

# *Clostridioides difficile* Infection Prevention

Last Updated 1/2019

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Healthcare-Associated Infections Program  
Center for Health Care Quality  
California Department of Public Health



# Objectives

- Describe the cause and epidemiology of *Clostridioides difficile* infection (CDI)
- Review evidence-based CDI prevention strategies
- Describe importance of adherence monitoring and feedback

## *Clostridioides difficile*

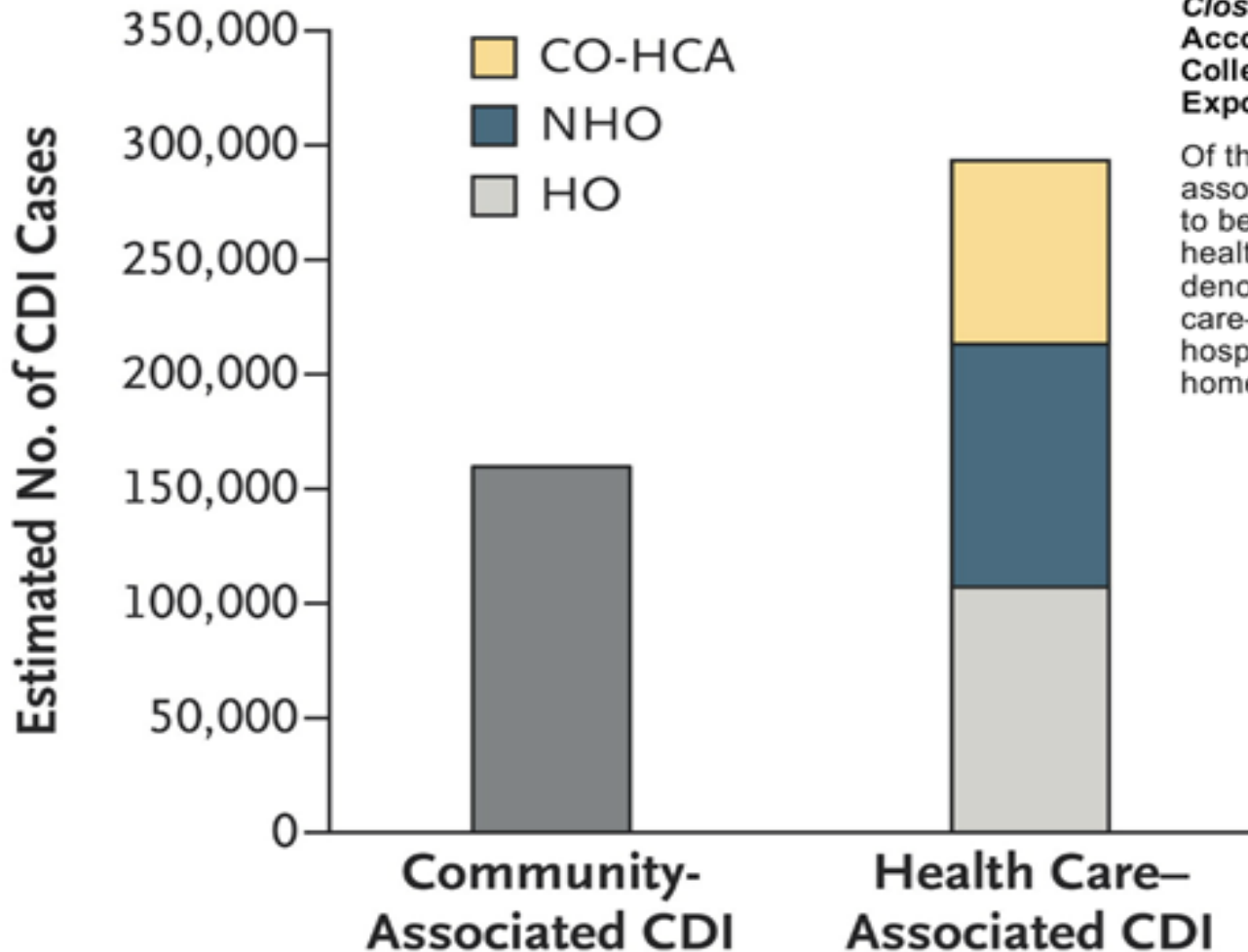
- An anaerobic, gram-positive, spore-forming, toxin-producing bacillus
- Transmitted among humans via the fecal-oral route
- The cause of *Clostridioides difficile* infection (CDI); severity ranges from mild diarrhea to severe intestinal infection (colitis); death in up to 9% of cases
- The leading cause of antibiotic-associated colitis in adults, in both acute and long-term care settings

