Arizona Department of Health Services

Clostridium difficile Infections (CDI) Prevention Toolkit

Healthcare-Associated Infection Program
HAI Prevention
Education
Prevention
Surveillance
ARIZONA

Arizona Healthcare Associated Infections (HAI) program

A Note to Our Readers:

This document was developed by the Prevention Strategies Subcommittee (PSS) of the Arizona Healthcare-Associated Infection (HAI) Advisory Committee in 2012. PSS is a multidisciplinary committee representing various healthcare disciplines working to define and categorize the strength of evidence for preventing healthcare-associated infections. Their work was guided by the best available evidence at the time this document was created. The toolkit documents reflect consensus on what the HAI Advisory Committee deems to be prudent practice.

The objectives of the PSS are directed at providing access to additional resources for healthcare facilities, creating a repository of information and constructing a toolkit of strategies that will assist facilities with preventing healthcare-associated infections.

The Prevention Strategies Subcommittee would like to acknowledge the following members who evaluated and assembled the documents:

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Clostridium difficile Infection (CDI) Surveillance

Clostridium difficile is responsible for a spectrum of *C. difficile* infections (CDI) [originally referred to as *C. difficile*-associated disease or CDAD], including uncomplicated diarrhea, pseudomembranous colitis, and toxic megacolon which can, in some instances, lead to sepsis and even death. Current CDC definitions for healthcare-associated infections, while adequate for the site of infection, do not take into account the special characteristics of disease caused by *C. difficile*. Although CDI represents a subset of gastroenteritis and gastrointestinal tract infection, specific standard definitions for CDI should be incorporated to obtain a more complete understanding of how *C. difficile* is being transmitted in a healthcare facility.[1]

Definitions

Clostridium difficile infection (CDI) is defined as the presence of symptoms (usually diarrhea) and either a stool test positive for *C. difficile* toxins or toxigenic *C. difficile*, or colonscopic or histopathologic findings revealing pseudomembranous colitis. Cases of CDI that are not present or incubating at the time of admission (i.e., meets criteria for a healthcare associated infection) should be reported as gastroenteritis (GE) [with diarrhea] or gastrointestinal tract (GIT) [without diarrhea] infection, whichever is appropriate.[2]

GE-Gastroenteritis

Gastroenteritis must meet both of the following criteria:

1. Patient has an acute onset of diarrhea (passage of 3 or more unformed stools in 24 or fewer consecutive hours).
2. A stool test result positive for the presence of toxigenic *C. difficile* or its toxins or colonscopic or histopathologic findings demonstrating pseudomembranous colitis.

GIT-Gastrointestinal tract excluding gastroenteritis

Gastrointestinal tract infections, excluding gastroenteritis, must meet at the following criteria:

1. A stool test result positive for the presence of toxigenic *C. difficile* or its toxins or colonscopic or histopathologic findings demonstrating pseudomembranous colitis.
   Rarely (in less than 1% of cases), a symptomatic patient will present with ileus and colonic distension with minimal or no diarrhea. Diagnosis in these patients is difficult; the only specimen available maybe a small amount of formed stool or a swab of stool obtained either from the rectum or from within the colon via endoscopy. In such cases, it

[1] Cohen SH, et al., Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Disease Society of America (IDSA) Infect Control Hosp Epidemiol 2010; 21(5)

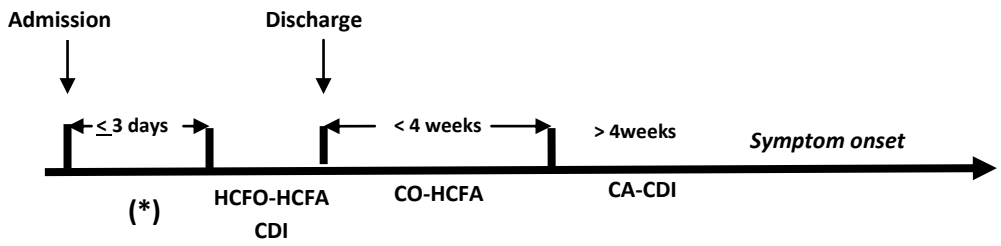
[2] Horan TC, Andrus M, et.al., CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control 2008;36:321-322.

is important to communicate to the laboratory the necessity to do a toxin assay or culture for C. difficile on the nondiarrheal stool specimen.

Duplicate *C. difficile*–positive test: Any *C. difficile* positive laboratory assay from the same patient following a previous *C. difficile* positive laboratory assay with the past two weeks.

Categorization Based on Date Admitted to Facility and Date Specimen Collected:[3]

- **Community-Onset Healthcare Facility-Associated Infection (CO-HCFA CDI):**
  Specimen collected as an inpatient ≤ 3 days after admission to the facility (i.e., days 1, 2, or 3 of admission) and who was discharged from the facility ≤ 4 weeks prior to date stool specimen collected.
- **Healthcare Facility-Onset Healthcare Facility Associated CDI (HCFO-HCFA CDI):**
  Specimen collected and onset of symptoms > 3 days after admission to the facility (i.e., on or after day 4).
- **Community Associated CDI (CA-CDI):**
  Specimen collected ≤ 3 days after admission (i.e., days 1, 2, or 3 of admission) and who was not at the facility in the last 4 weeks.



Timeline for surveillance definitions of *Clostridium difficile*-associated infection (CDI) exposures. A case patient who had symptom onset during the window of hospitalization marked by an asterisk (*) would be classified as having community–onset, healthcare facility-associated disease (CO-HCFA), if the patient had been discharged from the healthcare facility within the previous 4 weeks; or would be classified as having community associated CDI (CA-CDI), if the patient had not been discharged from the healthcare facility in the previous 4 weeks. HCFO-HCFA, healthcare facility-onset, healthcare facility –associated CDI. (Timeline modified from Figure 1. Practice Guidelines for C. difficile Infections in Adults.[1])

Calculated *C. difficile* Infection Incidence Rates:

Incident CDI Numerator: The total number of CDI cases newly identified during the surveillance month.

Denominator: The total number of patient days during the surveillance month.

[3] National Healthcare Safety Network, Patient Safety Protocol. MDRO and CDAD Module, June 2010

Data Analysis: Data are stratified by time (e.g., month, quarter, etc.) and either aggregated across the entire facility or stratified by patient care location.

Location CDI Incidence Rate = Number of Incident CDI per month for location/Number of patient days for the location x 10,000.

Facility CDI Healthcare Facility-Onset Incidence Rate = Number of Incident HO CDI per month in the facility/Number o patient days for the facility x 10,000.

Facility CDI Combined Incidence Rate = Number of Incident HO and CO-HCFA cases per month in the facility/Number of patient days for the facility x 10,000.

Contact your county health department for any suspicion of an outbreak.

Apache County Health Department.....928-337-7640

Cochise County Health Department.....520-432-9435

Coconino County Health Department.....928-679-7222

Gila County Health Department.....928-402-8762

Graham County Health Department.....928-428-0110

Greenlee County Health Department.....928-865-2601

La Paz County Health Department.....928-669-8960

Maricopa County Department of Public Health.....602-747-7111

Mohave County Health Department.....928-718-4927

Navajo County Health Department.....(M-Th) 7am-6pm 928-532-6057
All other times 928-241-0959

Pima County Health Department.....520-243-7797

Pinal County Health Department.....520-866-7138

Santa Cruz County Health Department.....520-375-7908

Yavapai County Health Department.....928-771-3134

Yuma County Health Department.....928-317-4624

Clostridium difficile Infection (CDI) Surveillance Worksheet

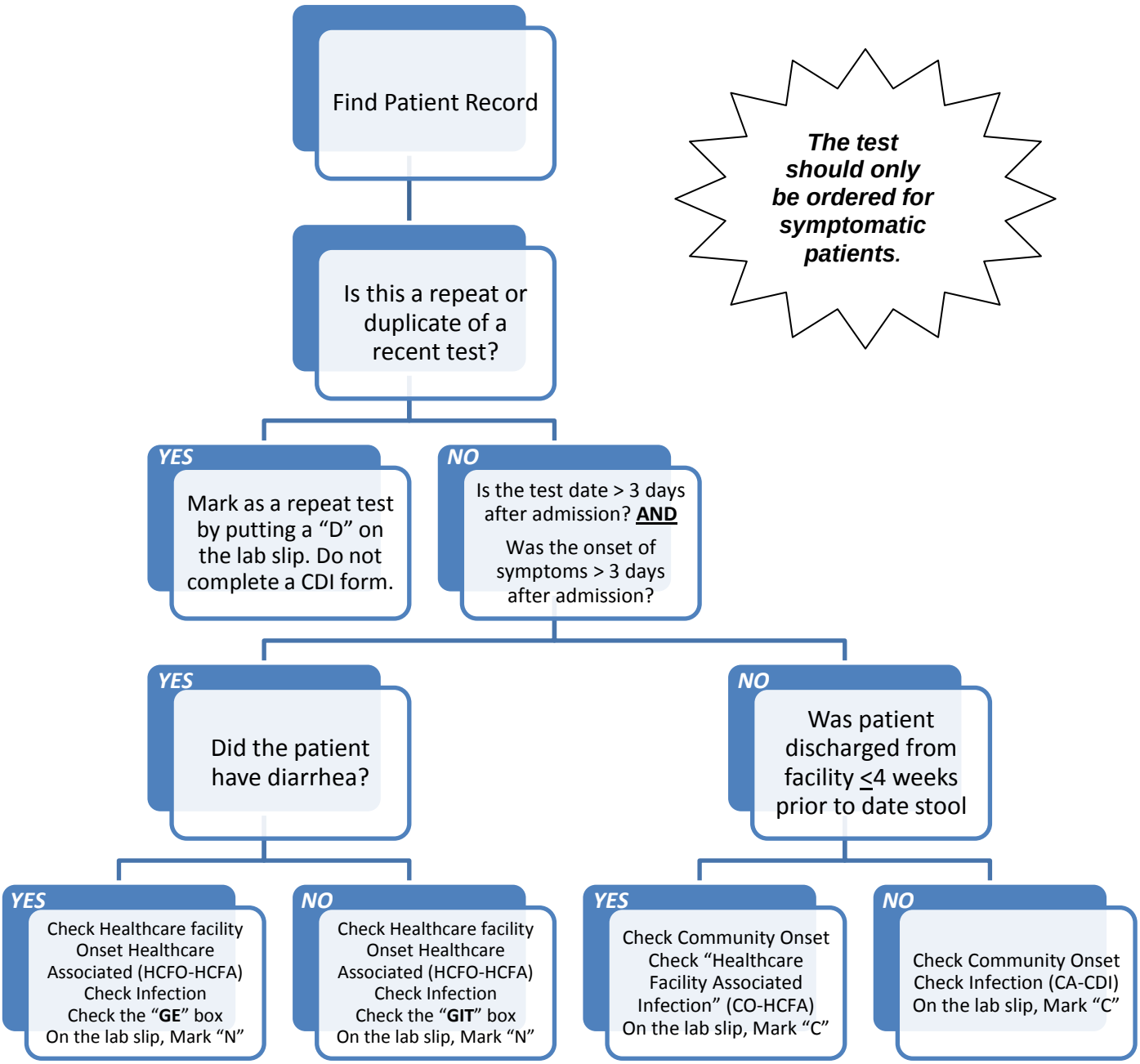
<table>
<tr><td colspan="2">Patient Name</td><td>Facility ID (MRN)</td><td>Service</td></tr>
<tr><td>Date Admitted to Facility</td><td>Date of Birth</td><td>Gender:
□ Male □ Female</td><td>Patient Location</td></tr>
<tr><td>Date Specimen Collected</td><td>Specific Test Organism
□ C. difficile</td><td colspan="2">Specimen Type
□ Stool
□ Other_____</td></tr>
<tr><td colspan="4">Infections Type: □ GE (C. difficile diarrhea) □ GIT (C. difficile no diarrhea)</td></tr>
<tr><td colspan="2">Admitted to ICU for CDI complications
□ Yes □ No</td><td colspan="2">Surgery for CDI complications
□ Yes □ No</td></tr>
<tr><td colspan="2">Died
□ Yes □ No</td><td colspan="2">CDI Contributed to Death?
□ Yes □ No</td></tr>
<tr><td colspan="3">□ Healthcare Facility Onset Healthcare Associated Infection
(> 3 days after admission (i.e., on or after day 4)</td><td>Date of Event</td></tr>
<tr><td colspan="4">□ Community Onset (≤ 3 days after admission)
□ Infection (CA-CDI)
□ Healthcare Facility Associated Infection (CO-HCFA)
discharged from your healthcare facility ≤ 4 weeks prior to date of stool specimen collection</td></tr>
</table>

