Clostridium difficile Infection Prevention

Last Updated 5/2018

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

Objectives

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

Clostridium difficile

- An anaerobic, gram-positive, spore-forming, toxin-producing bacillus
- Transmitted among humans via the fecal-oral route
- The cause of *Clostridium 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

Clostridium difficile Infection (CDI)

- *C.difficile* is not part of the normal gastrointestinal flora
  - 2-7% of healthy adult population colonized with *C.difficile*
- CDI is the most common healthcare-associated infection (HAI)

Cohen et al. Infect Contr Hosp Epidemiol; 31(5):431-55, 2010
Gladys et al. J Clin Microbiol ;52(7):2406-9, 2014
Magill et al N Engl J Med; 370:1198, 2014

U.S. CDI Burden

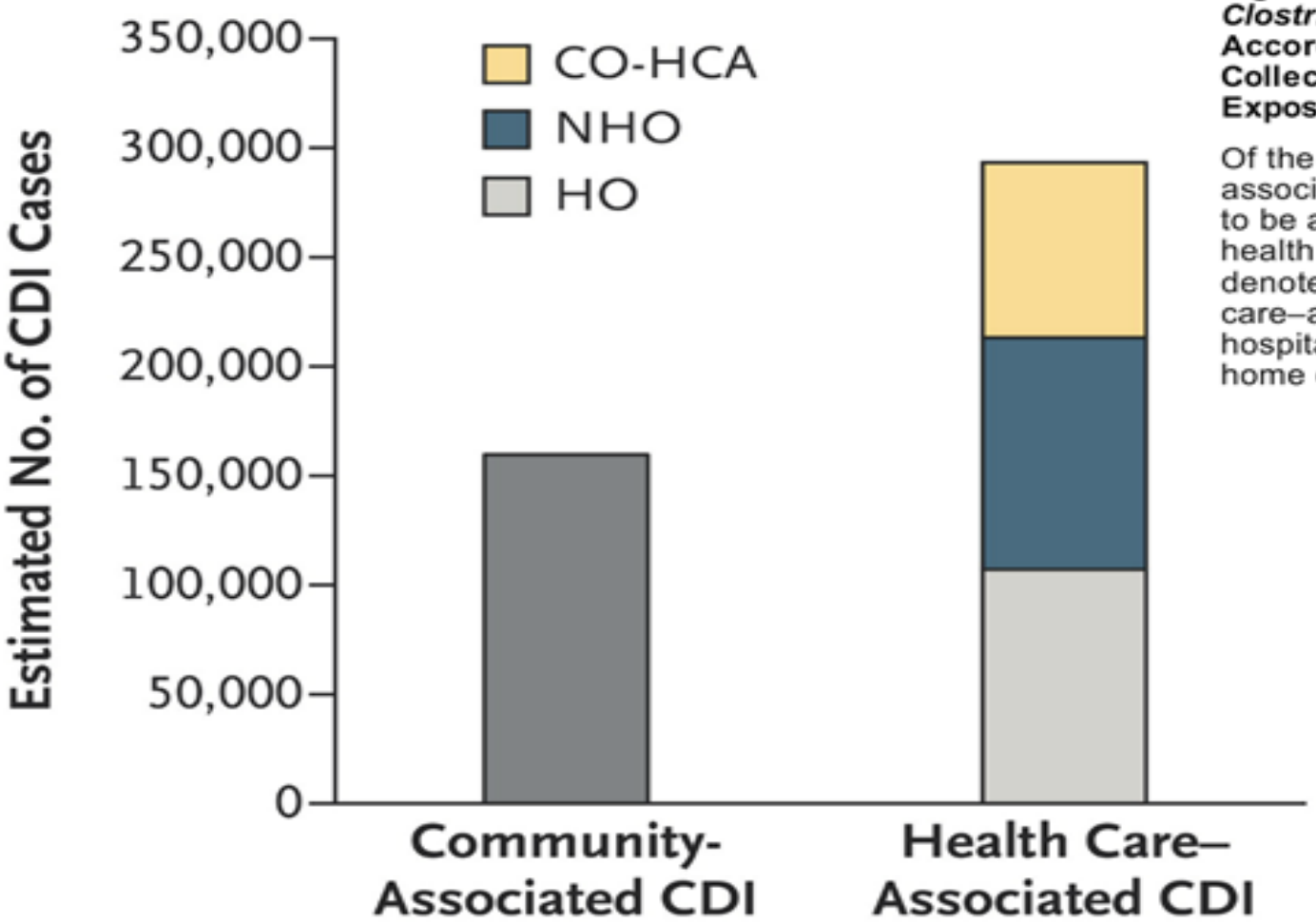

Figure 1. Estimated U.S. Burden of *Clostridium difficile* Infection (CDI), According to the Location of Stool Collection and Inpatient Health Care Exposure, 2011.