Leffler and Lamont. New Engl J Med ;372:1539-48, 2015

Lessa, et al. New Engl J Med ;372:825-34, 2015

Laffan, et al. J Am Geriatr Soc ;54(7):1068-73, 2006

## U.S. CDI Burden



**Figure 1. Estimated U.S. Burden of *Clostridium difficile* Infection (CDI), According to the Location of Stool Collection and Inpatient Health Care Exposure, 2011.**

Of the estimated cases of community-associated CDI, 82% were estimated to be associated with outpatient health care exposure.<sup>11</sup> CO-HCA denotes community-onset health care-associated infection, HO hospital onset, and NHO nursing home onset.

# Healthcare-Associated CDI in California

- *C.difficile* is the most frequently reported HAI by California hospitals
  - 7,783 hospital-onset CDI reported in 2017
- Patients often cycle between multiple hospitals, long term acute care, and long term care facilities
  - 26% of CDI patients in Orange County were readmitted to another facility within 12 weeks of discharge

## 2020 CDI Prevention Goal for Hospitals

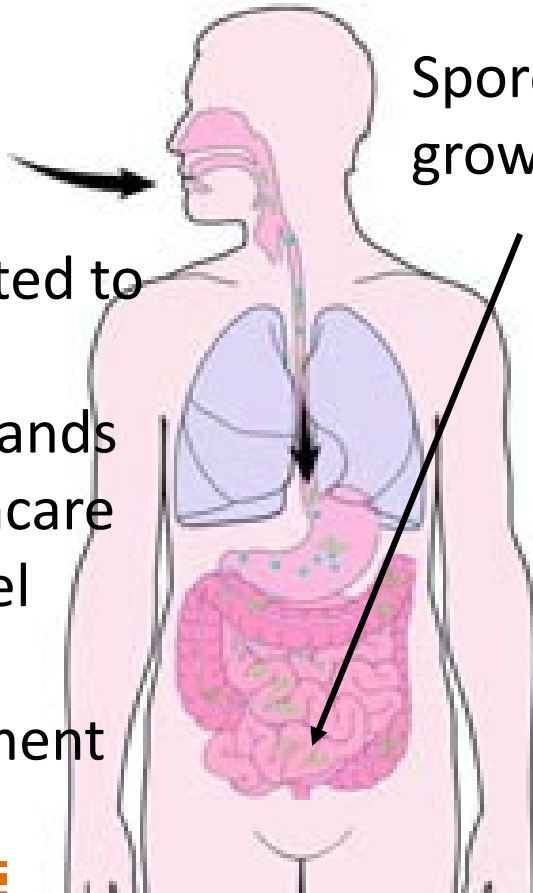
- National HAI Prevention Action Plan target goal:
  - 30% CDI reduction from 2015 baseline
    - 2017: California hospitals are on track - 26% decrease in CDI from 2015
  - Recommended by the CDPH HAI Advisory Committee for all California hospitals

## *C. difficile* Pathogenesis

The following events may take place separately and in any order, but both are required for CDI to occur.

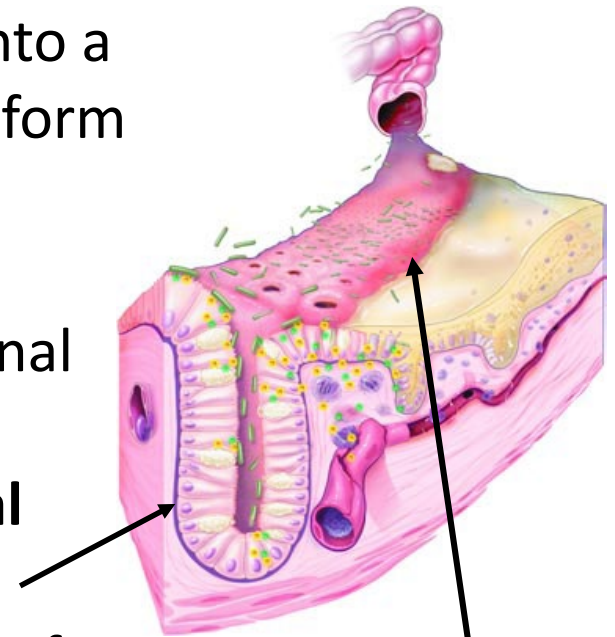
**Ingest *C. difficile* spores**

transmitted to patients via the hands of healthcare personnel and environment



Spores germinate into a growing vegetative form

Changes in lower intestinal flora due to **antimicrobial use** allows proliferation of *C. difficile* in colon



