Optimizing Prevention of Hospital-Onset (HO) *Clostridioides difficile* Infection (CDI)

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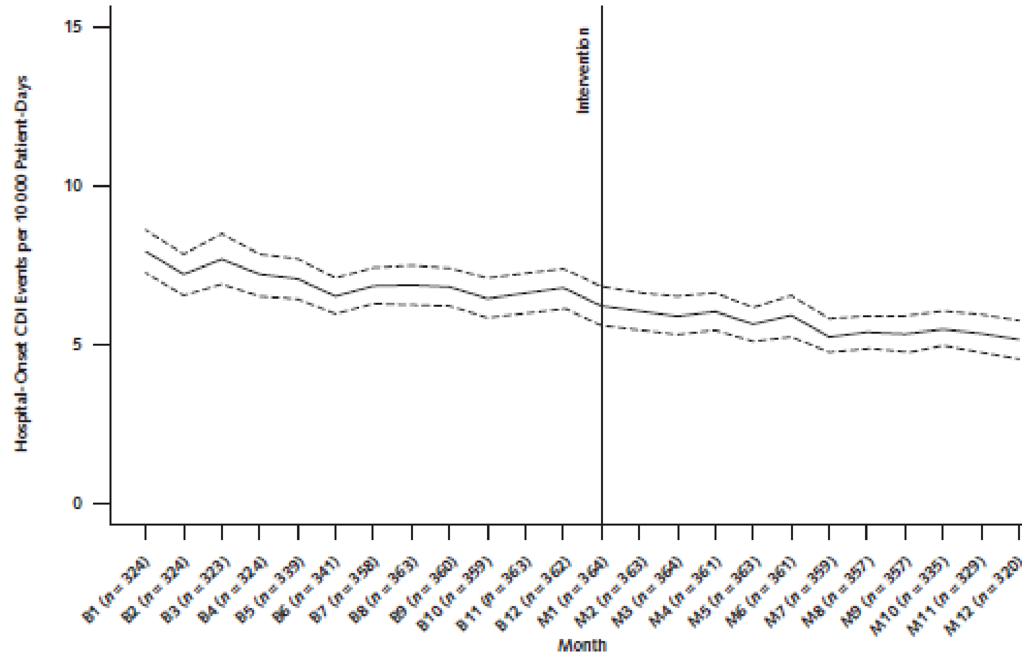
Disclosures

- Consulting: Merck, Rebiotix/Ferring, Pfizer, Seres, Summit
- Research: Rebiotix/Ferring, Pfizer, Synthetic Biologics

Declines in HO-CDI Apparently Unrelated to Interventions

- Interventions based on current recommendations
  - Likely already implemented
- Focus not have been optimized
  - 37.2% assessed gown and glove donning/doffing competency
  - 24.5% provided antibiotic prescribing feedback



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Dubberke. Ann Intern Med. 2019

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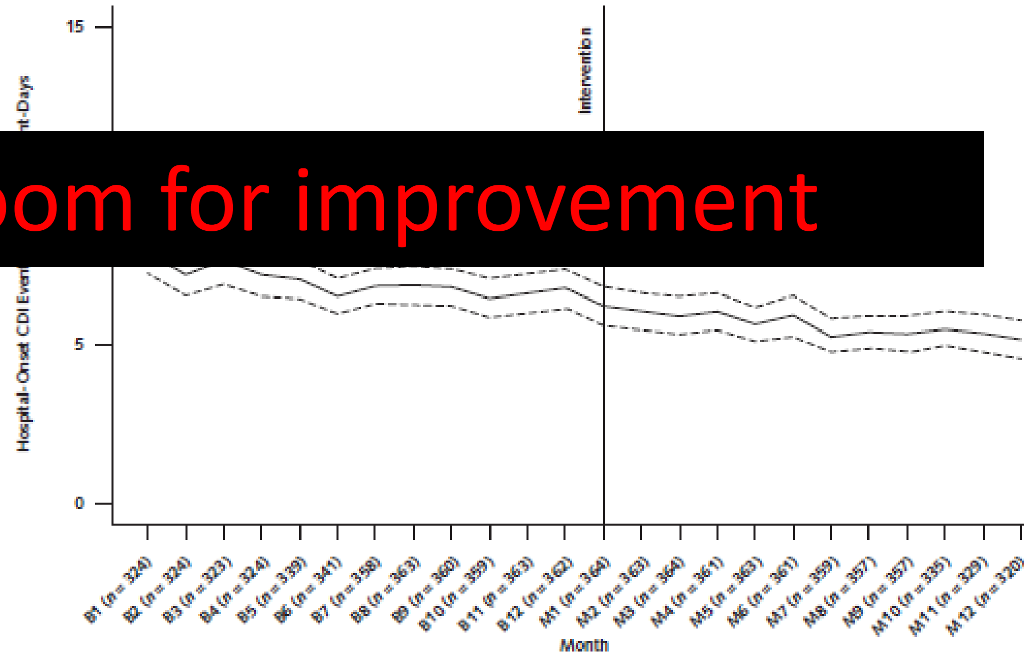
GOOD NEWS: Room for improvement



