associated with CDI occurred among Americans aged 65 years or older. Previous studies indicate that *C. diff* has become the most common cause of healthcare-associated infections in the United States, which cost up to \$4.8 billion each year for acute care facilities alone.<sup>1</sup>

*C. diff* prevalence is influenced by numerous factors within healthcare systems, including but not limited to: gaps in hand hygiene, environmental cleaning, testing practices or variability in antimicrobial stewardship programs. Even with clear testing guidelines, uncovering the root cause(s) for your facility can be a challenge.<sup>2</sup>

Many organizations incorporate CDI work groups into their stewardship programs to combat prevalence and improve processes. Electronic surveillance tools such as BD HealthSight™ Clinical Advisor can also provide a platform for case identification and streamlining documentation. From helping clinicians identify affected patients with alerting or empowering clinicians to intervene more efficiently, electronic surveillance plays an important role in enabling acute care facilities to take action to help ensure CDI prevention protocols are being administered.

This case study reviews the processes and protocols implemented by Hackensack Meridian–JFK Medical Center to help reduce CDI rates at their facility. As a result of implementing these new practices, the facility was able to reduce unnecessary therapies and realize economic benefit, including length of stay reduction.

Background

The infection prevention team at Hackensack Meridian Health’s JFK Medical Center reported an increase in the number of CDI cases in December of 2016, and reduction of CDI became a primary organizational priority. As a result, Hackensack Meridian Health–JFK Medical Center developed a steering committee consisting of key facility stakeholders including, but not limited to, physicians, pharmacists, infection preventionists, nurses, patient care technicians and environmental services.

This multidisciplinary team developed a CDI rate reduction strategy that included using BD HealthSight™ Clinical Advisor to monitor CDI trends and measure the impact of the organizational strategy to reduce CDI rates. As part of the program, JFK Medical Center partnered with BD HealthSight™ Clinical Advisor subject matter experts to review new protocols for enhanced best practices based on recent CDI guidelines. This case study explains how each team worked to contribute to CDI reduction at the facility.<sup>3</sup>

Pharmacy

The pharmacy department began by reviewing all antibiotic order sets to determine the appropriateness of current classifications and prescribing practices. The rapid emergence of multidrug-resistant organisms (MDRO) has become a serious threat to modern care. The inappropriate use of antimicrobials is considered to be a major factor driving the increase of bacterial resistance. Additionally, antibiotic overuse is associated with toxicity, the development of CDI and escalating healthcare costs. As a result, the judicious use of antimicrobial agents has become a nationwide imperative.<sup>4</sup>

The team quickly detected a trend for increased quinolone use in many order sets. Believing this could be a contributing factor for increased CDIs, the pharmacists consulted with physicians on alternative drug therapies by providing antibiotic utilization data from BD HealthSight™ Clinical Advisor. Educating facility physicians with alternative drug therapies resulted in a 50% reduction of quinolone use within a year. Table 1 shows the high number of quinolone order sets at the facility prior to intervention discussions between physicians and pharmacists.

Infection prevention

In the spring of 2017, the facility’s infection prevention team instituted daily huddles in the nursing unit for key stakeholders, including nurse managers, environmental staff, patient care technicians and infection preventionists. The objective of these huddles was to review patients with positive CDI results. For both new and hospital-onset cases, as well as discuss possible trends and gaps contributing to increased CDI rates at the facility. The hospital had recently switched CDI testing methodologies from antigen testing to a more sensitive polymerase chain reaction (PCR) testing.

Despite incorporation of a more sensitive testing methodology, CDI results remained the same at 22.98/10,000 patient days. Dissatisfied with the results, the facility engaged the BD HealthSight™ Clinical Advisor clinical services team comprised of infection preventionists, pharmacists and nurses for clinical consultation. Together, the BD HealthSight™ Clinical Advisor team and Hackensack Meridian–JFK Medical Center partnered to review clinical practices, monitor and benchmark patterns, and help determine the root cause of current CDI facility rates.

As part of the engagement, the BD HealthSight™ Clinical Advisor team reviewed current protocol, surveillance practices and testing methodologies utilized by the team and compared them against current CDI and PCR testing guidelines. This resulted in suggested protocol changes aligning JFK Medical Center protocols with the recently released 2018 CDI guidelines.