Toxin A & B production leads to colon damage

## Two Preventable Events in CDI

The following events may occur separately and in any order, but **both are required for infection to occur:**

1. The normal **intestinal flora must be compromised** (for example, due to antibiotics) allowing for *C.difficile* to establish itself and proliferate
2. **C.difficile bacteria or spores must be ingested**



## Risk Factors for CDI

- Acquisition of *C. difficile* bacteria (*Modifiable risk factor*)
- Antimicrobial exposure (*Modifiable risk factor*)
- Advanced age
- Immunosuppression
- Tube feedings
- Gastric acid suppression
- Prolonged stay in healthcare facility
- Inflammatory bowel disease
- GI surgery

## CDI Diagnosis

- Presence of symptoms, usually diarrhea
  - $\geq 3$  unformed stools over 24 hours (specifically, stool conforms to shape of container)
- Positive stool test for *C. difficile* or toxins
- Diagnostic imaging
  - Endoscopic or histologic (for example, pseudomembranous disease)
- CDI relapse occurs in 10-25% cases

Cohen, S., Clostridium difficile Infection: Current Challenges and Controversies, 2008

## CDI Testing Methods

- Only test patients with clinically significant diarrhea without other identified causes
  - Consider alternate etiologies for diarrhea
  - Discontinue laxatives for 24-48 hours and reevaluate prior to testing
- Use laboratory-based system for **immediate notification** of positive CDI test results
- Single stool specimen at onset of symptoms is sufficient
- Repeat testing is of limited value; “test of cure” is not recommended

# IDSA Clinical Practice Guidelines for CDI Update 2018

*Clinical Infectious Diseases*

**IDSA GUIDELINE**



## Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA)

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A panel of experts was convened by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) to update the 2010 clinical practice guideline on *Clostridium difficile* infection (CDI) in adults. The update, which has incorporated recommendations for children (following the adult recommendations for epidemiology, diagnosis, and treatment), includes significant changes in the management of this infection and reflects the evolving controversy over best methods for diagnosis. *Clostridium difficile* remains the most important cause of healthcare-associated diarrhea and has become the most commonly identified cause of healthcare-associated infection in adults in the United States. Moreover, *C. difficile* has established itself as an important community pathogen. Although the prevalence of the epidemic and virulent ribotype 027 strain has declined markedly along with overall CDI rates in parts of Europe, it remains one of the most commonly identified strains in the United States where it causes a sizable minority of CDIs, especially healthcare-associated CDIs. This guideline updates recommendations regarding epidemiology, diagnosis, treatment, infection prevention, and environmental management.

# Test Recommendations Algorithm

Clinicians and lab personnel agree at the institutional level to **not submit stool specimens on patients receiving laxatives** and to submit stool specimens only from patients with unexplained and new onset  $\geq 3$  unformed stools in 24hr for CDI testing

NO

Stool toxin test\* as part of a multiple step algorithm, (GDH plus toxin; GDH plus toxin, arbitrated by NAAT; or NAAT plus toxin) rather than a nucleic acid amplification test (NAAT) alone

YES

NAAT alone OR stool toxin test\* as part of a multiple step algorithm( GDH plus toxin; GDH plus toxin arbitrated by NAAT; or NAAT plus toxin), rather than a toxin test alone

\*Approved stool EIA toxin tests vary widely in sensitivity. Lab should choose a toxin test with sensitivity in the upper range of sensitivity as reported in literature.