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Dubberke. Ann Intern Med. 2019

CDI Prevention Today: Two Main Approaches

- Decrease risk of transmission
  - CDI: Contact precautions
    - Gloves/gowns
    - Dedicated patient equipment
  - Environment decontamination
- Decrease risk of CDI if transmission occurs
  - Antimicrobial stewardship

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Dubberke. Strategies to Prevent *Clostridium difficile* Infections in Acute Care Hospitals: 2014 Update. ICHE. 2014

Decreasing Transmission: Two Areas of Perseveration

- Environmental decontamination
- Hand hygiene: Soap and water vs. alcohol

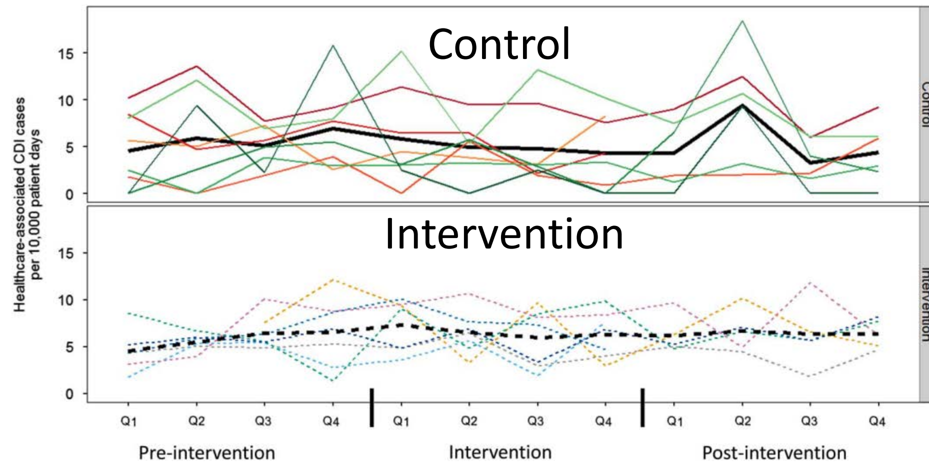
- Focus: CONTACT PRECAUTIONS

Environmental Decontamination to Prevent CDI

- Almost all reports of success in outbreak / high incidence settings
  - Other concurrent interventions
  - Regression to the mean
- Almost no reports of success in endemic settings
  - Most studies indicate <10% of new acquisitions / CDI cases from persistent environmental contamination

This is Why Enhanced Cleaning Does not Reduce CDI in Endemic Settings

- Cluster randomized trial
- Fluorescent marker and feedback to housekeeping
  - Significant improvements in cleaning and reductions in *C. difficile* contamination in intervention hospitals



No impact on CDI incidence

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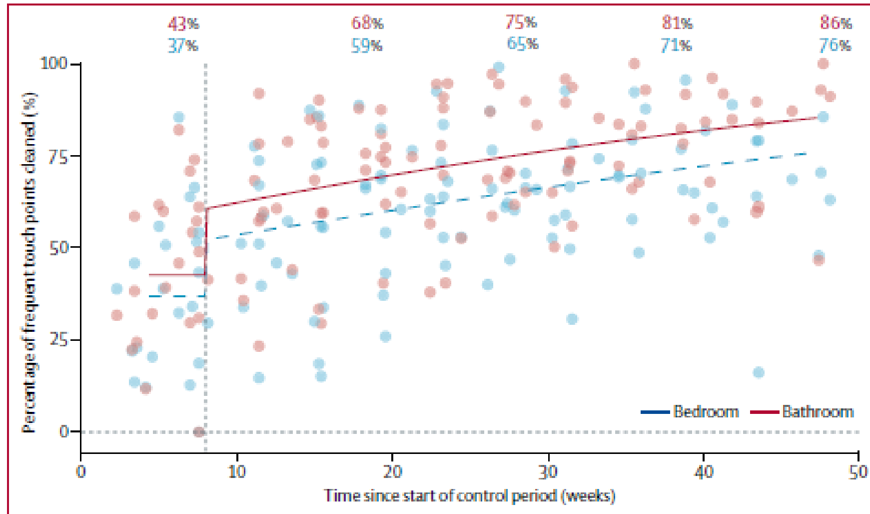
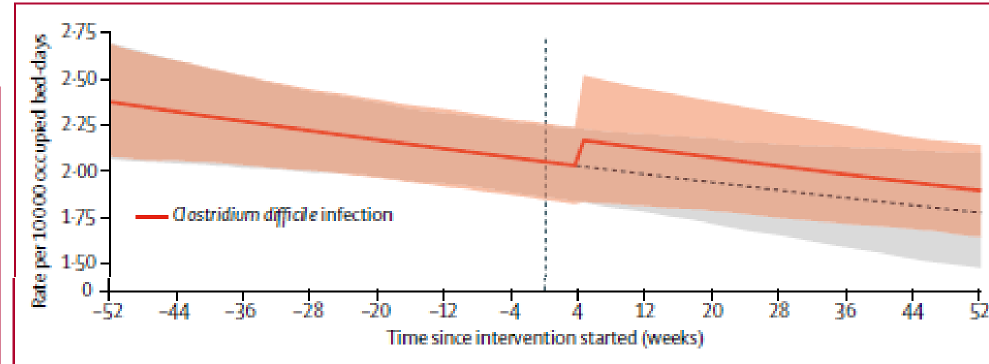
Ray. ICHE. 2017