HAI Advisory Committee January 2011

Instructions for completing the *Clostridium difficile* Infection (CDI) Surveillance Worksheet

Data Field	Instructions for Data Collection
Patient Name	Enter the last and first name of the patient
Facility ID (MRN)	Medical Record Number
Service	Service Responsible for Care of Patient (e.g., Medical, Surgical)
Date Admitted to Facility	Enter date patient admitted to facility using this format: MM/DD/YYYY
Date of Birth/Age	Record the date of the patient birth using this format: MM/DD/YYYY
Gender	Check Female or Male to indicate the gender of the patient
Patient Location	The inpatient location to which the patient was assigned when the CDI was identified. If the CDI develops in a patient within 48 hours of transfer from a location, indicate the transferring location, not the current location of the patient.
Specimen Collection Date	Date the specimen was collected
Specific Test	Check the *C difficile* box
Specimen Type	Check Stool or Other. Describe "other" specimen.
Admitted to ICU for CDI complications	CDI in a case patient within 30 days after symptom onset admitted to intensive care unit for complications associated with CDI (e.g., for shock that requires vasopressor therapy)
Surgery for CDI complications	CDI in a case patient within 30 days of symptom onset who has surgery (e.g., colectomy) for toxic megacolon, perforation, or refractory colitis
GE (Gastroenteritis)	Meets CDC criteria for gastroenteritis (patient must have diarrhea)
GIT (Gastrointestinal tract)	Meets CDC criteria for gastrointestinal tract infection (without diarrhea)
Died	Check Y if patient died during the hospitalization, otherwise check N.
CDI Contributed to Death	If the patient died, check Y if the CDI contributed to death, otherwise check N
Healthcare Facility Onset Healthcare Associated Infection (HCFO-HCFA)	Onset of illness is greater than 3 days past hospital admission and meets case definition
Date of Event	The date when the first clinical evidence of the CDI appeared or the date the specimen used to make or confirm the diagnosis was collected, whichever came first. Enter date of this event using the format: MM/DD/YYYY
Community Onset	Symptom onset less than or equal to three days after admission
Infection (CA-CDI)	Community onset of symptoms and patient was not at your healthcare facility within 4 weeks prior to date of stool specimen collection
Healthcare Facility Associated Infection (CO-HCFA)	Community onset of symptoms and was discharged from your healthcare facility within 4 weeks prior to date of stool specimen collection

CDI Infection Surveillance Algorithm



PRECAUTIONS TO PREVENT TRANSMISSION OF *C. DIFFICILE* IN VARIOUS HEALTHCARE AND NON-HEALTHCARE SETTINGS

Press Control and click on the link below to access specific information about each practice setting. The screen that appears will provide information for the selected practice setting. In the absence of evidence, the practice settings were contacted to share their practice.

When accessing a large document from a link (ex: CDC or WHO), specific words can be found by pressing control and F. This will bring up a search box where the words or phrase can be entered for easier document search. Click next and the document search for the word/phrase will advance.

Adult Day Care

Assisted Living

Ambulatory Surgery Centers

Behavioral Health and Recovery Care Centers

(Including rehabilitation, drug and alcohol treatment centers)

Correctional Facilities

Emergency Medical Services (EMS)

Hemodialysis

Home Health

Hospice

Hospital

(Including Long Term Acute Care-LTAC)

Long Term Care

Outpatient Treatment Center

(Including dialysis, wound care, infusion centers)

Physician Offices or Urgent Care Centers

ADULT DAYCARE	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf Staff assisting adult daycare clients follow hand hygiene guidelines (Best Practices)
Precautions	CDC guidelines http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf Page 34- 38 Healthcare may be provided in nonhealthcare settings such as **adult daycare** centers…Each of these settings has unique circumstances and population risks to consider when designing and implementing an infection control program. Therefore, these settings must be equipped to observe Standard Precautions and, when indicated, Transmission-based Precautions.
	○ Staff assisting adult daycare clients follow Standard Precautions ○ Facility Policies specify excluding persons with diarrhea (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	○ Remind family to give verbal or written information about patient's condition. ○ Give verbal and written information about patient's condition to ambulance staff. ○ Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

ASSISTED LIVING	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf Provide hand sanitizer at the entrance to dining room and encourage residents to use it before sitting down (Best Practices)
Precautions	CDC Guidelines Page 37-38 http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 37 Healthcare is provided in various settings outside of hospitals including facilities, such as long-term care facilities (LTCF) (e.g. nursing homes), homes for the developmentally disabled, settings where behavioral health services are provided, rehabilitation centers and hospices. In addition, healthcare may be provided in non-healthcare settings such as workplaces with occupational health clinics, adult day care centers, assisted living facilities, homeless shelters, jails and prisons, school clinics and infirmaries. Each of these settings has unique circumstances and population risks to consider when designing and implementing an infection control program. If transmission in outpatient settings is to be prevented, screening for potentially infectious symptomatic and asymptomatic individuals is necessary at the start of the initial patient encounter. Upon identification of a potentially infectious patient, implementation of prevention measures, including prompt separation of potentially infectious patients and implementation of appropriate control measures (e.g.: Transmission-Based Precautions) can decrease transmission risks. ○ Page 38 Recommended infection control measures in these non-traditional areas designated for healthcare delivery are the same as for other ambulatory care settings. Therefore, these settings must be equipped to observe Standard Precautions and, when indicated, Transmission-based Precautions. Exclude residents with diarrhea from the dining room (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

AMBULATORY SURGERY CENTERS	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 35 Epidemiologically important organisms: C. diffiicle Ambulatory Care In the past decade, healthcare delivery in the United States has shifted from the acute, inpatient hospital to a variety of ambulatory and community-based settings. Ambulatory care is provided in hospital-based outpatient clinics, nonhospital-based clinics, and ambulatory surgical centers. In these settings, adapting transmission prevention guidelines is challenging because patients remain in common areas for prolonged periods waiting to be seen by a healthcare provider. ○ Page 36 If transmission in outpatient settings is to be prevented, screening for potentially infectious symptomatic and asymptomatic individuals is necessary at the start of the initial patient encounter. Upon identification of a potentially infectious patient, implementation of prevention measures, including prompt separation and control measures can decrease transmission risks. • If the patient is symptomatic on pre-op screening, contact the surgeon. • Follow facility policies. (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	• Provide spatial isolation or private room if available while in pre-op and Post Anesthesia Care Unit (Best Practices) • Use a corner space if a private room is not available (Best Practices) • A stretcher or bed is wiped down with disinfectant and clean linen applied if left in the hallway during the procedure. (Best Practices)

BEHAVIORAL HEALTH	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf Staff and visitors are instructed to wash hands with soap and water (Best Practices)
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 36 Healthcare is provided in various settings outside of hospitals including facilities, such as homes for the developmentally disabled, settings where behavioral health services are provided. In addition, healthcare may be provided in non-healthcare settings such as workplaces with occupational health clinics, adult day care centers, assisted living facilities, homeless shelters, jails and prisons, school clinics and infirmaries. Each of these settings has unique circumstances and population risks to consider when designing and implementing an infection control program. ○ Page 137 Facilities that provide health care to patients who do not remain overnight (ex, hospital-based outpatient clinics, and substance abuse clinics, physical therapy and rehabilitation centers and dental practices
	• Contact Precautions (to control institutional outbreaks)are used for acute gastritis with or without a fever until determined by a physician that patient is not contagious • Equipment is cleaned after use or is discarded if it is disposable (sphygmomanometer, stethoscope, thermometer) (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
	Environmental Services is notified and are instructed to clean horizontal surfaces in the room daily with bleach (Best Practices)
Interfacility and Intrafacility: Patient Transport	• Upon arrival, inform the person receiving the patient if the patient has diarrhea. • Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	• Use a private room or share a room with patients who have similar symptoms. • Use designated toilet if possible. If toileting facilities must be shared, then clean after each use. (Best Practices)

CORRECTIONAL FACILITIES	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 37-38 Facilities that are not primarily healthcare settings but, in which healthcare is delivered include clinics in correctional facilities and shelters. Both settings can have suboptimal features, such as crowded conditions and poor ventilation.
	1997-Arizona Department of Corrections- Communical Disease and Infection Control Manual (Best Practices) http://www.azcorrections.gov/Zoya_dept_orders_1.aspx#1100 http://www.azcorrections.gov/Policies/1100/1102.pdf • Move individual to the infirmary and/or a private room • Implement contact precautions with use of gloves. • Recommended that a gown be used if soiling is likely • Place a sign on room door • Sink in room and toilet room
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information is currently available

EMERGENCY MEDICAL SERVICES (EMS)	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
	The Bureau of Emergency Medical Services certifies all EMS companies based on the use of Standard Precautions and CDC Guidelines. 2009 Arizona Administrative Code: Department of Health Services Emergency Medical Services http://www.azsos.gov/public_services/Title_09/9-25.pdf
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

HEMODIALYSIS	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2001 Recommendations for Preventing Transmission of Infections among Chronic Hemodialysis patients http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm#box2 – Infection control precautions recommended for all hemodialysis patients are adequate to prevent transmission for most patients infected or colonized with pathogenic bacteria, including antimicrobial-resistant strains. However, additional infection control precautions should be considered for treatment of patients who might be at increased risk for transmitting pathogenic bacteria. Such patients include those with either a) an infected skin wound with drainage that is not contained by dressings (the drainage does not have to be culture positive for VRE, MRSA, or any specific pathogen) or b) fecal incontinence or diarrhea uncontrolled with personal hygiene measures. For these patients, consider using the following additional precautions: a) staff members treating the patient should wear a separate gown over their usual clothing and remove the gown when finished caring for the patient and b) dialyze the patient at a station with as few adjacent stations as possible (e.g., at the end or corner of the unit). – Infection Control Precautions for Outpatient Hemodialysis Settings Compared with Inpatient Hospital Settings ○ Contact transmission can be prevented by hand hygiene (i.e., hand washing or use of a waterless hand rub), glove use, and disinfection of environmental surfaces. Of these, hand hygiene is the most important. In addition, nonsterile disposable gloves provide a protective barrier for workers' hands, preventing them from becoming soiled or contaminated, and reduce the likelihood that microorganisms present on the hands of personnel will be transmitted to patients. However, even with glove use, hand washing is needed because pathogens deposited on the outer surface of gloves can be detected on hands after glove removal, possibly because of holes or defects in the gloves, leakage at the wrist, or contamination of hands during glove removal ○ Contact precautions are not recommended in hemodialysis units for patients infected or colonized with pathogenic bacteria for several reasons. First, although contact transmission of pathogenic bacteria is well-documented in hospitals, similar transmission has not been well-documented in hemodialysis centers. Transmission might not be apparent in dialysis centers, possibly because it occurs less frequently than in acute-care hospitals or results in undetected colonization rather than overt infection. Second, contamination of the patient's skin, bedclothes, and environmental surfaces with pathogenic bacteria is likely to be more common in hospital settings (where patients spend 24 hours a day) than in outpatient hemodialysis centers (where patients spend approximately 10 hours a week). Third, the routine use of infection control practices recommended for hemodialysis units, which are more stringent than the Standard

	Precautions routinely used in hospitals, should prevent transmission by the contact route. CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 21-22 Ambulatory Care - In the past decade, healthcare delivery in the United States has shifted from the acute, inpatient hospital to a variety of ambulatory and community-based settings, including the home. ○ Page 35-37 Hand hygiene has been cited frequently as the single most important practice to reduce the transmission of infectious agents in healthcare settings and is an essential element of Standard Precautions.
Environmental cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

HOME HEALTH	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 37 Transmission risks during home care are presumed to be minimal. The main transmission risks to home care patients are from an infectious healthcare provider or contaminated equipment; providers also can be exposed to an infectious patient during home visits. Since home care involves patient care by a limited number of personnel in settings without multiple patients or shared equipment, the potential reservoir of pathogens is reduced.
	• **In a facility:** Staff education regarding hand hygiene, standard precautions, barrier between nursing bag and environmental surfaces in home • **In the home:** Patient/family education (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

HOSPICE	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	• CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 34 Healthcare is provided in various settings outside of hospitals including facilities, such as hospices. Each of these settings has unique circumstances and population risks to consider when designing and implementing an infection control program. If transmission in outpatient settings is to be prevented, screening for potentially infectious symptomatic and asymptomatic individuals is necessary at the start of the initial patient encounter. Upon identification of a potentially infectious patient, implementation of prevention measures, including prompt separation of potentially infectious patients and implementation of appropriate control measures (e.g.: Transmission-Based Precautions) can decrease transmission risks • **In the patient unit:** Environmental cleaning, private room/cohort patient if possible (Best Practices) • **In the home:** Patient/Family education. All staff providing care in the home are provided education regarding hand hygiene. Use Standard Precautions (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	No information currently available

HOSPITAL (including long-term acute care hospitals [LTACH])	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 85 In acute care hospitals and long-term care and other residential settings, use disposable noncritical patient care equipment (ex.blood pressure cuffs) or implement patient dedicated use of such equipment. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient (Category 1B)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 59 – Limit transport of patients to essential purposes, such as diagnostic and therapeutic procedures that cannot be performed in the patient's room. – When transport is necessary, use appropriate barriers on the patients (cover sheet, diaper). – Notify healthcare personnel in the receiving area of the impending arrival of the patient and of the precautions necessary to prevent transmission. – For patients being transported outside the facility, inform the receiving facility and transport personnel in advance about the use of precautions.