# Preventing CDI: The MOST Important Things

## *Prevent C. difficile Acquisition / Reduce Antimicrobial Exposure*

- Isolate patients with diarrhea pending CDI confirmation
- Lab alert system** for immediate notification of positive CDI tests
- Contact precautions** for duration of diarrhea plus 48 hours
  - Private room, dedicated toilet
  - Gloves/gown to enter room
  - Remove gloves, perform hand hygiene prior to room exit
- Hand hygiene** before/after patient contact & after glove removal
  - Patient hand hygiene
- Disposable equipment**
- Sporicidal disinfectant** for cleaning reusable equipment
- Sporicidal disinfectant for **terminal** cleaning
- Quality cleaning**, daily & terminal
- CDI-targeted **antimicrobial stewardship program**
  - Improve overall prescribing, stop unnecessary antibiotics
  - Restrict high-risk antibiotics based on local epidemiology
  - Stop inciting antibiotic

## Contact Precautions for CDI

Place on contact precautions for duration of diarrhea

- Extend contact precautions beyond duration of diarrhea (Example: for 48 hours after diarrhea ceases)
- Emphasize **glove use** and removal of gloves prior to exiting room of CDI patient
  - Gloves are effective at preventing *C.difficile* contamination of hands
  - Adherence to glove use is critical to preventing *C.difficile* transmission via hands of health care providers
- Emphasize compliance with **hand hygiene**

## Contact Precautions – Special Approaches

When CDI rates remain high or during an outbreak, **isolate patients with diarrhea pending CDI confirmation**

- Rationale: Patients with CDI may contaminate the environment and hands of health care providers before results of testing are known.
- For patients with possible recurrent CDI, isolate and test following first unformed stool



# Hand Hygiene for CDI

Perform hand hygiene before and after contact with CDI patient **and after removing gloves**

- Routinely use alcohol hand rub **or** soap and water
  - *C. difficile* spores are resistant to alcohol; however, studies did not find increases in CDI with alcohol-based hand hygiene, but several did find reductions in MRSA or VRE
- Use **soap and water** during CDI outbreak, “hyper-endemic setting,” or hand fecal contamination
  - **Be aware:** Hand hygiene adherence may decrease when soap and water is the only option provided

# Hand Hygiene and Gloves – Special Approaches

When CDI rates remain high or during an outbreak, **implement universal glove use** for facilities or units with high CDI rates

- Rationale: *C.difficile* spores are difficult to remove even with hand washing.
- Asymptomatic carriers play a role in transmission (though magnitude of contribution unknown)
- Adherence to glove use with or without contact precautions is critical to preventing *C. difficile* transmission via hands of health care providers

# CDI-Targeted Antimicrobial Stewardship

Implement an **antimicrobial stewardship program (ASP)**

- Goal: Minimize the **frequency** and **duration** of antimicrobials and the **number** of antimicrobials prescribed.
- Target antimicrobials based on local epidemiology
  - Restricting fluoroquinolones, cephalosporin, and clindamycin has been effective
- Reduce use of broad-spectrum antibiotics
  - Enforcing a narrow-spectrum antibiotic policy with feedback to prescribing physician resulted in significant CDI reduction in 3 acute geriatric medical wards

## CDI-Targeted Antimicrobial Stewardship - continued

- Increased risk of CDI has been linked to specific antibiotics

High Risk	Medium Risk	Low Risk
Aminopenicillins	Beta-lactam/beta-lactamase inhibitors	Macrolides
Clindamycin	Carbapenems	Trimethoprim/sulfamethoxazole
Cephalosporins		Tetracyclines
Fluoroquinolones		

Dubberke, et al. Infect Contr Hosp Epidemiol. 2014;35(6):628-645  
 Price, et al. Clin Microbiol Infect. 2010;16(8):1297-302

## Examples of CDI-Targeted ASP Interventions

- Formulary restriction and prospective audit with feedback
  - Target antibiotic(s) most associated with CDI at your facility
  - Recommend lower-risk alternatives, and optimizing dosing, route, and duration of therapy
- Target patients with CDI diagnoses for medication review to identify and discontinue unnecessary antibiotics

# ASP Interventions Reduce Risk of *C.difficile* Transmission

- Improved overall antimicrobial prescribing



- Stopping unnecessary antibiotics in patients with new CDI diagnoses



# California Antimicrobial Stewardship Initiative

- CDPH HAI Program activity
- Objective: Assist California hospitals and long-term care facilities with optimizing antimicrobial use to improve patient outcomes
- CDPH Antimicrobial Stewardship Program Initiative web page:  
[www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CA\\_AntimicrobialStewardshipProgramInitiative.aspx](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CA_AntimicrobialStewardshipProgramInitiative.aspx)