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

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

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Healthcare-Associated CDI in California

- *C.difficile* is the most frequently reported HAI by California hospitals
  - 10,279 hospital-onset CDI reported in 2016
- 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

Huang et al., Infect Control Hosp Epidemiol, 31(11), 1160-1169, 2010

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** (e.g., due to antibiotics) allowing for *C.difficile* to establish itself and proliferate

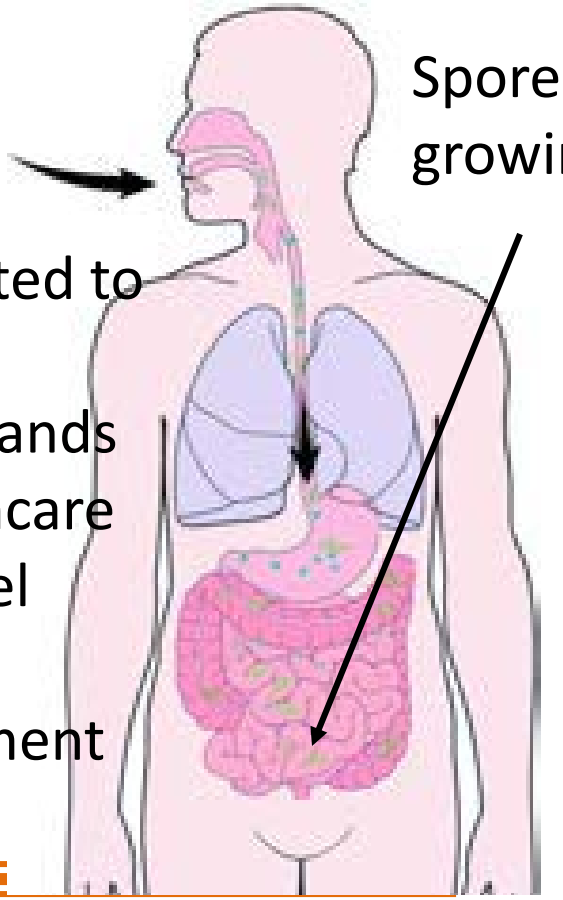
2. ***C.difficile* bacteria or spores must be ingested**

Sunenshine et al. Cleve Clin J Med;73:187-97, 2006

Clostridium difficile Pathogenesis

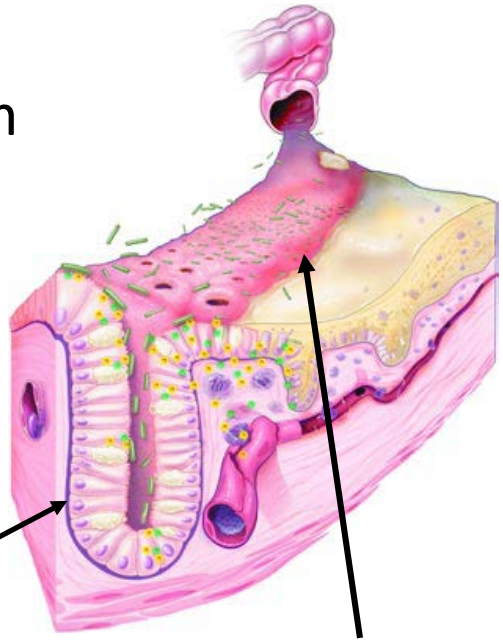
The following events may take place separately and in any order, but both are required for CDI to occur.

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

Sunenshine et al. Cleve Clin J Med. 2006;73:187-97

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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
  - ≥3 unformed stools over 24 hours (i.e., conforms to shape of container)
- Positive stool test for *C. difficile* or toxins
- Diagnostic imaging
  - Endoscopic or histologic (e.g., 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

2020 CDI Prevention Goal for Hospitals

- National HAI Prevention Action Plan target goal:
  - 30% CDI reduction from 2015 baseline
  - Recommended by the CDPH HAI Advisory Committee for all California hospitals

Preventing CDI: The MOST Important Things

Prevent C. difficile Acquisition /

- ❑ 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

Reduce Antimicrobial Exposure

- ❑ **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 (e.g., 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 increase 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 fecal hand contamination
  - **Be aware**: Hand hygiene adherence may decrease when soap and water is 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**

- 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 found most useful (may be used for surgical prophylaxis)
- 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

Fowler et al. J Antimicrob Chemother 2007;59:990-5.

