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Clostridium difficile: Environmental controls and testing methodology redesign to reduce incidence in an acute care setting

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Clostridium difficile was discovered in 1935, but it was not recognized as a cause of antibiotic associated diarrhea until 1974 when a "clindamycin-associated colitis" was identified. Research beginning in 1978 determined the following: (1) cytotoxin assay as the preferred method for diagnosis; (2) clindamycin was the common inducing agent; (3) identified toxin A ("enterotoxin") and toxin B ("cytotoxin"); (4) confirmed the age-associated risk; (5) identified acute and chronic care facilities are high risk; and (6) established oral vancomycin as the treatment of choice.

During the 21st century a more rapid detection method was developed, the real-time polymerase chain reaction (PCR) test. With the advent of the PCR test, the specificity and sensitivity were maintained, but the turnaround of the diagnostic test result was measured in hours as compared to days for a cell cytotoxicity test via tissue culture. Combined with patient symptoms, providers could confirm presence of the genetic code for C. difficile toxins from stool samples through use of the PCR test. This provided clinicians with a rapid, specific and sensitive diagnostic test to prescribe definitive antimicrobial treatment versus empiric antimicrobial treatment to patients.

There is no single recommended testing methodology or algorithm for C. difficile currently. When our hospital converted to the use the C. difficile PCR test as a single diagnostic tool, we saw an increase in the number of healthcare associated test results reported due to the C difficile PCR test. With the potential for increased utilization of antimicrobials for colonization versus active disease, some hospitals have chosen to use a combination of antigen and toxin test methodologies with the PCR test reserved for discrepant test results.

Our hospital converted to the Cepheid Xpert C. difficile assay (Sunnyvale, CA) in December 2011 as the primary method for C. difficile identification. With the increased sensitivity and specificity of the test results, the hospital reported an increase in healthcare associated test results and utilization of antimicrobials. As a result, the infection control program in conjunction with the antimicrobial stewardship leaders developed an algorithm for testing that included the C. difficile antigen and toxin test (PCR test for discrepant results only), isolation and cleaning protocol during admission and at time of discharge. An educational program for the physicians, nursing and microbiology staff covered the Bristol stool chart and appropriate stool type for testing, discontinuation of stool softeners and laxatives for 48 hours, as well as the need for 3 loose, watery stools within a 24-hour period. The environmental cleaning protocol utilized a sporicidal disinfectant on all lateral surfaces, including the floors, during admission and at time of discharge. The use of the UVC machine was included at time of discharge to ensure the patient room was cleaned and disinfected for the next patient. The instances where Nursing units have more than one positive test results, the isolates are sent for DNA typing to determine if there was cross transmission among the patient population.

There was a seventy five percent (75%) reduction in the positive C diff test results with the new testing methodology. Infectious Disease physicians can call the Laboratory for specific requests not included in the testing algorithm.

A combination of a new testing methodology algorithm, automated notification of patient discharge, an environmental control program that includes a sporicidal disinfectant and the use of UVC at time of discharge has allowed our acute care facility to maintain this reduction consistently for the last nine months.

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