# Environmental Cleaning and Disinfection

- Patients with CDI can shed bacteria and spores into the environment both during *and after* treatment of CDI
- Ensure thorough daily and terminal cleaning of patient care areas
  - Focus on **high-touch** surfaces and the bathroom
- **Assess adequacy of cleaning**
  - Study in 3 hospitals used fluorescence to assess cleaning
  - Only 47% of high-touch surfaces cleaned



# Equipment

- Identify and **remove unnecessary** equipment that can be environmental sources of *C.difficile* transmission
  - Use **disposable** equipment when possible
  - Ensure **reusable equipment** is cleaned with a **sporicidal disinfectant**

# Environmental Cleaning and Disinfection- Special Approaches

When CDI rates remain high or during an outbreak, use a **sporicidal disinfectant** for daily and terminal cleaning (for example, bleach), in conjunction with other measures

- Limited data suggest cleaning with bleach (1:10 dilution prepared fresh daily) reduces *C. difficile* transmission
- Two before-after studies showed benefit on units with high endemic CDI rates
- Sporicidal disinfectants may be most effective in reducing burden where CDI rates high

# CDI in the Hospital Environment

## *C. difficile* Transmission from Prior Room Occupants



Shaugnessey et al. Abstract K-4194  
IDSA / ICAAC. October 2008

# Infection Prevention Role in CDI Prevention

- Ensure policies reflect current evidence-based practice recommendations
- Ensure staff competency upon hire and at least annually (Examples: new hire orientation, annual skills fair, return demonstration to ensure competency)
- Establish an **adherence monitoring program** for core care practices
  - Use available adherence monitoring tools
  - Ensure feedback provided to frontline staff
- Present adherence results and CDI incidence to leaders

# Adherence Monitoring Tool - Hand Hygiene



## Healthcare-Associated Infections Program Adherence Monitoring Hand Hygiene

Assessment completed by:  
Date:  
Unit:

Regular monitoring with feedback of results to staff can improve hand hygiene adherence. Use this tool to identify gaps and opportunities for improvement. Monitoring may be performed in any type of patient care location.

**Instructions:** Observe at least 10 hand hygiene (HH) opportunities per unit. Observe a staff member and record his/her discipline. Check the type of hand hygiene opportunity you are observing. Indicate if HH was performed. Record the total number of successful HH opportunities and calculate adherence.

HH Opportunity	Discipline	What type of HH opportunity was observed? (select/ <input checked="" type="checkbox"/> 1 per line)	Was HH performed for opportunity observed? ✓ or ∅
<i>Example</i>	N	<input type="checkbox"/> before care/entering room* <input type="checkbox"/> before task <input type="checkbox"/> after body fluids <input type="checkbox"/> after care* <input checked="" type="checkbox"/> upon leaving room *Remember: Hand hygiene should be performed before <u>and</u> after glove use	✓
HH1.		<input type="checkbox"/> before care/entering room <input type="checkbox"/> before task <input type="checkbox"/> after body fluids <input type="checkbox"/> after care <input type="checkbox"/> upon leaving room	
HH2.		<input type="checkbox"/> before care/entering room <input type="checkbox"/> before task <input type="checkbox"/> after body fluids <input type="checkbox"/> after care <input type="checkbox"/> upon leaving room	
HH3.		<input type="checkbox"/> before care/entering room <input type="checkbox"/> before task <input type="checkbox"/> after body fluids <input type="checkbox"/> after care <input type="checkbox"/> upon leaving room	
HH4.		<input type="checkbox"/> before care/entering room <input type="checkbox"/> before task <input type="checkbox"/> after body fluids <input type="checkbox"/> after care <input type="checkbox"/> upon leaving room	

<b>Disciplines:</b> CNA = Nurse Assistant D = Dietary N = Nurse	P = Physician RT = Respiratory Therapist S = Student VIS = Visitor	VOL = Volunteer W = Social Worker OTH = Other, Specify U = Unknown	<b>Opportunities:</b> ✓ = Opportunity Successful ∅ = Opportunity Missed
<b>For HH1-HH10:</b>			
Total # HH Successful ("# ✓"): _____		Total # HH Opportunities Observed: _____	
		Adherence: _____%	
(Total # HH Successful ÷ Total HH Opportunities Observed x 100)			

# Adherence Monitoring Tool – Contact Precautions

Regular monitoring with feedback of results to staff can maintain or improve adherence to contact precautions practices. Use this tool to identify gaps and opportunities for improvement. Monitoring may be performed in any type of patient care location where patients are on contact precautions.