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

Fowler et al. J Antimicrob Chemother 2007;59:990-5.

ASP Interventions Reduce Risk of *C.difficile* Transmission

- Improved overall antimicrobial prescribing

Fewer patients on antimicrobials → **Fewer patients develop CDI** → **Fewer CDI patients contribute to transmission**

- Stopping unnecessary antibiotics in patients with new CDI diagnoses

Improved clinical response to treatment and reduced risk of recurrent CDI → **Fewer CDI patients contribute to transmission**

Dubberke, et al. Infect Contr Hosp Epidemiol. 2014;35(6):628-645

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

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% 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**

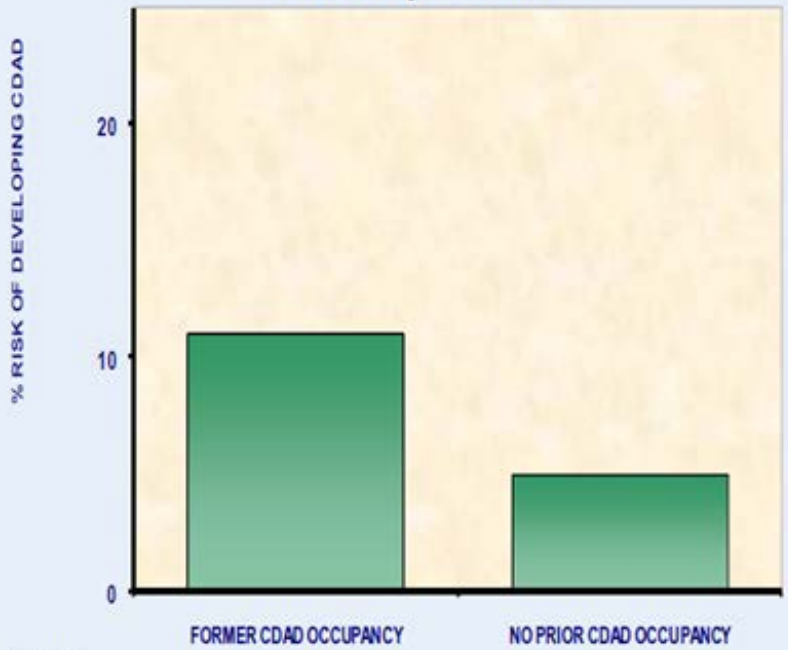
Environmental Cleaning and Disinfection-Special Approaches

When CDI rates remain high or during an outbreak, use a **sporicidal disinfectant** for daily and terminal cleaning (e.g., 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



110% Increased risk

Shaugnessey etal. Abstract K-4194
IDSA / ICAAC. October 2008

SHEA
The Society for Healthcare Epidemiology of America

August 2, 2011

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Infection Prevention Role in CDI Prevention

- Ensure policies reflect current evidence-based practice recommendations
- Ensure staff competency upon hire and at least annually (e.g., new hire orientation, annual skills fair, return demonstration to ensure competency)
- Establish **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

Discip line	What type of HH opportunity was observed? (select/ ☑ 1 per line) *__Remember__: Hand hygiene should be performed before and after glove use	✔ Successful Ø Missed
N	☐ entering room* ☐ before task ☐ after body fluids ☐ after care* ☑ leaving room	✔
	☐ entering room* ☐ before task ☐ after body fluids ☐ after care* ☐ leaving room	
	☐ entering room* ☐ before task ☐ after body fluids ☐ after care* ☐ leaving room	
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	☐ entering room* ☐ before task ☐ after body fluids ☐ after care* ☐ leaving room	

Total # HH Successful ("# ✔ "): _____	Total # HH Opportunities Observed: _____	Adherence: _____% (Total # HH Successful ÷Total # HH Opportunities Observed x 100)

CDPH Adherence Monitoring tools: http://www.cdph.ca.gov/HAI

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Adherence Monitoring Tool – Contact Precautions

Contact Precautions Practices	Pt/Res 1	Pt/Res 2	Adherence by Task	
			#Yes	#Obs
Gloves and gowns are available near point of use.	Yes No	Yes No		
Signs indicating the patient/resident is on contact precautions are clear and visible.	Yes No	Yes No		
The patient/resident housed in single-room or cohorted based on a clinical risk assessment.	Yes No	Yes No		
Hand hygiene is performed before entering the patient/resident care environment.	Yes No	Yes No		
Gloves and gowns are donned before entering the patient/resident care environment.	Yes No	Yes No		
Gloves and gowns are removed and discarded, **and** hand hygiene is performed before leaving the patient/resident care environment. *Soap & water if C. difficile* infection.	Yes No	Yes No		
Dedicated or disposable noncritical patient-care equipment (e.g. blood pressure cuffs) is used	Yes No	Yes No		
Total #Yes____ Total #Observed____ Total #Yes/Total #Observed = % Adherence_____%				