<table>
<tr><td rowspan="2">Patient Placement guidelines</td><td>CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings
http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

○ Page 56
– Results of several studies to determine the benefit of a single-patient room to prevent transmission of C. difficile are inconclusive and some studies have shown that being in the same room with a colonized or infected patient is not necessarily a risk factor for transmission.
– During a suspected or proven outbreak the facility should consider the use of private rooms or cohorting of patients with CDAD, especially those with fecal incontinence.
– In any outbreak caused by a pathogen whose reservoir is the gastrointestinal tract, such as C. difficile, use of single patient rooms with private bathrooms should limit opportunities for transmission.</td></tr>
<tr><td>Options for patient placement include single patient rooms, two patient rooms, and multi-bed wards.
● Single patient rooms are preferred when there is concern about transmission of an infectious agent. (Best Practices)</td></tr>
</table>

LONG TERM CARE	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 34 **Long Term Care Facility (LTCF)** applies to a diverse group of residential settings, ranging from institutions for the developmentally disabled to nursing homes for the elderly and pediatric chronic care facilities. Residents are brought together in one setting and remain in the facility for extended periods of time; for most residents, it is their home. An atmosphere of community is fostered and residents share common eating and living areas and participate in various facility-sponsored activities. ○ Page 85 In acute care hospitals and long-term care and other residential settings, use disposable noncritical patient care equipment (ex.blood pressure cuffs) or implement patient dedicated use of such equipment. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient (Category 1B) Maricopa County Public Health Division of Epidemiology: *Clostridium difficile* associated disease (CDAD) Infection Control Guidelines for Long-Term Care Facilities http://www.azdhs.gov/phs/oids/epi/disease/cdif/documents/CDADforLTCFs.pdf
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Residents of LTCFs are hospitalized frequently, and they can transfer pathogens between LTCFs and healthcare facilities in which they receive care. This is also true for pediatric long-term care populations. • Notify receiving facility of presence of *C. difficile* prior to transport. • Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

	○ Page 57 – Results of several studies to determine the benefit of a single-patient room to prevent transmission of C. difficile are inconclusive and some studies have shown that being in the same room with a colonized or infected patient is not necessarily a risk factor for transmission. However, during a suspected or proven outbreak the facility should consider the use of private rooms or cohorting of patients with CDAD, especially those with fecal incontinence. In any outbreak caused by a pathogen whose reservoir is the gastrointestinal tract, such as C. difficile, use of single patient rooms with private bathrooms should limit opportunities for transmission. ● Make decisions regarding patient placement on a case by case basis, balancing infection risks to other patients in the room, the presence of risk factors that increase the likelihood of transmission, and the potential adverse psychological impact on the infected or colonized patient.

OUTPATIENT TREATMENT CENTER (includes wound care, infusion centers)	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page 160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 21-22 Ambulatory Care**-** In the past decade, healthcare delivery in the United States has shifted from the acute, inpatient hospital to a variety of ambulatory and community-based settings, including the home. ○ Page 35-37 Hand hygiene has been cited frequently as the single most important practice to reduce the transmission of infectious agents in healthcare settings and is an essential element of Standard Precautions.
	• If the patient is symptomatic upon arrival, inform the receiving healthcare personell. • Follow facility policies. (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Interfacility and Intrafacility: Patient Transport	• Patient may transport themselves if stable. Instruct the patient to notify facility that they have diarrhea. • Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	• Perform hand hygiene. • Maintain spatial isolation. • Use Contact Precautions as appropriate • Use designated toilet if possible. If toileting facilities must be shared, then clean after each use. (Best Practices)

PHYSICIAN OFFICES or URGENT CARE CENTERS	
Evidence Based Guidelines or Current Best Practices	
General Information	CDC- *Clostridium difficile* Infections resources http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html
Hand Hygiene	CDC- 2002 Guideline for Hand Hygiene in Healthcare Settings Activity of Antiseptic Agents Against Spore-Forming Bacteria - Page 18-19 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf WHO- 2009 Guidelines on Hand Hygiene in Healthcare: Ranking system for evidence - Page160-162 http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf WHO Tools: Five Moments for Hand Hygiene http://www.who.int/gpsc/tools/Five_moments/en/index.html http://www.who.int/gpsc/tools/Pocket-Leaflet.pdf
Precautions	CDC- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf ○ Page 35-36 **Ambulatory Care -** In the past decade, healthcare delivery in the United States has shifted from the acute, inpatient hospital to a variety of ambulatory and community-based settings, including the home. ○ Page 49 **Hand hygiene -** Hand hygiene has been cited frequently as the single most important practice to reduce the transmission of infectious agents in healthcare settings and is an essential element of Standard Precautions. ○ Hand hygiene, gloves and gown are worn by providers of care if available (Best Practices)
Environmental Cleaning	Environmental cleaning practices are provided in another document contained in the toolkit.
Intrafacility: Patient Transport	• Give verbal and written information about patient's condition to ambulance staff. • Ambulance staff will communicate information to hospital staff. (Best Practices)
Patient Placement guidelines	• Use a private exam room. • If toileting facilities must be shared, then clean after each use. (Best Practices)

Removing *C. difficile* from the Environment

Maintaining an environment that is free from microbial contaminants requires an appropriate cleaning program. The following interventions and references identify best practices that are available to help guide a healthcare facility's cleaning protocol.

TOOL Rating Guide			
STRENGTH OF EVIDENCE	**COST OF IMPLEMENTATION**	**EASE OF IMPLEMENTATION**	**TIME COMMITTMENT**
Strongly Supported = 	Minimal cost = $	Easy = ☺	Minimal time = 🕒
Weakly Supported = 	Moderate cost = $$	Moderate = 😐	Moderate time = 🕒🕒
No Support = ⊘	Maximum cost = $$$	Difficult = ☹	Extensive time = 🕒🕒🕒

"One good housekeeper can prevent more infections than a dozen doctors can cure."

- Eric Rose

Removing C.*difficile* from the Environment

Intervention	References	Tool Ratings			
Develop well-designed cleaning processes In order to guarantee that your Environmental Services staff produces the desired result in removing contaminants from the environment, they must consistently execute best practices. The processes should be in writing with clear step-by-step procedures. The organizations referenced here provide best practices.	http://www.ashes.org/ http://issa.com/ http://www.cdc.gov/ http://www.epa.gov/		$		
Focus on "High Touch" surfaces *C. difficile* is primarily transmitted by hands. Therefore, cleaning procedures should focus on "high touch" surfaces such as door handles, faucets, toilet handles, grab bars, light switches, telephones, TVs, nurse-call remote controls, over bed tables, and chair arms. **Note regarding cleanable fabrics:** Many bleach cleanable fabrics have additional stain resistant finishes, antibacterial finishes, and moisture barriers. Facilities should purchase bleach cleanable fabrics whenever possible. Refer to the product's cleaning guidelines. To determine appropriate cleaning procedures.	http://www.cdc.gov/HAI/pdfs/cdiff/Cohen-IDSA-SHEA-CDI-guidelines-2010.pdf http://www.cdc.gov/HAI/toolkits/Evaluating-Environmental-Cleaning.html		$$		
Comprehensive Training Program The ideal training combines classroom and hands-on, detailed instruction in groups of no more than 5 staff members. Cleaning supply manufacturers and distributors will provide free training in the use and best application of their products. The organizations referenced here have training material available to their members.	http://www.ashes.org/ http://issa.com/		$		
The right chemicals and tools for the right job Cleaning well enough to receive a 100% quality rating based upon visual observation may not be good enough to ensure that an environment is free from microbial contamination. To ensure the environment is free from microbial contamination after cleaning, use of an appropriate disinfectant will be required. Only use disinfectants that are certified by the EPA. Quaternary ammonia-based disinfectants are widely used in healthcare settings. Others are sodium hypochlorite (bleach) and accelerated hydrogen peroxide. Use of diluted hypochlorite (1:10 dilution) should be considered in units with high *C. difficile* rates. The supply distributor will provide instructions. Bleach is a corrosive chemical and must be used with caution. After a 10 minute contact time, rinse with water.	http://www.epa.gov/ Link refers to use of hypochlorite solution (bleach) for outbreaks and repeat occurrences. http://www.cdc.gov/hicpac/Disinfection_Sterilization/3_2contaminatedDevices.html Reference: Perez J, Springthorpe S, Sattar SA. Activity of selected oxidizing microbicides against spores of Clostridium difficile: Relevance to environmental control. Am. J. Infect. Control 2005;33:320-5. http://www.ncbi.nlm.nih.gov/pubmed/16061137		$$		

A Quality Assurance Program To ensure that the expected quality results are consistent and sustainable, there must be a "Quality Management Program" in place. A Quality Management Program consists of the following: **Follow-up inspections -** Visual inspections of the environment should be done on a scheduled basis with the frequency dependent on the critical level of the area being inspected. **Testing -** Periodic testing of surfaces to ensure cleanliness, using an ATP (adenosine triphosphate) tool or glow pin/black light, should be done immediately after an Environmental Services staff member has cleaned an area. This will provide data regarding the thoroughness of the cleaning not apparent with visual observation. Your supply distributor can provide information and proper use instructions. **Re-training and evaluations** - Staff members who are not producing the desired result, based on inspections and testing, should receive documented re-training. Your supplier can provide information about tools you are implementing as part of your QAP.	"Using ATP in Healthcare Settings" Infection Control Today – December 7, 2010 http://www.infectioncontroltoday.com/news/2010/12/using-atp-in-healthcare-settings.aspx http://www.cdc.gov/HAI/toolkits/Evaluating-Environmental-Cleaning.html		$$$	😐	🕒🕒🕒
A multidisciplinary oversight team A multidisciplinary oversight team, made up of the key stakeholders, will provide guidance and accountability to the Environmental Services program. Consider recruiting Infection Control, Nursing, Human Resources and Purchasing as possible members of this team.		💪	$	☺	🕒🕒🕒
Establish a plan to address an outbreak A day-to-day cleaning program as outlined above is the first defense against C. diff and will help control outbreaks. If you do experience an outbreak or repeat occurrences of *C.difficile*, it is recommended to use bleach as the disinfectant of choice and focus on cleaning all surfaces touchable by hands. Continue using bleach until the rates decrease to acceptable levels.	http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Disinfection_Nov_2008.pdf	💪	$$$	☺	🕒🕒🕒

Management of ***Clostridium difficile*** Infection (CDI)
Adapted from the 2010 SHEA-IDSA Guidelines

A. General Management

1. Discontinue therapy with the inciting antimicrobial as soon as possible
2. Monitor electrolyte and volume status and replete if necessary
3. When severe or complicated CDI is suspected, initiate empiric therapy as soon as possible. Consider Infectious Diseases and General Surgery consultation early in the case
4. If possible, avoid the use of antiperistaltic agents since they may mask symptoms and precipitate toxic megacolon
5. Consider discontinuation of proton pump inhibitor agents
6. Encourage patient hand hygiene with soap and water

Management of CDI[1,2]

Severity Category	Severity Criteria (Once clinical and/or laboratory diagnosis made)	Treatment Regimen
Mild – moderate disease	• Elevated WBC count ≤15,000 cells/mm^3 • SCr < 1.5 times premorbid level	• Metronidazole 500 mg PO every 8 hours x 10 to 14 days • Pediatric dosing: 30 mg/kg/day po divided q 6 h x 7 to 10 days; not to exceed 2 g/day [3] • May take 4 – 6 days for diarrhea to completely resolve
Severe disease	• Elevated WBC count >15,000 cells/mm^3 • SCr >1.5 times premorbid level	• Consider Infectious diseases consultation • Consider General Surgery consultation • Consider Gastroenterology consultation • Vancomycin 125 mg po every 6 hours for 10 to 14 days • Pediatric dosing: 40 mg/kg/day po divided q6-8h x 7 to 10 days; not to exceed 2 g/day[3]
Severe complicated disease	• Hypotension or shock • Ileus • Toxic megacolon,	• Consider Infectious diseases consultation • Consider General Surgery consultation • Consider Gastroenterology consultation • Metronidazole 500 mg IV q8h + vancomycin 500 mg PO or via NGT every 6 hours (if possible) • Consider rectal vancomycin 500 mg in 100 mL NS every 6 hours as a retention enema: (1) #18 foley catheter with a 30 mL balloon inserted into rectum; (2) balloon inflated; (3) vancomycin bag attached to catheter and instilled (4) catheter clamped for 60 minutes (5) deflate and remove[2]
Recurrent CDI 6%-25% of patients treated for CDI with metronidazole or vancomycin experience at least 1 additional episode due to either relapse of infection or re-infection	First recurrence Second or later recurrence	• Same regimen as for initial episode stratified for disease severity • Vancomycin tapered and/or pulse regimen Various regimens. Example[4]: Taper dosing: Week 1: Vancomycin 125 mg po every 6 hours Week 2: Vancomycin 125 mg po twice daily Week 3: Vancomycin 125 mg po once daily Week 4: Vancomycin 125 mg po every other day Followed by Pulse dosing: Vancomycin 125 mg po every 3 days for 2 weeks • Metronidazole should not be used beyond the first recurrence because of the potential for cumulative neurotoxicity Other potential options (ID Consult suggested): • Fecal transplants

- These are general guidelines and may not apply to all patients. Clinical judgment should be used in all cases.
- If metronidazole is contraindicated (concomitant ethanol intake, pregnancy, hypersensitivity), use oral vancomycin.
- Intravenous vancomycin is NOT effective for the treatment of CDAD and is NOT a substitute for oral vancomycin.
- While rectal administration of vancomycin may be very helpful in severe cases with ileus, caution should be utilized in its administration to avoid perforation. Avoid vigorous or forceful administration of rectal vancomycin.