No Impact Down Under, Either





- Estimated change in CDI incidence linear trend with no intervention:
  - -28.8 (p=0.0193)
- Actual change in CDI incidence linear trend with intervention
  - 7.3 (p=0.4655)

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Mitchell. Lancet ID. 2019

The Answer is Not Automated Terminal Disinfection

	Bleach	Bleach plus UV
Exposed patients	2499	2678
Incident CDI cases (%)	36 (1.4%)	38 (1.4%)
Rate (per 10,000 pt days)	31.6	30.4
Risk reduction	Reference	1.2 (-12.7 to 15.2)
Relative risk	Reference	1.0 (0.57 to 1.75)

Anderson. Lancet. 2017

The Answer is Not Automated Terminal Disinfection

As long as rooms are getting cleaned, more intensive cleaning does not appear to provide much additional benefit for CDI prevention*

*all epi is local

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Anderson. Lancet. 2017

Hand hygiene: Soap and Water versus Alcohol Based Hand Rub (ABHR)

- Alcohol does not kill *C. difficile* spores
- Soap and water washes spores away

But…

…the problem is…

…compliance with soap and water…

…is so poor…

IT IS LIKE DOING NOTHING

Soap and Water ≅ Placebo

- Adherence to hand washing guidance ~40%

TABLE 7. Average duration of handwashing by health-care workers

Ref. no.	Year	Mean/median time
(*392*)	1997	4.7–5.3 seconds
(*303*)	1994	6.6 seconds
(*52*)	1974	8–9.3 seconds
(*85*)	1984	8.6 seconds
(*86*)	1994	<9 seconds
(*87*)	1994	9.5 seconds
(*88*)	1991	<10 seconds
(*294*)	1990	10 seconds
(*89*)	1984	11.6 seconds
(*300*)	1992	12.5 seconds
(*59*)	1988	15.6–24.4 seconds
(*17*)	1998	20.6 seconds
(*279*)	1978	21 seconds
(*293*)	1989	24 seconds

- ~1 log reduction with 15 seconds
- ~2 log reduction with 30 seconds
- ~4 log reduction with alcohol based hand rubs (vegetative cells, not spores)

HICPAC Hand Hygiene Guideline.
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm

CDI Does Not Increase with Alcohol-Based Hand Rubs, But Other HAIs Do

- 8/9 studies have **NOT** found correlation with hand hygiene method and CDI incidence
  - **BUT:** 6/7 did find reductions in other MDRO and/or HAI with ABHR

Gopal Rao. J Hosp Infect. 2020; Gordin. ICHE. 2005; Boyce. ICHE. 2006; Rupp. ICHE. 2008; Vernaz. JAC. 2008; Kaier. ICHE. 2009; Knight. AJIC. 2010; Kirkland BMJ. 2012; Stone. BMJ. 2012; Silva. In J Infect Dis. 2013;

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Be a Champion for Contact Precautions