Together, the team created custom documentation in BD HealthSight™ Clinical Advisor to capture and qualify patient data in alignment with the agreed-upon protocol changes. To encourage engagement and data submission, the teams utilized mobile tablets to populate documentation in real time. Incorporating mobile tablets also allowed the team to review data

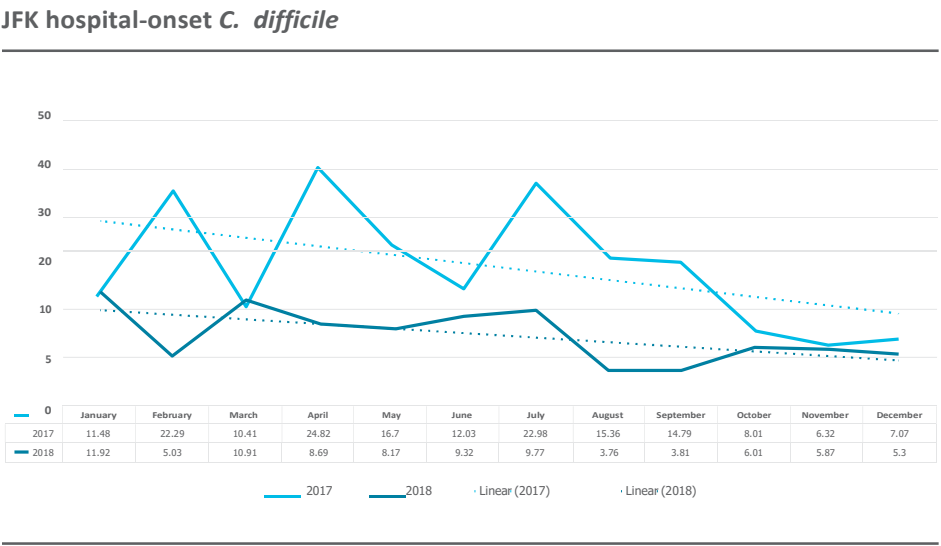


Table 2. 2017 hospital-onset CDI rates compared to 2018. This 48% reduction was statistically significant with a *P*-value of 0.0001. BD HealthSight™ Clinical Advisor data.

during daily huddles on the floor. Sample questions nurses and clinicians were expected to answer during rounds included:

- o Was the facility following *C. diff* testing algorithms?
- o Did the patients have any episode of liquid or watery stool that conformed to the shape of the container?
- o Did a physician order a specimen that meets the *C. diff* criteria?
- o Were patients exhibiting any signs and symptoms of CDI, such as:
- Specimen conforms to the container
- Elevated white blood count
- Abdominal pain
- Temperature
- None

By tracking the trends from the data captured in the custom form, the facility learned that they were following *C. diff* testing algorithms 92% of the time. By requiring clinicians to complete forms detailing specific symptoms based on guidelines, nurses could better determine which patients to monitor and test for CDI based on compliance agreements.

Additionally, physicians were asked to restrict orders for testing after 3 days of symptoms rather than 1 day, resulting in fewer overall tests.

In summary, as a result of the data collected, the teams agreed to the following three key changes to help decrease CDI at the facility:

- Implementation of new physician orders to reduce unnecessary testing from 1 to 3 days
- Daily huddles utilizing mobile tablets to review CDI results in real time for streamlined workflow and increased collaboration
- Training and education on new protocols and CDI guidance to all front-line staff

These recommendations from BD HealthSight™ Clinical Advisor consulting were incorporated into the facility’s CDI program in September of 2017. The facility closely monitored the CDI results every month. Within a year, Hackensack Meridian–JFK Medical Center began to see a reduction in overall hospital-onset CDI cases in October of 2018 by 48%.

National comparison by teaching status

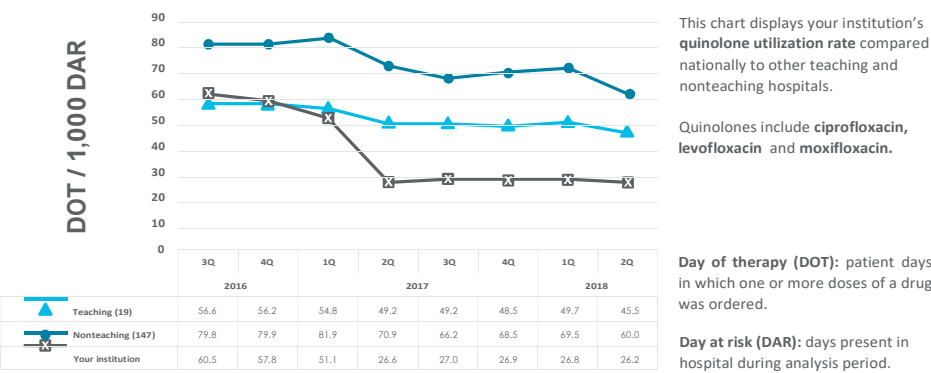


Table 1. Number of quinolone order sets at the facility in Q2 2017 compared to Q4 2018; data from BD HealthSight™ Clinical Advisor

Hospital-acquired <i>C. diff</i>													
<i>C. diff</i>	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	YTD rate 2017
Incidence rate per 10,000 patient days	11.48	22.29	10.41	24.82	16.70	12.03	22.98	15.36	14.79	8.01	6.32	7.07	14.3
# infections	10	17	9	20	13	9	18	12	12	6	5	6	137
Patient days	8,714	7,627	8,644	8,059	7,783	7,479	7,832	7,811	8,114	7,486	7,915	8,491	95,955