- There is no evidence to support use of a combination of oral metronidazole and oral vancomycin.
- There is no evidence to support adding cholestyramine to any regimen. Cholestyramine, colestipol and other anion-exchange resins bind vancomycin, making these a specific contraindication.

B. Antibiotic stewardship strategies

Antibiotic use is one of the major risk factors associated with the development of CDAD. The risk increases with the number of antimicrobials administered, the number of doses, and the duration of antimicrobial therapy. Therefore, careful use of antimicrobials is one of the keys to reducing its incidence in conjunction with infection control, hand hygiene, and environmental disinfection.

Any antibiotic can be associated with CDAD. However, it is likely that exposure to antimicrobials that lack activity against the prevailing *C. difficile* strain will confer the greatest risk. For example, clindamycin was the antibiotic implicated in the 1970s. The *C. difficile* strains during that time were resistant to clindamycin. By the 1980s, this had changed to cephalosporins and broad-spectrum penicillins including amoxicillin because of their extensive use. Recently, fluoroquinolones have been implicated due to the prevalence of the fluoroquinolone resistant B1/NAP1/027 strains of *C. difficile*.[2,6]

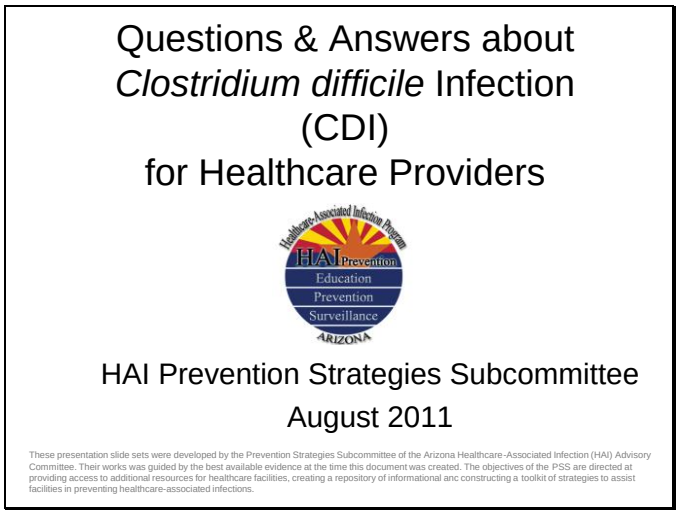
Antibiotic stewardship strategies to decrease the incidence of *C. difficile* include the following:

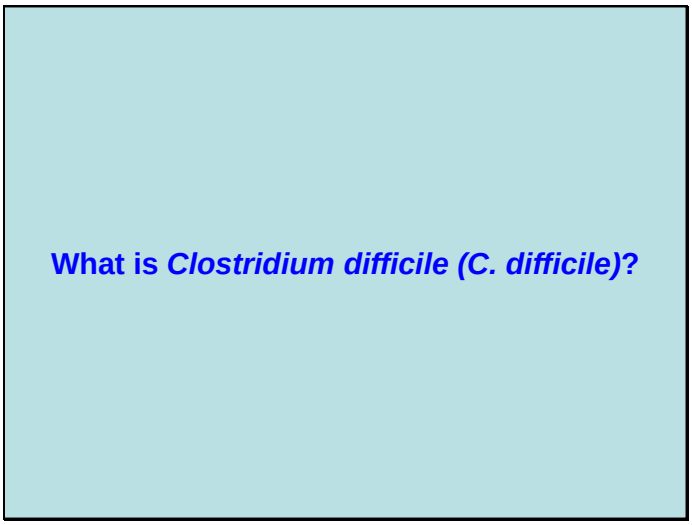
1. Decrease the use of unnecessary antibiotics. Specific goals include:
    a. Decrease the use of antibiotics for which there is no indication
    b. Minimize the duration of antimicrobial therapy to the duration appropriate for the particular infection
    c. Minimize the number of antimicrobial agents prescribed
2. Decrease the use of antibiotics that have been highly associated with increases in CDAD infection. If possible, target those antimicrobials based on local epidemiology and the prevalent *C. difficile* strains. It may be useful to target the following antibiotics:
    a. Fluoroquinolones if the NAP1/B1/027 strain is prevalent in the area
    b. Clindamycin
    c. Cephalosporins

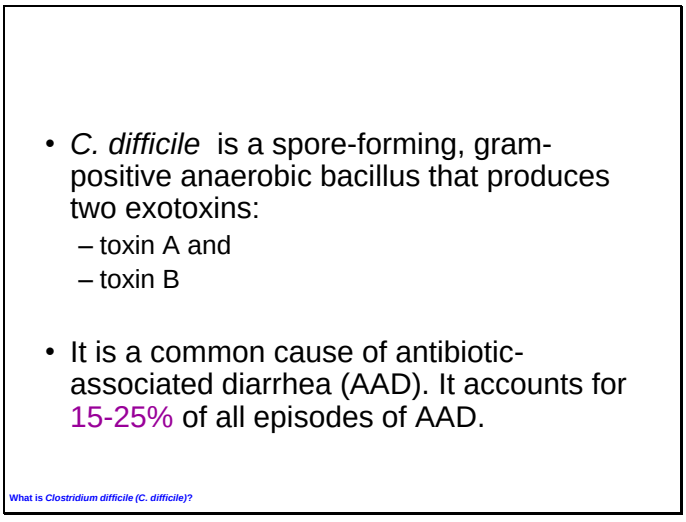
Note: The combination of cephalosporins and fluoroquinolones may confer an even higher risk of developing CDAD[7]

In the hospital setting, guidelines may be developed or revised to incorporate strategies to reduce *C. difficile*. For example, in a single-hospital outbreak recently reported by Power et al, hospital guidelines were revised to restrict the use of cephalosporins and quinolones in the first line treatment of pneumonia and urinary tract infections as part of a program that successfully decreased the system-wide *C. difficile* rate by 56% from baseline.[8] In addition to this study, there are other reports in the literature that provide evidence that effective antibiotic stewardship program is one of the essential tools needed to reduce the incidence of *C. difficile*.[7, 9, 10, 11, 12]

References:
1. Cohen SH, Gerding DN, et al. Clinical practice guidelines for *clostridium difficile* infection in adults: 2010 update by the society for healthcare epidemiology of America (SHEA) and the infectious diseases society of America (IDSA).Infect Control Hosp Epidemiol.2010;31:431-55.
2. Owens RC.*Clostridium difficile*-associated disease.Changing epidemiology and implications for Management.Drugs.2007;67:487-502.
3. McEvoy G, ed. American Hospital Formulary Service Drug Information. Bethesda, Md. American Society of Health Care pharmacists.2010
4. Gilbert DN, ed. The Sanford Guide to Antimicrobial Therapy. Fortieth ed. Sperryville,Va. Antimicrobial Therapy, Inc.2010.
5. Bartlett JG. Historical perspective on studies of *clostridium difficile* and clostridium difficile infection.Clin Infect Dis.2008:46;S4-11.
6. Pepin J et al. Emergence of fluoroquinolones as the predominant risk factor for *Clostridium difficile*-associated diarrhea: a cohort study during an epidemic in Quebec. Clin Infect Dis.2005;41:1254-60.
7. DeBast SB, Vaessen N, et al. Successful combat of an outbreak due to *Clostridium difficile* PCR ribotype 027 and recognition of specific risk factors.Clin Microbiol Infect.2009;15:427-34.
8. Power M, Wigglesworth N. et al.Reducing *clostridium difficile* infection in acute care by using an improvement collaborative.BMJ.2010;341:196-199.
9. Valiquette L, Benoit Cossette, et al.Impact of a reduction in the use of high-risk antibiotics on the course of an epidemic of *clostridium difficile*-associated disease caused by the hypervirulent NAP1/027 strain.Clin Infect Dis.2007;45:S112-121.
10. Muto CA, Blank MK, et al.Control of an outbreak of infection with the hypervirulent *clostridium difficile* B1 strain in a university hospital using a comprehensive "bundle" approach.Clin Infect Dis.2007;45:1266-73.
11. Khan R, Cheesbrough J.Impact of changes in antibiotic policy on *clostridium difficile*-associated diarrhoea (CDAD) over a five-year period in a district general hospital.J Hosp Infect.2003;54:104-8.
12. Fowler S, Webber A, et al.Successful use of feedback to improve antibiotic prescribing and reduce c*lostridium difficile* infection: a controlled interrupted time series.J Antimicrob Chemother.2007;59:990-95.

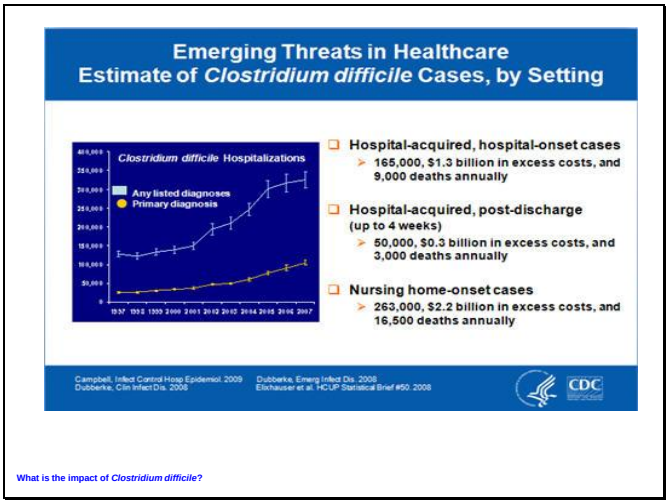






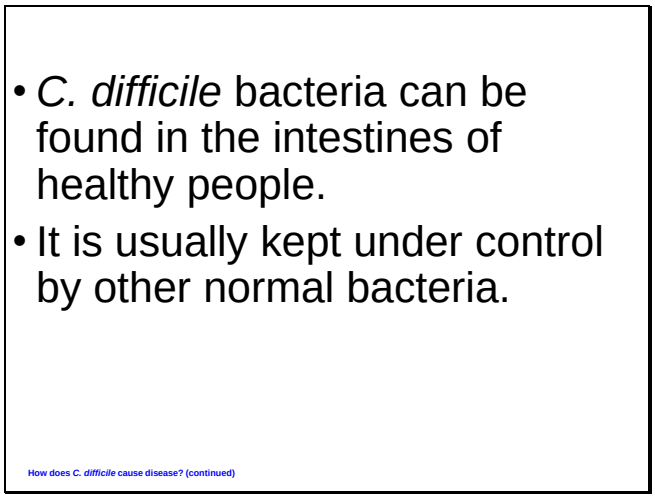
The C.diff spores can live in the environment for many months making environmental hygiene very important. Microbiologic culturing is difficult because is an anaerobe (grows in the absence of O2).

What is the impact of CDI?