- McFarland

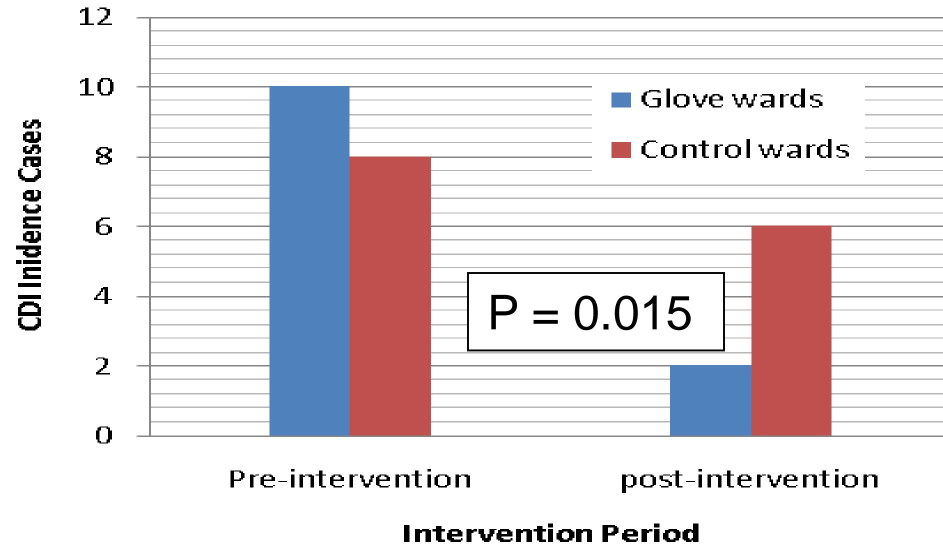
Gloves	Washed Hands	*C. difficile* Recovered from Hands
No	No	44%
No	Yes	65%
Yes	??	0

- Landelle et al
  - 16/66 (24%) HCW with *C. difficile* hand contamination
  - BUT: 7/16 (44%) had at least one contact without gloves
    - Only 30/386 (8%) contacts without gloves

McFarland. NEJM. 1989; Landelle. ICHE. 2014

"High" Strength Recommendation: Wear Gloves When Handling Stool

- Four wards randomized
- Intervention
  - Education: gloves when handling body substances (stool)
  - Gloves placed bedside
- Reduction in CDI on glove wards
  - Also colonization



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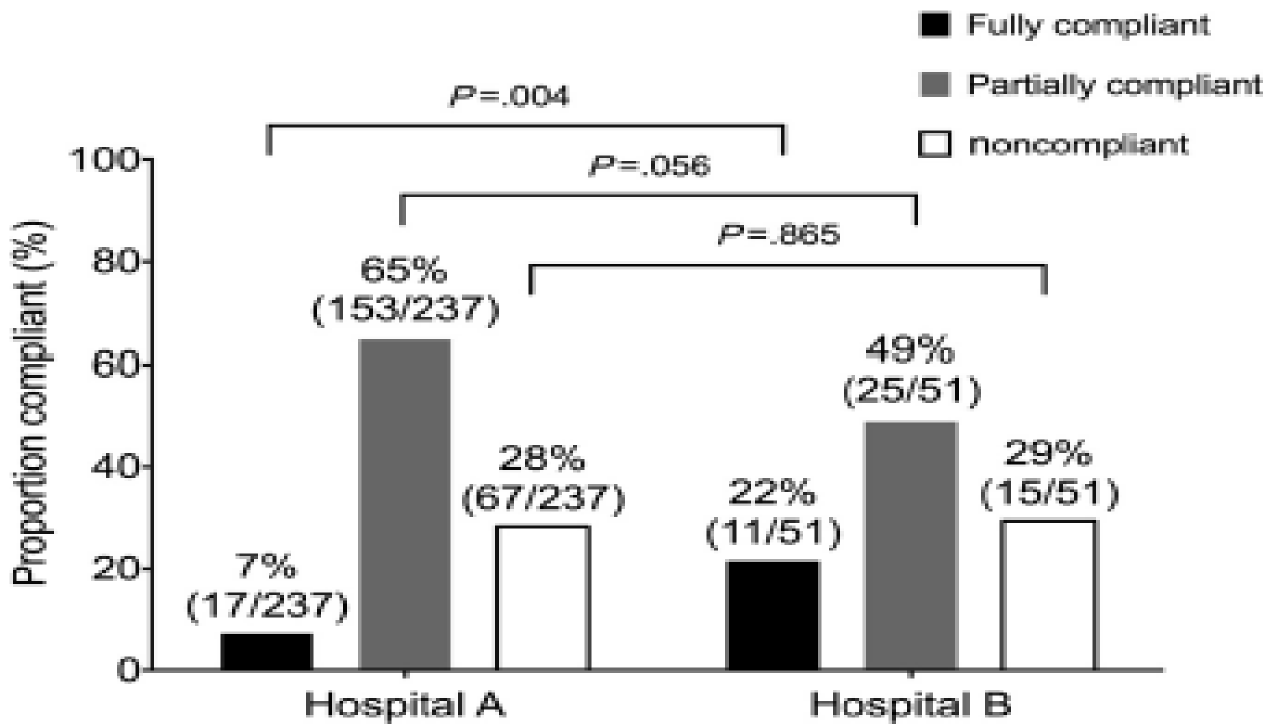
Johnson S, et al. *Am J Med.* 1990;88:137-140.