**Instructions:** Observe 3-4 patients/residents on contact precautions. Observe each practice and check a box if adherent, Yes or No. In the column on the right, record the total number of “Yes” for adherent practices observed and the total number of observations (“Yes” + “No”). Calculate adherence percentage in the last row.

Contact Precautions Practices		Contact Precautions Patient/Resident 1	Contact Precautions Patient/Resident 2	Contact Precautions Patient/Resident 3	Contact Precautions Patient/Resident 4		
						# Yes	# Observed
CP1.	Gloves and gowns are available and located near point of use.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP2.	Signs indicating the patient/resident is on contact precautions are clear and visible.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP3.	The patient/resident on contact precautions is housed in single-room or cohorted based on a clinical risk assessment.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP4.	Hand hygiene is performed before entering the patient/resident care environment.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP5.	Gloves and gowns are donned before entering the patient/resident care environment.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP6.	Gloves and gowns are removed and discarded, <b>and</b> hand hygiene is performed before leaving the patient/resident care environment. <i>Soap &amp; water is used if it is hospital policy or if the patient/resident has C.difficile infection.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
CP7.	Dedicated or disposable noncritical patient-care equipment (e.g. blood pressure cuffs) is used; if dedicated/disposable equipment is unavailable, then equipment is cleaned and disinfected prior to use on another patient/resident according to manufacturers' instructions.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		

# of Correct Practices Observed (“# Yes”): \_\_\_\_\_

Total # Contact Precautions Observations (“# Observed”): \_\_\_\_\_

Adherence \_\_\_\_\_%

(Up to 28 total)

(Total “# Yes” ÷ Total “# Observed” x 100)

*if practice could not be observed (i.e. cell is blank), do not count in total # Observed.*

# Adherence Monitoring Tool – Environmental Cleaning and Disinfection

Regular monitoring with feedback of results to staff can maintain or improve adherence to environmental cleaning practices. Use this tool to identify gaps and opportunities for improvement. Monitoring may be performed in any type of patient care location.

**Instructions:** Observe at least two different environmental services (EVS) staff members. Observe each practice and check a box if adherent, Yes or No. In the column on the right, record the total number of “Yes” for adherent practices observed and the total number of observations (“Yes” + “No”). Calculate adherence percentage in the last row.

Environmental Cleaning Practices		EVS Staff 1	EVS Staff 2	EVS Staff 3	Adherence by Task	
					# Yes	# Observed
ES1.	The room is clean, dust free, and uncluttered.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
ES2.	Detergent/disinfectant solution is mixed and stored according to manufacturer’s instructions.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
ES3.	Solution remains in wet contact with surfaces according to manufacturer’s instructions.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
ES4.	Cleaning process avoids contamination of solutions and cleaning tools; a clean cloth is used in each patient area, and the cloth is changed when visibly soiled.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
ES5.	Environmental Services staff use appropriate personal protective equipment (e.g. Gowns and gloves are used for patients/residents on contact precautions upon entry to the contact precautions room.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
ES6.	High-touch surfaces* are thoroughly cleaned and disinfected after each patient.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		

\*Some examples of high touch surfaces:

Bed rails	Chair	Room inner door knob/handle	PPE container(s)	Toilet bedpan cleaner
Tray table	Room sink	Bathroom door knob/handle	Bathroom sink	In-room medical carts
IV pole (“grab area”)	Room light switch	Bathroom light switch	Toilet seat	In-room cabinets
Call button	TV remote	Bathroom handrails	Toilet flush handle	In-room computers/keyboards
Bedside table handle				

# of Correct Practice Observed (“# Yes”): \_\_\_\_\_

Total # Environmental Services Observations (“# Observed”): \_\_\_\_\_

(Up to 15 Total)

Adherence \_\_\_\_\_%

(Total “# Yes” ÷ Total “# Observed” x 100)

If practice could not be observed (i.e. cell is blank), do not count in total # Observed.