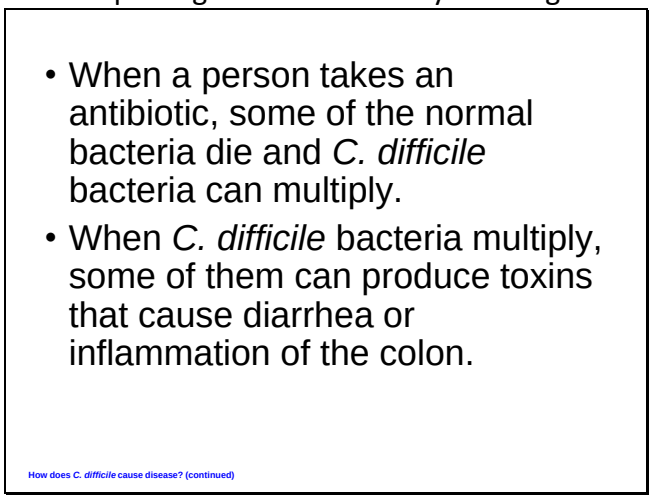


The number of Clostridium difficile infection (CDI) cases is increasing across all healthcare settings in the United States. Nearly half a million Americans acquire CDI every year. That number climbs by about 10 percent each year. C. difficile infection is associated with a 16.7 percent mortality rate at one year.

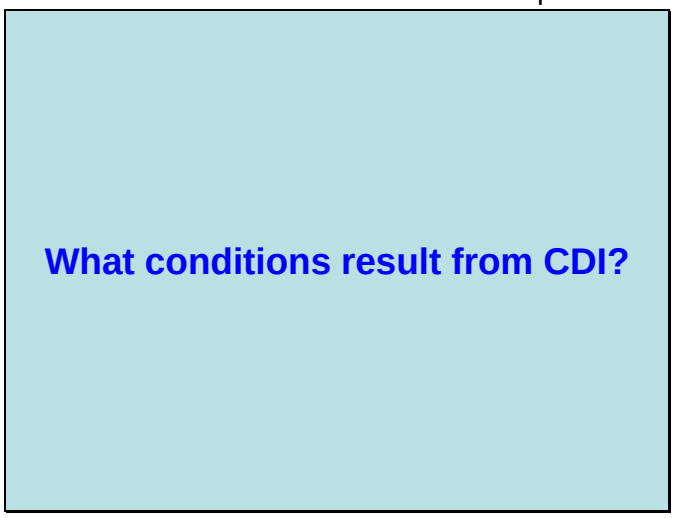
How does *C. difficile* cause disease?

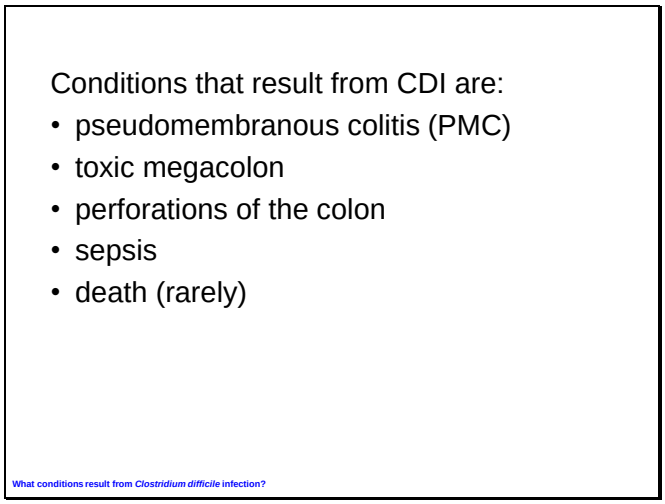


Emphasize: People in good health usually do not get the disease

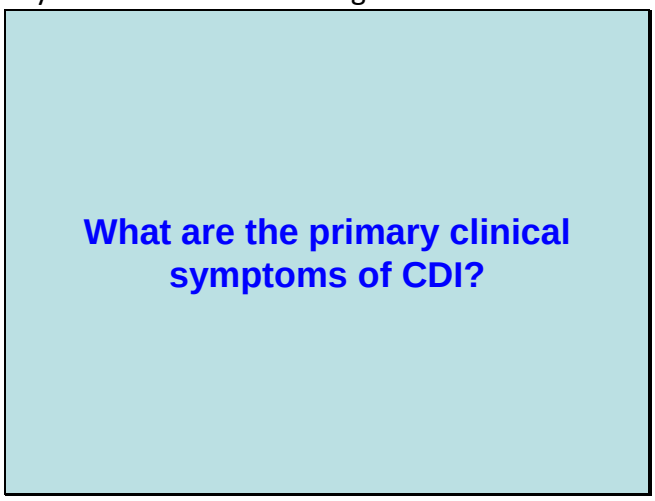


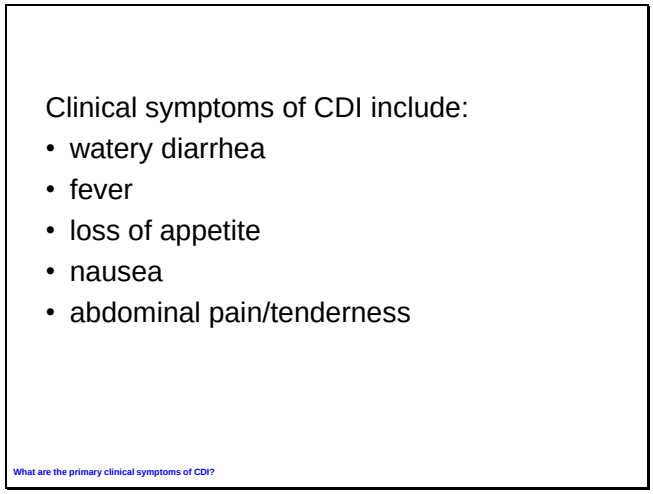
Conditions that alter the normal bowel flora enable C.diff to proliferate and cause disease.



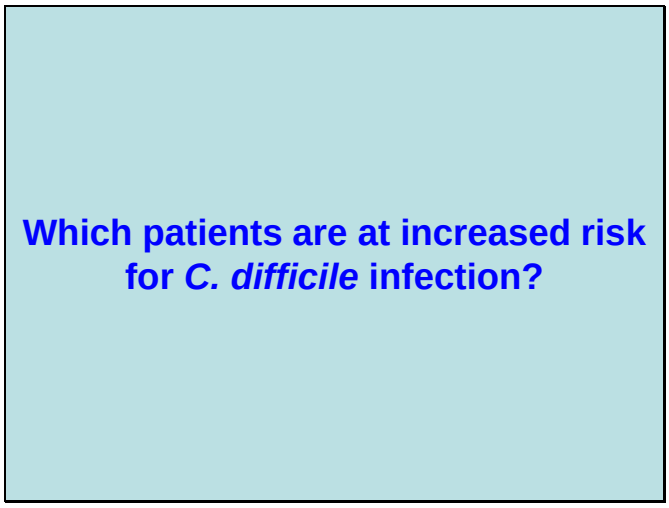


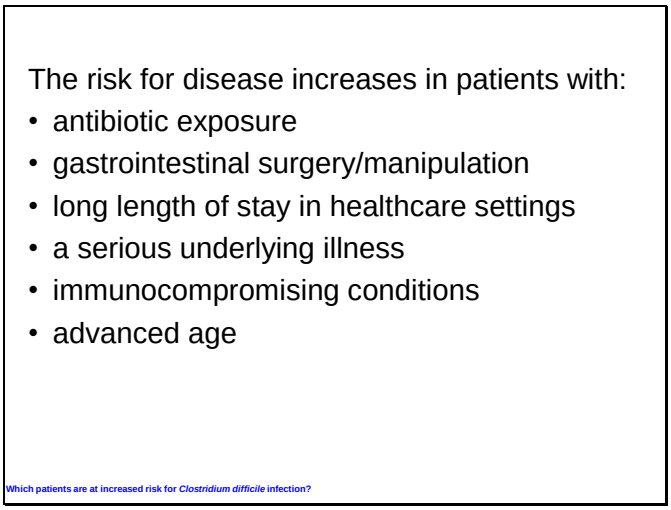
PMC- Inflammation of the colon.
Toxic Megacolon- Irritation of the colon by toxins causing signs and symptoms of PMC.
Perforations of the colon- a hole or tear in the wall of the colon.
Sepsis- potentially life-threatening condition, in which your immune system's reaction to an infection may injure body tissues far from the original infection.



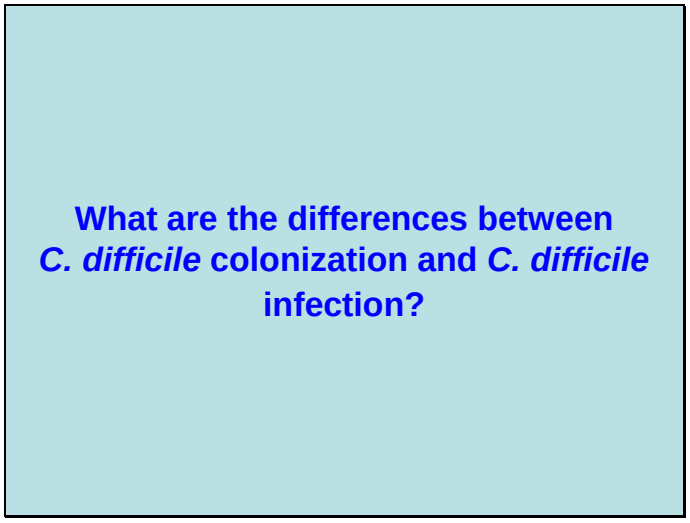


May have one or more of these symptoms…





C.diff should be suspected in any adult with diarrhea who has received antibiotics and/or has been in a healthcare facility including a long term care facility within the last several months.



Characteristics	*C. difficile* colonization*	*C. difficile* infection
Patient has clinical symptoms	**NO**	Yes
Patient tests positive for *C. difficile* organism **and/or** its toxin	Yes	Yes
Patient can transmit infection	Yes but not as easily	Yes

*** More common than the *C. difficile* infection**

What are the differences between *Clostridium difficile* colonization and *Clostridium difficile* -infection?

Colonization- the presence of the microorganism on the host with growth and multiplication without tissue invasion or damage.

Infection- Entry and multiplication of an infectious agent in the tissues and causing disease.

Which laboratory tests are commonly used to diagnose CDI?

- Stool culture for *C. difficile*
- Molecular tests: FDA-approved PCR assays
- Antigen detection for *C. difficile*
- Toxin testing for *C. difficile* *
- *C. difficile* toxin

* *Clostridium difficile*-associated diarrhea and colitis* SHEA 1995 : October 2008 Update to 1995 SHEA/IDSA CDI guidelines (ICHE October 2008)

See following slides for details about each bullet

Stool culture for *C. difficile*

- Most sensitive test available
- Most often associated with false-positive results due to presence nontoxigenic *C. difficile* strains
- Can be overcome by testing isolates for toxin production (i.e. so called "toxigenic culture")
- Labor intensive
- Require an appropriate culture environment to grow anaerobic microorganisms
- Have a relatively slow turn-around time (i.e. results available in 48-96 hours)
- Results of toxigenic cultures do serve as a gold-standard against which other test modalities are compared in clinical trials of performance.

Very few labs use because of the technical expertise needed to read the test.

Molecular tests: FDA-approved PCR assays

- Test for the gene encoding toxin B.
- Are highly sensitive for the presence of a toxin-producing *C. difficile* organism.
- Are highly specific for the presence of a toxin-producing *C. difficile* organism.

Expensive. Short turnaround time for results, highly accurate.

Antigen detection for *C. difficile*

- Rapid tests (<1 hr) that detect the presence of *C. difficile* antigen by latex agglutination or immunochromatographic assays.
- Because results of antigen testing alone are non-specific, antigen assays have been employed in combination with tests for toxin detection, PCR, or toxigenic culture in two-step testing algorithms.

Ag detection tests for the presence of the organism (Ag) itself, not the actual toxin that C.diff produces. C.diff is present in the bowel of asymptomatic carries.

Toxin testing for C. difficile *

- Tissue culture cytotoxicity assay
  - detects toxin B only
  - requires technical expertise to perform
  - is costly
  - requires 24-48 hr for a final result
  - provides specific and sensitive results for *C.difficile* infection
  - served as a historical gold standard for diagnosing clinical significant disease caused by *C. difficile*
  - less sensitive than PCR or toxigenic culture for detecting the organism in patients with diarrhea.

* *Clostridium difficile*-associated diarrhea and colitis* SHEA 1995 : October 2008 Update to 1995 SHEA/IDSA CDI guidelines (ICHE October 2008)

Shows lysis of tissue cells due to C.diff toxin B. Very difficult to interpret.

