Background

*Clostridium difficile* infection (CDI) is among the most common causes of healthcare-associated infection (HAI) in community hospitals (1). The CDC reported a greater than five-fold increase in the rate of age-adjusted deaths due to CDI in the US from 1999 to 2006 (2). The average hospital cost for patients with CDI is approximately $24,000; the annual aggregate inpatient cost for this infection exceeds $8 billion (3). Traditional interventions to control *C. difficile* include contact isolation and thorough cleaning and disinfection of the hospital environment; however, such methods are not able to prevent the majority of cases of CDI. We agree with the emerging consensus opinion that antimicrobial stewardship interventions that reduce antimicrobial exposure are the best way to prevent this HAI. This newsletter discusses two resources designed to aid in development of CDI control plans. These two resources: 1) the DICON *Clostridium difficile* Infection Prevention Initiative (4), and 2) the Agency for Healthcare Research and Quality (AHRQ) Toolkit for Reduction of *Clostridium difficile* through Antimicrobial Stewardship (5) are now available to all DICON hospitals.

**DICON Clostridium difficile Infection Prevention Initiative**

The rate of CDI in the DICON-affiliated hospitals increased dramatically from 2007 to 2013 (4). A recent study of surveillance data collected from 15 DICON hospitals found that CDI was almost twice as common as central line-associated bloodstream infection and caused 1 in 5 of all HAIs (1). These data were the primary and direct stimulus for the creation of the DICON *Clostridium difficile* Infection Prevention Initiative. A booklet containing all elements of this prevention initiative was sent to each DICON hospital in December 2013. It remains available online through the Member Services section of the DICON website. Our initiative contains five sections that are summarized below:
Section 1) Information for senior leadership: including a flow diagram of an overall strategic plan to prevent CDI and a five page summary of the Prevention Initiative.

Section 2) Epidemiology of *C. difficile* infection: including case and surveillance definitions of CDI, a comparison of standard surveillance and LabID surveillance, which the CDC implemented in 2013 (6), and a summary of the rationale for contact precautions.

Section 3) Education – how to control and manage CDI: including PowerPoint slides, posters, and fact sheets detailing *C. difficile* infection control and treatment strategies.

Section 4) Environmental cleaning: including a discussion of recommended cleaning agents, a protocol for use of Ultraviolet Visible Markers (UVMs) to monitor efficacy of cleaning, and educational materials for environmental service supervisors and employees.

Section 5) Resources: including recommended references and a discussion on antimicrobial stewardship, including topics such as formulary restriction and pre-authorization, prospective audit with intervention and feedback, and de-escalation of therapy.

AHRQ Toolkit for Reduction of *Clostridium difficile* through Antimicrobial Stewardship

Antibiotic use is by far the most significant risk factor for CDI (7). More than half of all patients with CDI receive at least one course of inappropriate antibiotics before developing this infection (8). A recent meta-analysis showed that implementation of antimicrobial stewardship programs (ASP) decreased risk of infection with *C. difficile* by 52% (9) (see the July 2014 DASON newsletter). The AHRQ released a toolkit designed to help hospitals reduce *C. difficile* infections through effective ASPs in November 2014. This toolkit provides detailed discussion regarding the organizational changes and resources required by hospitals to create and maintain ASPs targeted to reduce CDI. The authors organized the toolkit by providing detailed answers to four major questions that must be addressed in order to establish and sustain an effective ASP focused on reducing the risk of CDI. We have summarized their answers to these four key questions below:

1) *Is our organization ready for an ASP to assist with *C. difficile* reduction efforts?*

The answer to this question simply has to be yes for two reasons. First, an effective antimicrobial stewardship program is the best way to reduce CDI risk and simultaneously reduce antibiotic resistance and costs (10). Second, the Department of Health and Human Services will require all hospitals to “implement robust antibiotic stewardship programs that adhere to best practices” by the end of 2016 (11) (see the November 2014 DASON newsletter). We agree that establishing an ASP is a key and necessary first step in decreasing CDI risk at every hospital. And the sooner hospitals establish an ASP the better.