CDPH Adherence Monitoring tools: http://www.cdph.ca.gov/hai

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Adherence Monitoring Tool – Environmental Cleaning and Disinfection

Environmental Cleaning Practices	EVS Staff 1		EVS Staff 2		Adherence by Task	
					# Yes	# Obs
Detergent/disinfectant solution is mixed according to manufacturer's instructions.	Yes	No	Yes	No		
Solution remains in wet contact with surfaces according to manufacturer's instructions.	Yes	No	Yes	No		
A new clean, saturated cloth is used in each room. The cloth is also changed when visibly soiled and after cleaning the bathroom.	Yes	No	Yes	No		
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.*)	Yes	No	Yes	No		
Objects and environmental surfaces in patient care areas that are touched frequently* are cleaned and then disinfected when visibly contaminated or at least daily with an EPA-registered disinfectant.	Yes	No	Yes	No		
# Yes_____ # Observed _____ #Yes/#Observed = % Adherence _____%						

CDPH Adherence Monitoring tools: http://www.cdph.ca.gov/hai

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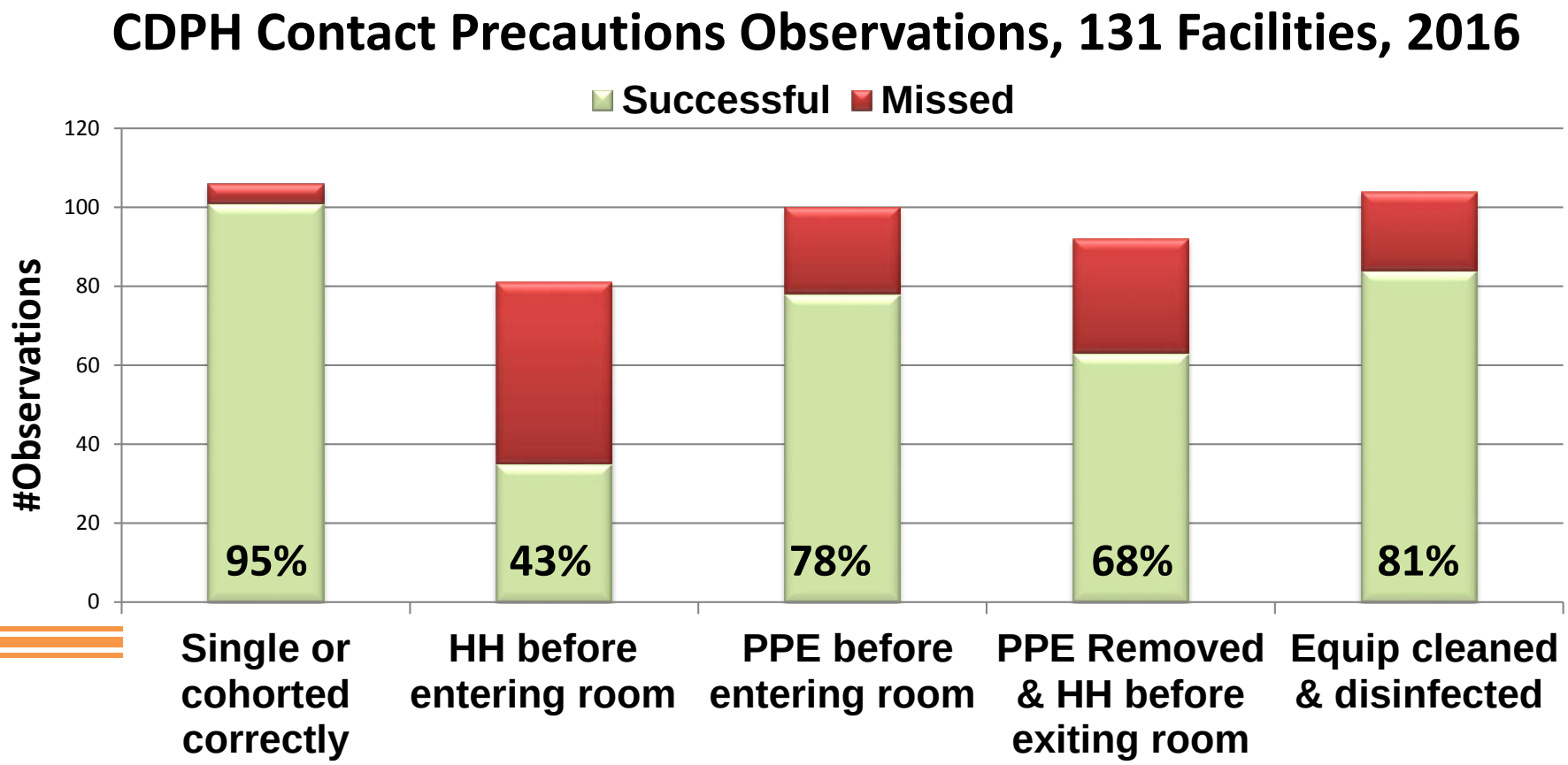
Provide Feedback on Adherence Monitoring