*Toxin testing for C. difficile * (continued)*

- Enzyme immunoassay detects toxin A, toxin B, or both A and B
  - due to concerns over toxin A-negative, B-positive strains causing disease, most laboratories employ a toxin B-only or A and B assay
  - these are same-day assays
  - relatively inexpensive
  - relatively easy to perform
  - popular with clinical laboratories
  - increasing concerns about their relative insensitivity (less than tissue culture cytotoxicity and much less than PCR or toxigenic culture).

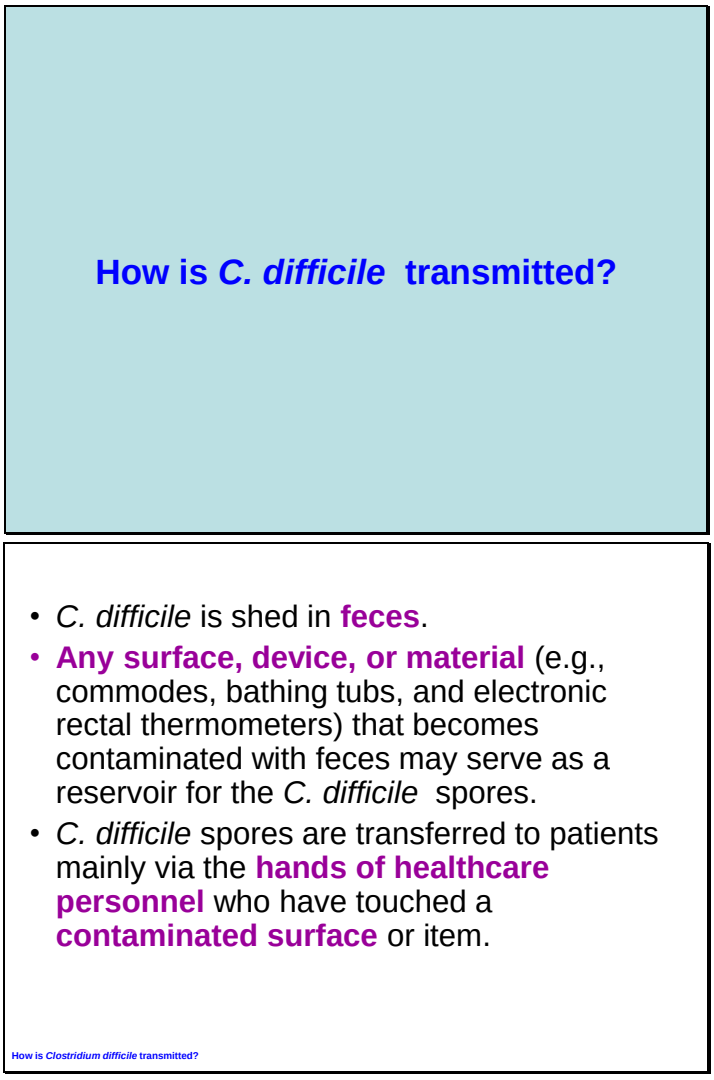
* *Clostridium difficile*-associated diarrhea and colitis* SHEA 1995 : October 2008 Update to 1995 SHEA/IDSA CDI guidelines (ICHE October 2008)

Most widely used in lab testing

C. difficile toxin

- Very unstable
- Toxin degrades at room temperature
- Toxin may be undetectable within 2 hours after collection of a stool specimen
- False-negative results occur when specimens are not promptly tested or kept refrigerated until testing can be done

Specimen transport is extremely important. Stool must be refrigerated if testing not performed within a couple of hours. Each testing method is different and the guidelines must be followed.



Physicians, nurses, and other healthcare workers can serve as a mode of transmission. It can also be spread on the hands of visitors.

- In about 20% of patients, *C. difficile* infection will resolve within 2-3 days of discontinuing the antibiotic to which the patient was previously exposed.
- The infection can usually be treated with an appropriate course (about 10 days) of oral antibiotics including
  - metronidazole or
  - vancomycin

How is CDI usually treated?

Metronidazole= Flagyl

- After treatment, repeat *C. difficile* testing is not recommended if the patients' symptoms have resolved, as patients may remain colonized.

How is CDI usually treated?

How can CDI be prevented in hospitals and other healthcare settings?

- Use antibiotics judiciously
- Use Contact Precautions: for patients with known or suspected *C. difficile* infection:
  - Place these patients in private rooms.
  - If private rooms are not available, these patients can be placed in rooms (cohorted) with other patients with *C. difficile* infection.
  - Use gloves when entering patients' rooms and during patient care.

How can CDI be prevented in hospitals and other healthcare settings?

In addition to gloves: use a gown with anticipated contact with the patient or the patient environment

- Perform Hand Hygiene after removing gloves.
  - Alcohol does not kill *C. difficile* spores.
  - Use soap and water whenever possible.
  - Vigorous soap and water hand washing is recommended after contact with the *C. difficile* infected patient, his/her room, or the equipment that has been used for that patient.
  - Early experimental data suggest that, even when using soap and water, the removal of *C. difficile* spores is more challenging than the removal or inactivation of other common pathogens.
  - Preventing contamination of the hands via glove use remains the cornerstone for preventing *C. difficile* transmission via the hands of healthcare workers; any theoretical benefit from instituting soap and water must be balanced against the potential for decreased compliance resulting from a more complex hand hygiene message.
  - If your institution experiences an outbreak, consider using only soap and water for hand hygiene when caring for patients with *C. difficile* infection.

How can CDI be prevented in hospitals and other healthcare settings? (cont)

The mechanical action of washing your hands with soap and running water washes the contaminate down the drain…

- Use gowns when entering patients' rooms and during patient care.
- Remove gown and gloves when leaving patients' room.
- Dedicate or perform cleaning of any shared medical equipment.
- CONTINUE THESE PRECAUTIONS UNTIL DIARRHEA CEASES
  - Because *C. difficile* infected patients continue to shed organism for a number of days following cessation of diarrhea, some institutions routinely continue isolation for either several days beyond symptom resolution or until discharge, depending upon the type of setting and average length of stay.

How can CDI be prevented in hospitals and other healthcare settings? (cont)

Some hospitals require visitors to wear gloves and gowns also. Mobile patient equipment must be cleaned between each patient use. It is unknown how long a patient with C.diff will continue to shed the organism.

- Implement an environmental cleaning and disinfection strategy:
  - Ensure adequate cleaning and disinfection of environmental surfaces and reusable devices, especially items likely to be contaminated with feces and surfaces that are touched frequently.
  - Consider using an Environmental Protection Agency (EPA)-registered hypochlorite-based disinfectant for environmental surface disinfection after cleaning in accordance with label instructions;
    - generic sources of hypochlorite (e.g., household chlorine bleach) also may be appropriately diluted and used.
    - (Note: Standard EPA-registered hospital disinfectants are not effective against *C. difficile* spores .)
    - Hypochlorite-based disinfectants may be most effective in preventing *C. difficile* transmission in units with high endemic rates of *C.difficile* infection.
  - Follow the manufacturer's instructions for disinfection of endoscopes and other devices.

How can CDI be prevented in hospitals and other healthcare settings? (cont)

Environmental cleaning is of utmost importance. A 1:10 bleach solution is the only EPA approved agent to kill C.diff spores.

- Recommended infection control practices in **long term care** and **home health** settings are similar to those practices taken in traditional health-care settings.

How can CDI be prevented in hospitals and other healthcare settings? (cont)

What can I use to clean and disinfect surfaces and devices to help control *C. difficile* ?

- Surfaces should be kept clean, and body substance spills should be managed promptly as outlined in CDC's "Guidelines for Environmental Infection Control in Health-Care Facilities." (http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf

What can I use to clean and disinfect surfaces and devices to help control *Clostridium difficile* ?

- Hospital cleaning products can be used for routine cleaning.
  - Hypochlorite-based disinfectants have been used with some success for environmental surface disinfection in those patient-care areas where surveillance and epidemiology indicate ongoing transmission of *C. difficile* .
  - Consult the aforementioned guidelines for use conditions for generic sources of hypochlorite-based products (e.g., household chlorine bleach) for disinfection of environmental surfaces.
- Note: EPA-registered hospital disinfectants are recommended for general use whenever possible in patient-care areas.

What can I use to clean and disinfect surfaces and devices to help control *Clostridium difficile* ?

Primary References:

- CDC Frequently Asked Questions: Information for Healthcare Providers,
  Released August 2004; Updated 07/20/2010
- CDC *Clostridium difficile* Infections Web Site
  http://www.cdc.gov/ncidod/dhqp/id_Cdiff.html

Additional Scientific References:

- Boone N, Eagan JA, Gillern P, Armstrong D, Sepkowitz KA. Evaluation of an interdisciplinary re-isolation policy for patients with previous *Clostridium difficile* diarrhea. Am J Infect Control 1998;26:584–7.
- CDC. Guidelines for environmental infection control in health-care facilities. MMWR 2003;52 (RR10):1–42. Also available at: http://www.cdc.gov/ncidod/hip/enviro/guide.htm
- CDC. Guidelines for hand hygiene in health-care settings. MMWR 2002;51 (RR16):1–45.
- Johnson S, Gerding DN. *Clostridium difficile*-associated diarrhea. Clin Infect Dis 1998;26:1027–36.
- Simor AE, Bradley SF, Strausbaugh LJ, Crossley K, Nicolle LE. SHEA Position Paper: *Clostridium difficile* in long-term-care facilities for the elderly. Infect Control Hosp Epidemiol 2002;23:696–703.
- Gerding DN, Johnson S, Peterson LR, Mulligan ME, Silva J. SHEA Position Paper:*Clostridium difficile*-associated diarrhea and colitis. Infect Control Hosp Epidemiol 1995;16:459–77. Reference new IDSA guideline instead
- Use the CCMJ reference instead (2006)
- HICPAC 2007 Isolation Precaution http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html
- HICPAC 2006 MDRO Guidelines http://www.cdc.gov/hicpac/mdro/mdro_0.html
- SHEA/IDSA Compendium October 2008 http://www.cdc.gov/ncidod/dhqp/HAI_shea_idsa.html

Publications & Guidelines

Publications

- Risk Factors for and Estimated Incidence of Community-associated *Clostridium difficile* Infection, North Carolina, USA EID 2010 http://www.cdc.gov/ncidod/dhqp/pdf/cdiff/KuttyEID2010.pdf
- Multicenter study of the Impact of Community-Onset *Clostridium difficile* Infection on Surveillance for *C. difficile* Infection ICHE 2009 http://www.cdc.gov/ncidod/dhqp/pdf/DubberkeCDIratesimpact_CO_ICHE2009.pdf
- Complete Restriction of Fluoroquinolone Use to Control an Outbreak Of *Clostridium difficile* Infection at a Community Hospital ICHE 2009 http://www.ncbi.nlm.nih.gov/pubmed/19215193
- *Clostridium difficile* Infection in Ohio Hospitals and Nursing Homes During 2006 ICHE 2009 http://www.cdc.gov/ncidod/dhqp/pdf/cdiff/CampbellOhioICHEJune2009.pdf
- *Clostridium difficile* Infections in Children PIDJ 2009 http://www.cdc.gov/ncidod/dhqp/pdf/cdiff/BryantPIDJ2009.pdf
- The changing spectrum of *Clostridium difficile*-associated disease: Implications for dentistry Blossom, JADA, 2008 http://www.ncbi.nlm.nih.gov/pubmed/18167383
- Bench-to-bedside review: *Clostridium difficile* colitis CritCare 2008 http://www.cdc.gov/ncidod/dhqp/pdf/Gould_CritCare2008.pdf
- *Clostridium difficile*-associated disease: New challenges from an established pathogen, http://www.ncbi.nlm.nih.gov/pubmed/16478043
- Severe *C.difficile*-associated disease in populations previously at low risk - Four States MMWR 2005 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5447a1.htm
- An epidemic, toxin gene-variant strain of *Clostridium difficile.* N Engl J Med. 2005 http://www.ncbi.nlm.nih.gov/pubmed/16322603?dopt=Abstract

Guidelines

- *Clostridium difficile*-associated diarrhea and colitis* SHEA 1995 : October 2008 Update to 1995 SHEA/IDSA CDI guidelines (ICHE October 2008) http://www.shea-online.org/assets/files/position_papers/Cldiff95.PDF
- Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007 http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html
- Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006 http://www.cdc.gov/hicpac/mdro/mdro_0.html
- Guideline for Environmental Infection Control in Health-Care Facilities, 2003 http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf
- *C. difficile* Excerpt: Guideline for Environmental Infection Control in Health-Care Facilities, 2003 http://www.cdc.gov/ncidod/dhqp/id_Cdiff_excerpts.html
- Hand Hygiene in Healthcare Settings, 2002 MMWR 2002 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf

Other Resources

Continuing Education

- Risk Factors for and Estimated Incidence of Community-Associated *Clostridium difficile* Infection, North Carolina, USA *
  http://cme.medscape.com/viewarticle/715799

Educational Materials

- **Patient FAQ's about *Clostridium difficile***
  http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Cdiff_tagged.pdf
  En español: Preguntas frecuentes *"Clostridium difficile"*
  http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/SPAN_C-Diff.pdf

- *Clostridium difficile* (CDI) Infections Toolkit
  http://www.cdc.gov/hai/pdfs/toolkits/CDItoolkitwhite_clearance_edits.pdf

- Wipe Out CDAD*
  http://www.rmei.com/cdadposter/WipeOutCDAD-Poster.pdf

- Understanding *Clostridium difficile**
  http://www.rmei.com/cdadbrochure/UnderstandingCD-Brochure.pdf

EDUCATION FOR HEALTHCARE PROVIDERS
POST TEST – *Clostridium difficile*

Name/Title: _____ Date: _____
Department: _____

Fill in completely.