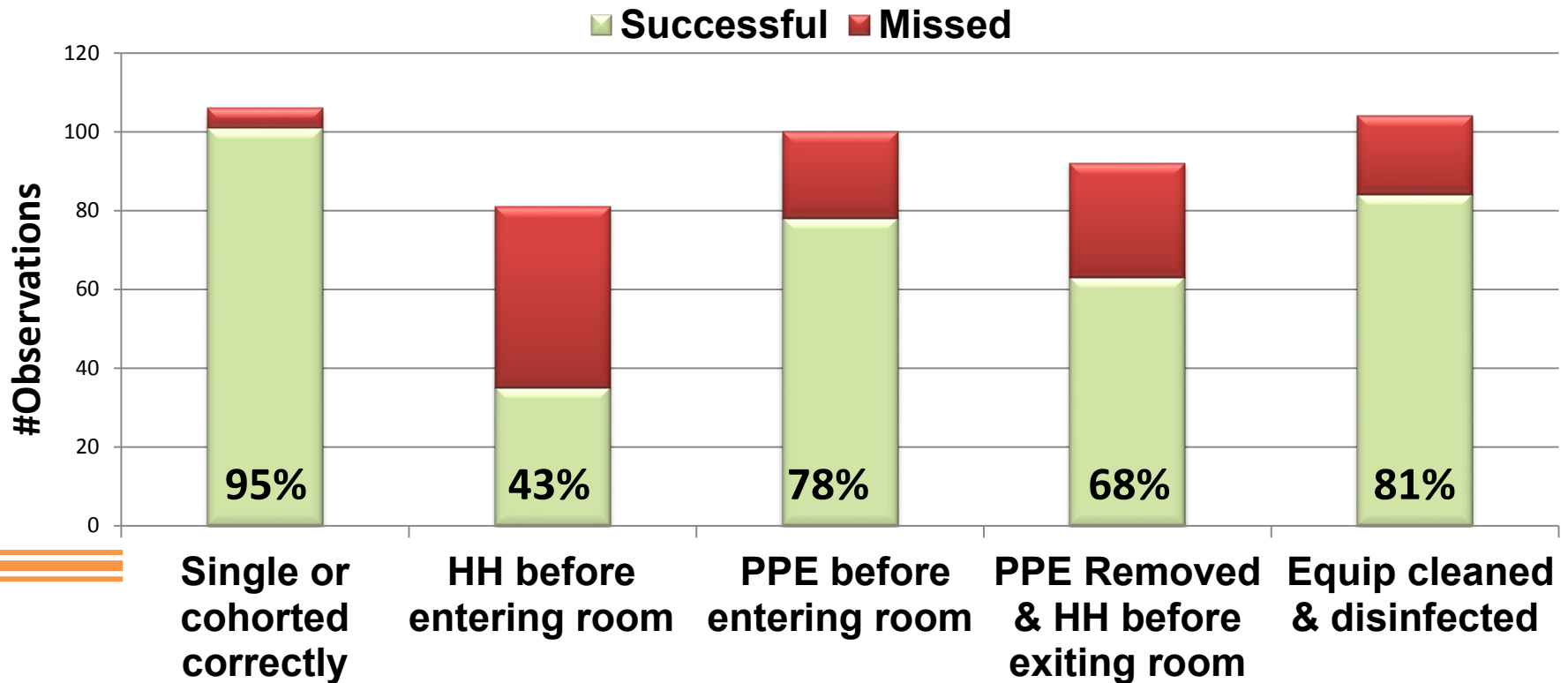
# Provide Feedback on Adherence Monitoring

- Share adherence monitoring results and CDI incidence with unit staff
- Present results to managers and leadership
  - Use data to focus prevention efforts
  - Use data to get needed resources