Room for Improvement: Compliance with Contact Precautions



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Yanke. AJIC. 2015

Removal Technique Important

- Doffing assessment
  - 12/18 (67%) with at least one error
  - 5/18 (28%) with evidence of self contamination
- After patient care
  - 9/54 (17%) with self contamination
  - 5/54 (9%) contaminated outside of patient room

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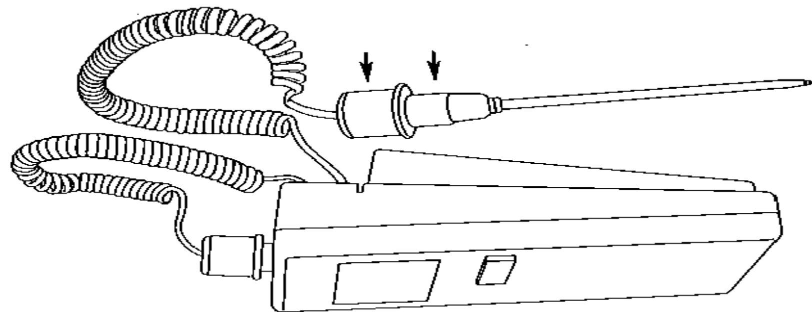
Kwon. ICHE. 2017; Kwon. ICHE. 2020

Dedicated Equipment and/or Adequately Cleaned

- Electronic thermometers
  - Outbreaks
- Blood pressure cuffs
  - Manian: As contaminated as bedside commodes (10% vs. 12%)
  - Walker: 33% contaminated
- Stethoscopes: 5% to 14%



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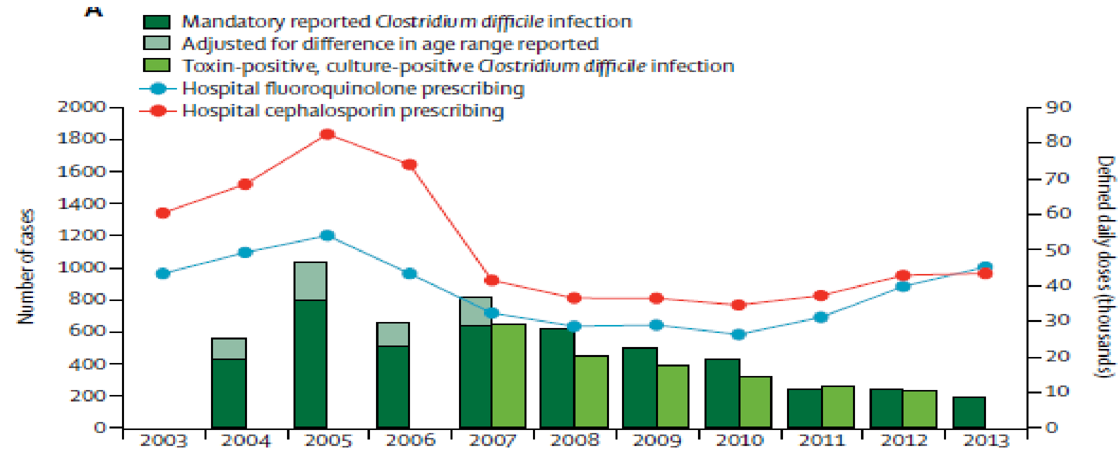
Cohen. ICHE. 2010; Manian. ICHE. 1996; Walker. J Hosp Infect. 2006; Alleyne. J Hosp Infect. 2009; Vajravelu. ICHE. 2012

Shout Out: Antimicrobial Stewardship

- At least 25% of antimicrobials prescribed are not necessary
- Select lower CDI risk antimicrobials
  - If still first line therapy



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Dingle. Lancet. 2017

Conclusions

- Most hospital-onset CDI due to new *C. difficile* acquisition
- Persistent environmental contamination accounts for <10% of new hospital-onset CDI cases
  - Ensure adequate cleaning and know local epidemiology
- Soap and water compliance not adequate
  - Target soap and water use: after contact with items likely contaminated with feces, gloves not worn
  - Still use ABHR
- Stress compliance with contact precautions
  - Proper donning and ***doffing*** technique
  - Use isolation stethoscope

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