True False

1) A *Clostridium difficile* infection does not always need to be treated with antibiotics.

2) After treatment, repeat testing is not recommended if the patient's symptoms have resolved.

3) Because the bacteria is shed in the stool, a *C.difficile* infected patient can no longer infect others once the diarrhea stops.

4) New onset of fever and diarrhea in a critically ill patient should trigger the need to test for *C.difficile.*

5) *C.difficile* toxins are very stable and can be detected several hours after a stool specimen is collected.

6) The judicious use of antibiotics and contact precautions for infected patients are key *C.difficile* prevention strategies in the healthcare setting.

7) The consequences that can result from a *C.difficile* infection include all of the following: pseudomembranous colitis, toxic megacolon, perforated colon, sepsis, and even death.

8) When testing for *C.difficile* in a patient who has diarrhea, the presence of toxin production found in the stool is the most reliable indicator.

9) Vigorous handwashing with soap and water is recommended after contact with the *C.difficile* infected patient, his/her room, or the equipment that has been used for that patient.

10) *C.difficile* prevention strategies in the healthcare setting include all of the following: performing hand hygiene before and after gloving, wearing gloves and gowns when entering the room of a *C.difficile* infected patient and placing the patient in a private room whenever possible.

EDUCATION FOR HEALTHCARE PROVIDERS
POST TEST ANSWER KEY– *Clostridium difficile*

Name/Title: _____ Date: _____
Department: _____

Fill in completely.

True	False	
●	○	**11) A *Clostridium difficile* infection does not always need to be treated with antibiotics.**
●	○	**12) After treatment, repeat testing is not recommended if the patient's symptoms have resolved.**
○	●	**13) Because the bacteria is shed in the stool, a *C.difficile* infected patient can no longer infect others once the diarrhea stops.**
●	○	**14) New onset of fever and diarrhea in a critically ill patient should trigger the need to test for *C.difficile*.**
○	●	**15) *C.difficile* toxins are very stable and can be detected several hours after a stool specimen is collected.**
●	○	**16) The judicious use of antibiotics and contact precautions for infected patients are key *C.difficile* prevention strategies in the healthcare setting.**
●	○	**17) The consequences that can result from a *C.difficile* infection include all of the following: pseudomembranous colitis, toxic megacolon, perforated colon, sepsis, and even death.**
●	○	**18) When testing for *C.difficile* in a patient who has diarrhea, the presence of toxin production found in the stool is the most reliable indicator.**
●	○	**19) Vigorous handwashing with soap and water is recommended after contact with the *C.difficile* infected patient, his/her room, or the equipment that has been used for that patient.**
●	○	**20) *C.difficile* prevention strategies in the healthcare setting include all of the following: performing hand hygiene before and after gloving, wearing gloves and gowns when entering the room of a *C.difficile* infected patient and placing the patient in a private room whenever possible.**

Questions & Answers about
Clostridium difficile Infection (CDI)
for Non-Clinical
Healthcare Workers

HAI Prevention Strategies Subcommittee
August 2011

These presentation slide sets were developed by the Prevention Strategies Subcommittee of the Arizona Healthcare-Associated Infection (HAI) Advisory Committee. Their works was guided by the best available evidence at the time this document was created. The objectives of the PSS are directed at providing access to additional resources for healthcare facilities, creating a repository of informational anc constructing a toolkit of strategies to assist facilities in preventing healthcare-associated infections.

What is *Clostridium difficile (C. difficile)*?

- *Clostridium difficile* [pronounced Klo-STRID-ee-um dif-uh-SEEL], also known as *C. difficile* [See-dif-uh-SEEL], is a germ that can cause diarrhea.
- Most cases of *C. difficile* infection occur in patients taking antibiotics.

What is *Clostridium difficile (C. difficile)*?

C. difficile

- Is a germ that causes diarrhea
- It can occur when a person takes antibiotics
- It can be transferred to others by not washing hands and cleaning equipment and the environment properly

How does *C. difficile* cause disease?

- *C. difficile* bacteria can be found in the intestines of healthy people.
- It is usually kept under control by other normal bacteria.

How does *C. difficile* cause disease? (continued)

- When a person takes an antibiotic, some of the normal bacteria die and *C. difficile* bacteria can multiply.
- When *C. difficile* bacteria multiply, some of them can produce toxins that cause diarrhea or inflammation of the colon.

How does *C. difficile* cause disease? (continued)

Good bacteria can die and the *C. difficile* bacteria can multiply and cause illness when people take antibiotics

What are the most common symptoms of CDI?

The most common symptoms are:

- Watery diarrhea
- Fever
- Loss of appetite
- Nausea
- Belly pain and tenderness

What are the most common symptoms of CDI? (continued)

What are the differences between *C. difficile* colonization and *C. difficile* -infection?

What are the differences between *C. difficile* colonization and *C. difficile* -infection?

Characteristics	*C. difficile* colonization*	*C. difficile* Infection
Patient has clinical symptoms	NO	Yes
Patient tests positive for *Clostridium difficile* organism **and/or** its toxin	Yes	Yes
Patient can transmit infection	Yes but not as easily	Yes

* More common than the *C. difficile* infection

What are the differences between of *Clostridium difficile* colonization and *Clostridium difficile* infection? (continued)

Infection causes symptoms such as diarrhea

Colonized people can be contagious but they do not have symptoms

Who is most likely to get CDI?

The risk for disease increases in patients who:

- are being given antibiotics
- have had gastrointestinal surgery
- have been in a healthcare setting for a long time
- have a serious illness
- have a weak immune system
- are older in age

Who is most likely to get CDI? (continued)

How is *C. difficile* spread?

- *C. difficile* is shed in **stool**.
- *C. difficile* can live outside the human body for a very long time.

How is *Clostridium difficile* spread? (continued)

- *C. difficile* can live on surfaces for a long time and may be found on things around us such as:
  - bed linens,
  - bed rails,
  - bathroom fixtures,
  - and equipment.

How is *Clostridium difficile* spread? (continued)

- *C. difficile* infection can easily **spread** from **person-to-person** on:
  - **contaminated equipment**
  - **hands** of:
    - Doctors
    - Nurses
    - other healthcare providers
    - visitors.

How is *Clostridium difficile* spread? (continued)

C. difficile

- Can be spread by dirty hands and dirty equipment
- Healthcare workers, visitors and patients can spread *C. difficile* if they do not wash their hands properly

How is CDI treated?

- When patients taking antibiotics get *C. difficile* the symptoms will sometimes get better 2-3 days after stopping the antibiotic.

How is CDI treated? (continued)

- Antibiotics can be used to treat *C. difficile*. Some of these are:
  - –metronidazole and
  - –Vancomycin

How is CDI treated? (continued)

- In some severe cases, a person might have to have surgery to remove the infected part of the intestines. This surgery is needed in only 1 or 2 out of 100 people with *C. difficile.*

How is CDI treated? (continued)

How can CDI infection be prevented in hospitals and other healthcare settings?

- Use antibiotics carefully
- Wash hands with soap and water before and after caring for **every patient and touching contaminated surfaces and equipment**

How can CDI be presented in hospitals and other healthcare settings? (continued)

- Carefully **clean** hospital rooms and equipment that have been used for patients with *C. difficile.*
  - **Always** follow the instructions on the container of cleaning agent that is being used.

How can CDI be presented in hospitals and other healthcare settings? (continued)

- Use Contact Precautions for patients with known or suspected *C. difficile* infection:
  - Place these patients in private rooms.
  - If private rooms are not available, these patients can be placed in rooms (cohorted) with other patients with *C. difficile* infection.

How can CDI be presented in hospitals and other healthcare settings? (continued)

- Use gloves and gowns when entering patients' rooms and during patient care.
- When leaving the room, **remove** gown and gloves and **clean hands**.
  - Alcohol does not kill *C. difficile* spores.
  - Wash hands vigorously with soap and water whenever possible.
  - Some scientific studies have shown that even with soap and water removal of *C. difficile* can be hard.
  - Because of this **vigorously washing** with the **soap and water** is very important

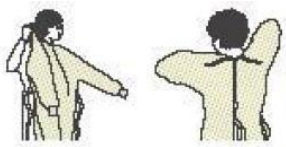
How can *Clostridium difficile* infection be presented in hospitals and other healthcare settings? (continued)

Isolation and PPE

- Place patient is private room when possible or cohort
- Make certain all persons entering the room use the proper personal protective equipment such as gowns and gloves
- Wash Hands vigorously with Soap and Water

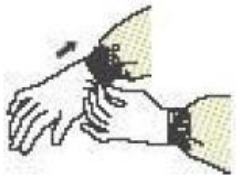
Donning Gown

- Fully cover torso from neck to knees, arms to end of wrist, and wrap around the back
- Fasten in back at neck and waist



Donning Gloves

- Use non-sterile for isolation
- Select according to hand size
- Extend to cover wrist of isolation gown

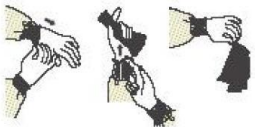


Removing PPE

- Remove PPE at doorway before leaving patient room or in anteroom
- Remove gloves first
- Then remove gown
- Dispose of before leaving room

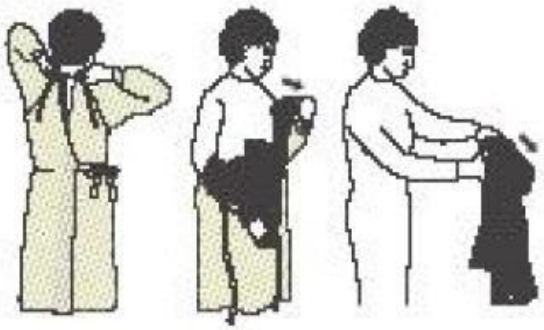
Glove Removal

- Outside of gloves are contaminated!
- Grasp outside of glove with opposite gloved hand; peel off
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist



Gown Removal

- Gown front and sleeves are contaminated!
- Unfasten neck, then waist ties
- Remove gown using a peeling motion; pull gown from each shoulder toward the same hand
- Gown will turn inside out
- Hold removed gown away from body, roll into a bundle and discard into waste or linen receptacle



– Dedicate or perform cleaning of any shared medical equipment.
– **CONTINUE THESE PRECAUTIONS UNTIL DIARRHEA STOPS**
  - Because patients infected with *C. difficile* still have the C. difficile spores in their body for a number of days after diarrhea has stopped some healthcare facilities continue contact precautions for awhile after symptoms have stopped. It is important to follow the rules of your facility.

How can CDI be presented in hospitals and other healthcare settings? (continued)

What can I use to clean and disinfect surfaces and devices to help control *C. difficile* ?

- Surfaces should be kept clean, and body fluid spills should be taken care of right away. (For more information see CDC's "Guidelines for Environmental Infection Control in Health-Care Facilities." found at http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf)

What can I use to clean and disinfect surfaces and devices to help control *Clostridium difficile* ?

Clean surfaces as soon as possible after they become soiled and clean the patient area and equipment often

- Hospital cleaning products can be used for routine cleaning.
  - Hypochlorite-based (bleach) disinfectants have been used with some success for cleaning and disinfection in patient-care areas where spread of *C. difficile* has been happening.
- Note: EPA-registered hospital disinfectants are recommended for general use whenever possible in patient-care areas.

What can I use to clean and disinfect surfaces and devices to help control *Clostridium difficile* ?

Use the correct cleaner and disinfectant

- Follow the directions for use on the container.
- Use EPA registered disinfectants in healthcare settings

Primary References:

- CDC Frequently Asked Questions: Information for Healthcare Providers, Released August 2004; Updated 07/20/2010
- CDC *Clostridium difficile* Infections Web Site http://www.cdc.gov/ncidod/dhqp/id_Cdiff.html

- Frequently Asked Questions about *Clostridium difficile.* SHEA. 2008.