Hospital-acquired <i>C. diff</i>													
<i>C. diff</i>	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	YTD rate 2018
Incidence rate per 10,000 patient days	11.92	5.03	10.91	8.69	8.17	9.32	9.77	3.76	3.81	6.01	5.87	4.97	7.4
# infections	11	4	9	7	6	7	7	3	3	5	5	4	71
Patient days	9,230	7,953	8,251	8,056	7,343	7,503	7,168	7,973	7,881	8,321	8,515	8,046	96,245

## During this 2-year initiative, the team identified several factors and key learnings that likely contributed to the reduction of CDI:

- Using well-defined testing protocols and guidelines can help lead to better identification of colonized patients.
- Involving all key stakeholders is critical for complete cross-facility collaboration.
- Daily, on-the-floor huddles increases collaboration across multidisciplinary teams.
- Mobile technologies provide real-time analytics during rounds and huddles to help streamline workflows and increase efficiency and communication.
- Pharmacists should reinforce appropriate treatment with alternative drug therapies.
- Adding UV technologies to cleaning services positively impacts reduction of CDI-positive rooms.
- Using electronic surveillance helps clinicians visualize and prioritize best practice implementation for improved patient outcomes.
- A third-party clinical expert can offer unbiased guidance to help empower stewardship programs.

Table 3. Data representing hospital-acquired *C. diff* rates per 10,000 patient days, and comparison of 2017 and 2018 data from BD HealthSight™ Clinical Advisor.

### About BD HealthSight™ Clinical Advisor

BD HealthSight™ Clinical Advisor automates the process of aggregating and standardizing patient data, enabling clinicians and pharmacists to utilize the data along with other factors of which the healthcare professionals are aware of to intervene with at-risk patients. Our solutions help alert you to opportunities for proactive clinical intervention while empowering you with analytics that help streamline workflows and make evidence-based decisions for better patient care. Leveraging these system-wide analytics, combined with consultation from subject matter clinical experts, helps improve clinical, operational and financial outcomes.

## Economic impact

The team also recognized an estimated economic benefit due to their interventions. In 2016, the average attributable cost for CDI case management was \$42,316 U.S. The average and LOS for CDI inpatient treatment compared to patients without CDI was 11.1 days.<sup>5</sup> Applying this cost data to Hackensack Meridian Health–JFK Medical Center’s CDI results demonstrates a potential average reduction in length of stay by 732.6 days and \$2.7 million in avoided costs.

2-year CDI outcomes			
Year	Total number of hospital-acquired CDI patients	Cost avoided (\$42,316 per case)	Length of stay avoided
2017	137	\$5,797,292	1,520.7
2018	71	\$3,004,436	788.1
Total	66 fewer patients impacted by CDI	\$2,792,856 in avoided patient costs	732.6 days avoided due to 11.1 average stay per CDI case

## Conclusion

Leveraging surveillance technology, improving communications through daily huddles with mobile technologies, educating staff on new CDI testing protocols, improving environmental service practices, reducing unnecessary antibiotics and incorporating physician approval processes are believed to all have contributed to the overall reduction of CDI for Hackensack Meridian’s JFK Medical Center. Most importantly, open dialogue led to great organizational education and opportunities for multidisciplinary teams to collaborate and advocate for improved patient outcomes. By focusing on prevention and early identification of true CDI cases, the Hackensack Meridian–JFK Medical Center has been able to reduce CDI by 48% year over year, and has reduced quinolone usage by 50%. This results in an average estimate of 732 LOS patient days reduction and an average estimated potential savings of \$2.7 million in avoided costs.

## References

- 1 CDC Newsroom. Nearly half a million Americans suffered from *Clostridium difficile* infections in a single year. <https://www.cdc.gov/media/releases/2015/p0225-clostridium-difficile.html>. Published February 25, 2015. Accessed January 30, 2019.
- 2 Blázquez J, Couce A, Rodríguez-Beltrán J, et al. Antimicrobials as promoters of genetic variation. *Curr Opin Microbiol*. 2012;15:561-569.
- 3 This analysis was performed as a Quality improvement project by the hospital administrators. All analyses were decided upon by the relevant hospital clinicians without BD funding. BD core platforms were used as described in this document.
- 4 Yu K, Rho J, Morcos M, et al. Evaluation of dedicated infection diseases pharmacists on antimicrobial stewardship teams. *Am J Health-Syst Pharm*. 2014;71(12):1019-1028.
- 5 Zhang S, Palazuelos-Munoz S, Balsells EM, Nair H, Chit A, Kyaw MH. Cost of hospital management of *Clostridium difficile* infection in United States—a meta-analysis and modelling study. *BMC Infect Dis*. 2016;16(1):447.

BD, San Diego, CA, 92130, U.S.

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