- 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



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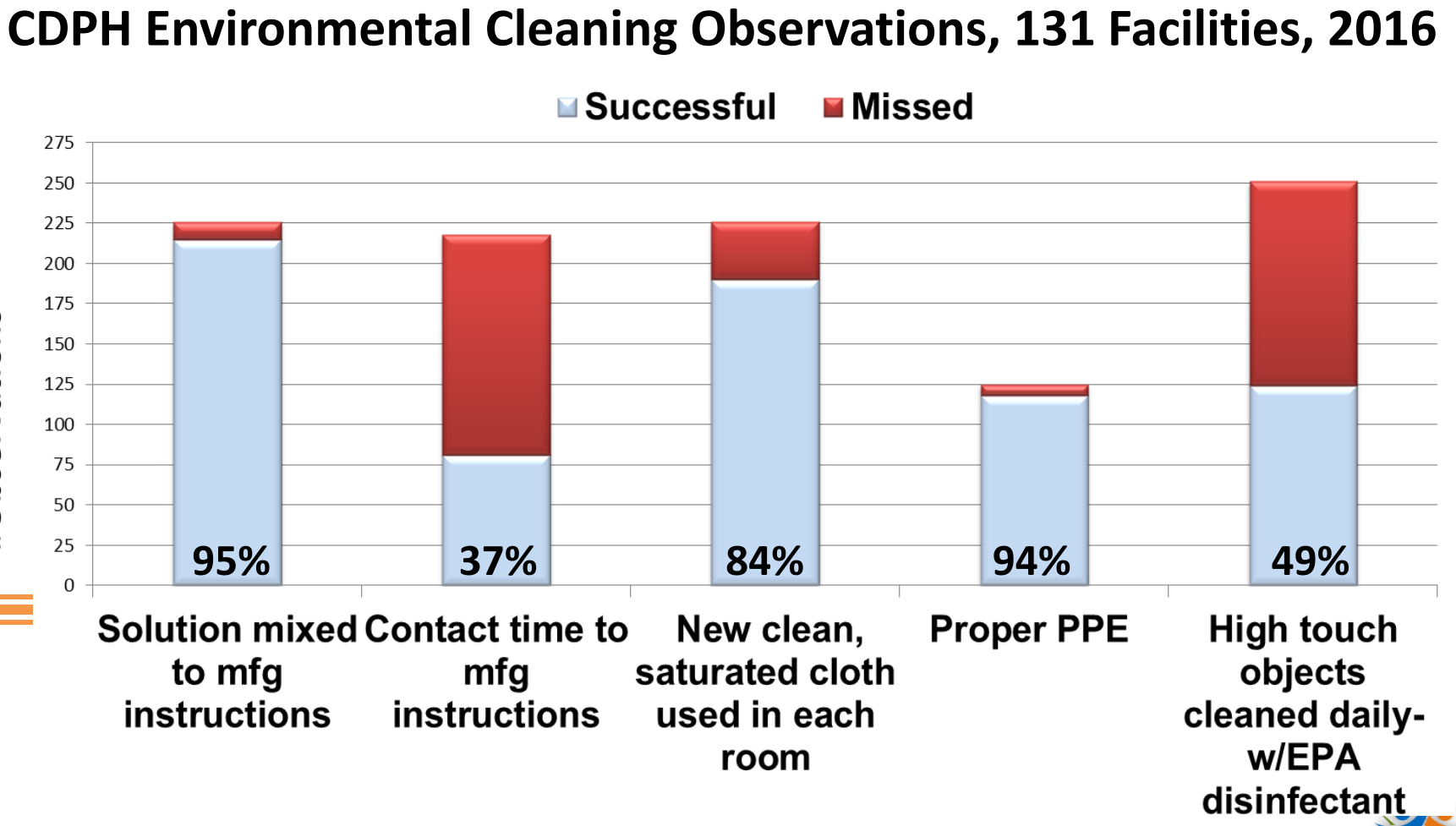

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Resources

- 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
- 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,
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