Guidelines

- *Clostridium difficile*-associated diarrhea and colitis* SHEA 1995 : October 2008 Update to 1995 SHEA/IDSA CDI guidelines (ICHE October 2008) http://www.shea-online.org/assets/files/position_papers/Cldiff95.PDF
- Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007 http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html
- Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006 http://www.cdc.gov/hicpac/mdro/mdro_0.html
- Guideline for Environmental Infection Control in Health-Care Facilities, 2003 http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf
- *C. difficile* Excerpt: Guideline for Environmental Infection Control in Health-Care Facilities, 2003 http://www.cdc.gov/ncidod/dhqp/id_Cdiff_excerpts.html
- Hand Hygiene in Healthcare Settings, 2002 MMWR 2002 http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf

Other Resources

Continuing Education

- Risk Factors for and Estimated Incidence of Community-Associated *Clostridium difficile* Infection, North Carolina, USA * http://cme.medscape.com/viewarticle/715799

Educational Materials

- **Patient FAQ's about *Clostridium difficile***
  http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Cdiff_tagged.pdf
  En español: Preguntas frecuentes *"Clostridium difficile"*
  http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/SPAN_C-Diff.pdf
- *Clostridium difficile* (CDI) Infections Toolkit
  http://www.cdc.gov/hai/pdfs/toolkits/CDItoolkitwhite_clearance_edits.pdf
- Wipe Out CDAD*
  http://www.rmei.com/cdadposter/WipeOutCDAD-Poster.pdf
- Understanding *Clostridium difficile** http://www.rmei.com/cdadbrochure/UnderstandingCD-Brochure.pdf

Questions?

EDUCATION FOR NON-CLINICAL STAFF
POST TEST – *Clostridium difficile*

Name/Title: _____ Date: _____
Department: _____

Fill in completely.

True False

1) **Healthy people can have C*lostridium difficile* in their intestines without being ill.**

2) **A person who is only "colonized" with *C. difficile* bacteria cannot cause others to become infected.**

3) **People who have recently been in the hospital and treated for other infections will not likely get a *C.difficile* infection because they have protection provided by the antibiotics in their systems.**

4) **The most common symptoms of *C.difficile infection* are watery diarrhea, fever, loss of appetite, nausea and belly pain or tenderness.**

5) **The *C.difficile* bacteria only causes illness when toxins are produced.**

6) **This bacteria is not easily spread in a hospital.**

7) **The *C.difficile* bacteria is not easily spread to others.**

8) **Alcohol-based hand sanitizers are not an effective mean of killing *C.difficile* on your hands.**

9) **Vigorous handwashing with soap and water is recommended after contact with the *C.difficile* infected patient, his/her room, or the equipment that has been used for that patient.**

10) **It is important to carefully clean hospital rooms and equipment that have been used by *C.difficile* infected patients because the *C.difficile* spores can live on surfaces for a long time.**

EDUCATION FOR NON-CLINICAL STAFF
POST TEST ANSWER KEY– *Clostridium difficile*

Name/Title: _____ Date: _____
Department: _____

Fill in completely.

True	False	
●	○	**1) Healthy people can have C*lostridium difficile* in their intestines without being ill.**
○	●	**2) A person who is only "colonized" with *C. difficile* bacteria cannot cause others to become infected.**
○	●	**3) People who have recently been in the hospital and treated for other infections will not likely get a *C.difficile* infection because they have protection provided by the antibiotics in their systems.**
●	○	**4) The most common symptoms of *C.difficile infection* are watery diarrhea, fever, loss of appetite, nausea and belly pain or tenderness.**
●	○	**5) The *C.difficile* bacteria only causes illness when toxins are produced.**
○	●	**6) This bacteria is not easily spread in a hospital.**
○	●	**7) The *C.difficile* bacteria is not easily spread to others.**
●	○	**8) Alcohol-based hand sanitizers are not an effective mean of killing *C.difficile* on your hands.**
●	○	**9) Vigorous handwashing with soap and water is recommended after contact with the *C.difficile* infected patient, his/her room, or the equipment that has been used for that patient.**
●	○	**10) It is important to carefully clean hospital rooms and equipment that have been used by *C.difficile* infected patients because the *C.difficile* spores can live on surfaces for a long time.**

STOP the Spread

of *Clostridium difficile*

C. difficile is a spore-forming bacteria. It is a leading cause of health-care-associated infection. People with other underlying diseases who have been treated with broad-spectrum antibiotics are at greatest risk of acquiring *C. difficile*-associated disease.

Transmission

- ***C. difficile*** **bacteria grow in the intestines and are expelled during fecal elimination.**
- **Spores can survive outside the body on inanimate surfaces for months, and they can be transmitted from frequently touched surfaces such as bed rails, IV poles, toilets, grab bars, light switches, and faucets. They can also adhere to and be transmitted from clothes, towels, curtains, and bed linens.**
- **Healthcare workers can spread the bacteria by touching contaminated surfaces and then touching other patients or items in their rooms.**
- ***C. difficile*** **infection occurs from oral ingestion of spores.**

Prevention

- **Staff and visitors should always use standard and contact isolation precautions, including use of gloves and gowns.**
- **When leaving the room, staff and visitors should remove gloves and gowns and wash their hands.**
- **Washing hands vigorously for 20 seconds with soap and water helps remove *C. difficile* spores.**
- **Alcohol-based hand rub alone does not kill *C. difficile*.**
- **Housekeeping should use a healthcare-facility-approved disinfectant to thoroughly clean the room (and bathroom) at least daily.**
- **Licensed independent practitioners should strictly adhere to antibiotic prescribing protocols and avoid broad-spectrum antibiotics whenever possible.**

Additional information is available at www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html.

Healthcare-Associated Infection Program
HAI Prevention
Prevention Strategies
Antimicrobial Stewardship
Education & Training
Surveillance
ARIZONA

This material was prepared by Health Services Advisory Group, Inc. (HSAG), the Medicare Quality Improvement Organization for Arizona, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.
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Quality Improvement Organizations
Sharing Knowledge. Improving Health Care.
CENTERS FOR MEDICARE & MEDICAID SERVICES

HSAG HEALTH SERVICES ADVISORY GROUP

Evaluation of *Clostridium difficile* Toolkit

Please evaluate the prevention toolkit by answering the following questions.

Which of the following facilities do you represent?

- ☐ Acute care hospital
- ☐ Long-term acute care hospital (LTACH)
- ☐ Long-term care/Skilled Nursing Facility
- ☐ Critical Access Hospitals
- ☐ Hospice
- ☐ Outpatient Treatment Center
- ☐ Physician Office/ Urgent care centers
- ☐ Assisted Living Facility
- ☐ Ambulatory Surgery Center
- ☐ Hospice
- ☐ Dialysis
- ☐ Behavioral health centers
- ☐ Correctional facilities
- ☐ Other (please specify) _____

Do you perform routine or active surveillance on *Clostridium difficile* infections?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Do you isolate patients with *Clostridium difficile* infections?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Do you have ready access to a computer?

- ☐ Yes
- ☐ No

Are you a member of APIC?

- ☐ Yes
- ☐ No

Surveillance of *Clostridium difficile*

The Surveillance protocol and worksheets are designed to aid healthcare staff in the proper identification and classification of Community or Healthcare associated C.difficile infections. The tool will also provide information on data collection, classification, and surveillance for outbreaks.

InfectionSurveillanceProtocol, ***SurveillanceWorksheet***, ***SurveillanceAlgorithm***

Do you understand the case definition of *Clostridium difficile* infections as described in the surveillance section of the toolkit?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Is the Clostridium difficile infections Surveillance Algorithm comprehensive and easy to use by staff to assist with identifying Clostridium difficile infections?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are there other areas in the surveillance component of the Clostridium difficile Toolkit that you would like to see addressed?

_____

_____

_____

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_____

_____

_____

_____

Hand Hygiene & Contact Precautions

This component of the toolkit focuses on evidence based and best practices related to contact precautions and hand hygiene recommendations in specific healthcare settings.

Contact precautions to prevent C. difficile in various settings

Can you locate your facility type on the Contact Precautions document?

- ☐ Yes
- ☐ No

Can you open the link for the facility type you represent in the Precautions to prevent transmission of *Clostridium difficile* document?

- ☐ Yes
- ☐ No

Is the information provided in the discipline you represent helpful to you?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are there other areas in the hand hygiene and the contact precautions component of the Clostridium difficile Toolkit that you would like to see addressed?

_____

_____

_____

_____

_____

_____

Environmental Cleaning

The environmental cleaning section of the toolkit provides evidence based tools along with strength of evidence for each intervention recommended to remove C.difficile spores from the environment.

EnvironmentalCleaningToolkit

The information on cleaning methods provided in the Environmental Toolkit is:

- ☐ Appropriate
- ☐ Lacking detail
- ☐ Not helpful
- ☐ Do not know

Was the information easy to use for your facility type?

- ☐ Yes
- ☐ No

Do you know how to contact the county health department if you have questions?

- ☐ Yes
- ☐ No

Was the reference section of this document easy to use to obtain additional information?

- ☐ Yes
- ☐ No

Are there other areas in the environmental cleaning component of the Clostridium difficile Toolkit that you would like to see addressed?

_____

_____

_____

Antibiotic Stewardship & Treatment of Clostridium difficile

This component of the toolkit is designed to assist healthcare staff in determining the appropriate antibiotic treatment regimen for a patient with a C.difficile infection based on severity of illness.

Does your facility have an antimicrobial stewardship program?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Does your facility have a physician champion for antibiotic stewardship?

- ☐ Yes
- ☐ No
- ☐ Do not know

Does your facility do culture and sensitivities to prescribe the appropriate antibiotics?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Is severity category, criteria and treatment regimen layout of The Treatment for *Clostridium difficile* component of the toolkit easy to understand?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are the severity categories, criteria and treatment regimen, appropriate for the mild-moderate disease category?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are the severity categories, criteria and treatment regimen, appropriate for the severe disease category?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are the severity categories, criteria and treatment regimen, appropriate for the recurrent disease category?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Is the antibiotic stewardship strategies section of the Management of *Clostridium difficile* component useful?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Was the reference section of this document easy to use to obtain additional information?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are there other areas in the Antibiotic stewardship and Treatment of *Clostridium difficile* component of the toolkit that you would like to see addressed?

_____

_____

_____

_____

Staff Education on Clostridium difficile

The education component of the toolkit includes developed training slide sets created specifically for clinical and non-clinical healthcare providers on Clostridium difficile infections. Each slide set is accompanied by a post-test to evaluate the information gathered from the presentations. Along with the education component, the subcommittee developed a C.difficile poster to be displayed within healthcare facilities.

Is the Q & A format of the presentation slides easy to use?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are the presentation slide sets that were developed for healthcare providers comprehensive and include all related topics?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are the post test questions a sufficient measure of the knowledge gained after the Q & A for healthcare providers?

- ☐ Yes
- ☐ No
- ☐ Do not know

Clostridium difficile Pamphlet

This pamphlet on Clostridium difficile was developed to provide information to the general public on Clostridium difficile, how to manage Clostridium difficile and to avoid spread of Clostridium difficile to others.

Clostridium *difficile* pamphlet: GeneralPrinting, ProfessionalPrinting

Was the *Clostridium difficile* Public Education Pamphlet appropriately written for patients?

- ☐ Yes
- ☐ No

Was the pamphlet easy to format into booklet form and print?

- ☐ Yes
- ☐ No

The content of the *Clostridium difficile* pamphlet:

- ☐ Had too much information
- ☐ Was lacking in some areas
- ☐ Was difficult to understand
- ☐ Was just right

How will you distribute the pamphlets?

- ☐ Pamphlet form
- ☐ E-mail link to website
- ☐ Other (please specify)

Does your facility have the capability to print these pamphlets?

- ☐ Yes
- ☐ No

Does your facility have the funding to print these pamphlets?

- ☐ Yes
- ☐ No
- ☐ Do not know
- ☐ Not applicable

Are there other areas in the *Clostridium difficile* pamphlet that you would like to see addressed?

_____

_____

_____

_____

_____

_____

_____

_____

General

What specifically can be done to make the toolkit more user-friendly?

Suggestions for future toolkits:

Please fax, e-mail or send your completed evaluation to:

Arizona Department of Health Services HAI Program
150 N. 18th Ave., Suite 140
Phoenix, AZ 85007
Office phone: 602-364-4561
Fax: 602-364-3199
Or scan and e-mail to: HAIProgram@AZDHS.Gov