The AHRQ toolkit can help hospitals evaluate the rigor of preexisting CDI prevention practices such as contact precautions and hand hygiene. The toolkit also can help hospitals assess their local leadership support and staff attitudes toward current antimicrobial stewardship practices and formally make a business case to leadership and local prescribers for instituting further measures
within their current ASP. Resource needs and associated barriers to ASPs targeting CDI are also discussed.

2) **How do we determine which ASP interventions to implement?**

There is not a single “right answer” to this question. Each hospital has to develop their own approach to selecting locally appropriate, practical, and logical stewardship interventions. The authors of the AHRQ toolkit recommend performing a limited case control study to determine the key antibiotic or group of antibiotics to target in initial ASP initiatives. Common antibiotic use metrics, including defined daily dose, days of therapy, number of courses, and number of patients on three or more antibiotics are described. This discussion is interesting, but in our view, it is not particularly useful as we strongly believe that the preferred and best metric of antibiotic use is days of therapy. The authors of the toolkit discuss potential advantages, disadvantages, and examples of typical ASP interventions, such as formulary changes or restriction with preauthorization, prospective audit with intervention and feedback, antibiotic streamlining or de-escalation, order sets and treatment algorithms, and educational components for clinicians and patients.

3) **How do we monitor the intervention and measure outcomes?**

We advise that hospitals use their local surveillance data on rates of CDI to assess the efficacy (or lack of efficacy) of all CDI-prevention interventions. Indeed, the Centers for Medicare and Medicaid Services (CMS) now requires that hospitals report facility-wide LabID *C. difficile* events using National Healthcare Safety Network (NHSN) definitions. The LabID module included in the NHSN reporting schema accommodates results from non-molecular toxin testing and PCR testing of stool samples to diagnose CDI. These surveillance data on CDI can be time trended with parallel time-trended data on antibiotic prescribing and use data, as well as resistance patterns. We also advise hospitals to analyze the cost savings from reduced antibiotic use and the impact of these savings.

4) **How do we sustain the ASP for reducing *C. difficile* over time?**

The answer to this question also has to be answered locally as there is no single or best answer. The authors of the AHRQ toolkit discuss the importance of maintaining or expanding pharmacy staffing for ASP initiatives, how to measure these programmatic costs, and how to provide feedback related to CDI initiatives. The toolkit also describes other key elements of organizational support needed to keep ASP practices in place.

**How Effective is the AHRQ CDI Toolkit?**

A recent study compared six hospitals with newly established ASPs that adopted CDI-prevention initiatives described in the AHRQ toolkit to four hospitals without ASPs that continued traditional CDI prevention strategies (12). Hospitals that instituted *C. difficile*-specific ASP practices had lower utilization of targeted antibiotics and fewer healthcare-associated *C. difficile* infections than control...
hospitals. But, importantly, hospitals with ASP programs did not have statistically significant lower CDI rates. Hospitals with ASPs reported that it took approximately 15 months to fully implement most CDI initiatives. Therefore, only the last three months of the study period truly compared the outcomes of hospitals with ASP interventions to control hospitals (without functioning ASPs). Despite these limitations, we believe this important study suggests that stewardship initiatives targeting CDI can decrease antibiotic use and hospital costs, and importantly, that such initiatives are feasible in most community hospitals. Finally, we agree with the authors of this pilot study that long-term institutional and leadership support for ASP interventions, which often require months to years to become fully operational and effective, is absolutely essential.

Conclusion

In summary, Clostridium difficile infection is a very common but often preventable healthcare-associated infection associated with poor patient outcomes and high hospital costs. The DICON CDI Prevention Initiative and the AHRQ Toolkit for Reduction of CDI through Antimicrobial Stewardship are two useful resources to help DICON hospitals reduce CDI risk. The DICON manual provides a comprehensive look at many elements of C. difficile infection prevention, and the AHRQ toolkit focuses on prevention of CDI via ASP initiatives. Your DICON infection preventionists and physicians can help with implementation of the Prevention Initiative recommendations, and DASON pharmacists and physicians can help you build antimicrobial stewardship CDI prevention protocols individualized for your hospital. Look for DASON to provide more information soon regarding the process of selecting and implementing specific ASP practices (see the Program Elements section of the DASON Member Services webpage).

References