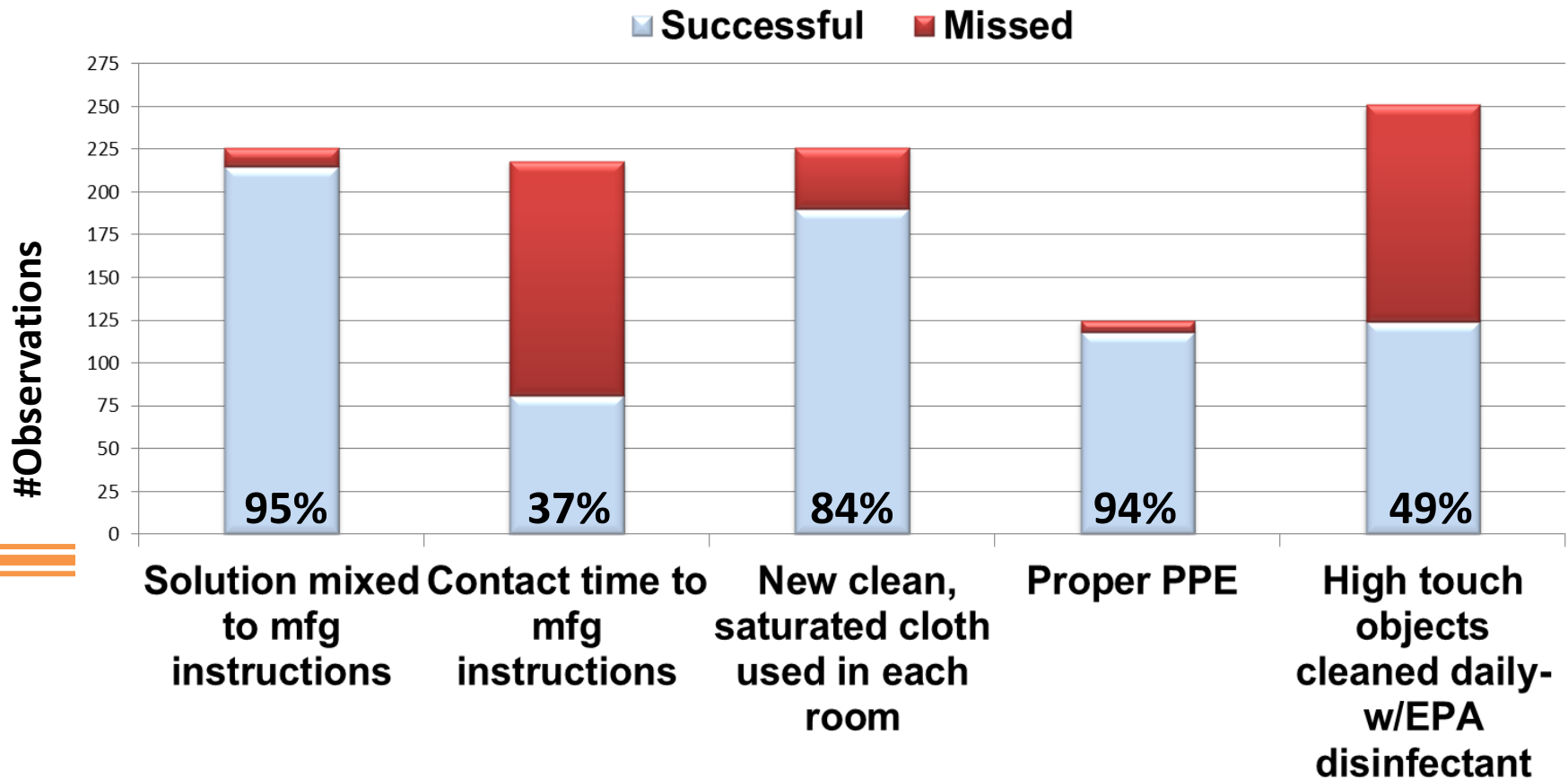
# Feedback Report Sample

## CDPH Contact Precautions Observations, 131 Facilities, 2016



# Feedback Report Sample

## CDPH Environmental Cleaning Observations, 131 Facilities, 2016



# Preventing CDI: The MOST Important Things

## *Prevent C. difficile Acquisition / Reduce Antimicrobial Exposure*

- Isolate patients with diarrhea pending CDI confirmation
- Lab alert system** for immediate notification of positive CDI tests
- Contact precautions** for duration of diarrhea plus 48 hours
  - Private room, dedicated toilet
  - Gloves/gown to enter room
  - Remove gloves, perform hand hygiene prior to room exit
- Hand hygiene** before/after patient contact & after glove removal
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- Disposable equipment**
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- CDI-targeted **antimicrobial stewardship program**
  - Improve overall prescribing, stop unnecessary antibiotics
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# Resources

- McDonald, LC et al. Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA). *Clin Infect Dis*. 2018;7(19):1-48
- Stone ND, Ashraf MS, Calder J et al. CDC/SHEA Surveillance Definitions for Infections in Long-term Care Facilities: Revisiting the McGeer Criteria, 2012. [www.jstor.org/stable/10.1086/667743](http://www.jstor.org/stable/10.1086/667743)
- SHEA/IDSA Compendium of Recommendations. *Infect Control Hosp Epidemiol*, 35:628-644, 2014  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4223864/>

# Questions?

For more information,  
please contact any  
HAI Liaison IP Team member  
or email  
[HAIProgram@cdph.ca.gov](mailto:HAIProgram@cdph.ca.gov)