Reducing a Facility's *C. difficile* SIR

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Disclosures

- No relevant disclosures

Acknowledgments

- Rob El-Kareh, MD, MPH
- Francesca Torriani, MD

Objectives

- 1) Identify 2 tools that are very useful in reducing your hospital *C. difficile* SIR
- 2) Describe 5 interventions that have a wide range of success reported in the literature
- 3) List 2 interventions, that while potentially having some reduction in SIR

Reducing C diff means understanding the C diff SIR

- Algorithm

Table 3. Risk Factors Used in the Acute Care Hospital CDI LabID Event Model

Factor	Parameter Estimate	P-value
Intercept	-8.9463	<0.0001
Inpatient community-onset (CO) admission prevalence rate	0.7339	<0.0001
CDI test type= EIA	-0.1579	<0.0001
CDI test type= NAAT	0.1307	<0.0001
# ICU beds: ≥ 43	0.7465	<0.0001
# ICU beds: 20-42	0.7145	<0.0001
# ICU beds: 10-19	0.6261	<0.0001
# ICU beds: 5-9	0.4394	<0.0001
Oncology hospital (facility type = HOSP-ONC)	1.2420	<0.0001
General acute care hospital (facility type = HOSP-GEN)	0.3740	<0.0001
Total facility bed size	0.0003	<0.0001
CDI LabID surveillance in ED or 24-hour observation location(s)	0.1119	<0.0001
Teaching facility (major, graduate, or undergraduate)	0.0331	0.0028

https://www.cdc.gov/nhsn/pdfs/datastat/riskadjustment-mrsa-cdi.pdf

Patient Population Impact

- Remember during COVID-19 your patient population changed
  - Loss of short acute care stays for non emergent surgeries (low risk population)
  - Cancers, transplant and emergent cases still admitted (high risk)
- Depending on antimicrobial stewardship among patients with COVID-19

Does the SIR really adjust?

- Yes, for most facilities
- No if BMT and transplant are large populations cared for by your facility
- “For tertiary-care referral hospitals with specialized ICUs and a large number of ICU beds, the ICU bed adjustor functions as a global adjustment in the SIR calculation, accounting for the increased complexity of patients in ICUs and non-ICUs at these facilities. However, the SIR decrease with removal of oncology and HCT unit data, even with the ICU bed adjustment, suggests that an additional adjustment should be considered for oncology and HCT units within general hospitals, perhaps similar to what is done for ICU beds in the current SIR.”
- Polage CR, Quan KA, Madey K, Myers FE, Wightman DA, Krishna S, Grein JD, Gibbs L, Yokoe D, Mabalot SC, Chinn R, Hallmark A, Rubin Z, Fontenot M, Cohen S, Birnbaum D, Huang SS, Torriani FJ. Evaluation of the National Healthcare Safety Network standardized infection ratio risk adjustment for healthcare-facility-onset Clostridioides difficile infection in intensive care, oncology, and hematopoietic cell transplant units in general acute-care hospitals. Infect Control Hosp Epidemiol. 2020 Apr;41(4):404-410. doi: 10.1017/ice.2020.4.

What resources do you have? What is it costing you?

- Costs attributable range from $5682-$8090
- Payment differences range from $197-$964 (1)
- Attributable 1 Year Mortality 0%-7.9%
- Do the math. Calculate your HO cases * attributable costs for money lost (not including CMS reduced payments) and the attributable mortality.

- (1)Holly Yu, MSPH, Jennifer L Nguyen, ScD, MPH, Tamuno Alfred, PhD, Jingying Zhou, MA, MEd, Margaret A Olsen, PhD, MPH, 16. Attributable Mortality, Healthcare Costs and Out-of-Pocket Costs of *Clostridioides difficile* Infection in US Medicare Advantage Enrollees, *Open Forum Infectious Diseases*, Volume 8, Issue Supplement_1, November 2021, Pages S11–S12,

- Antibiotic stewardship
- Reduce transmission

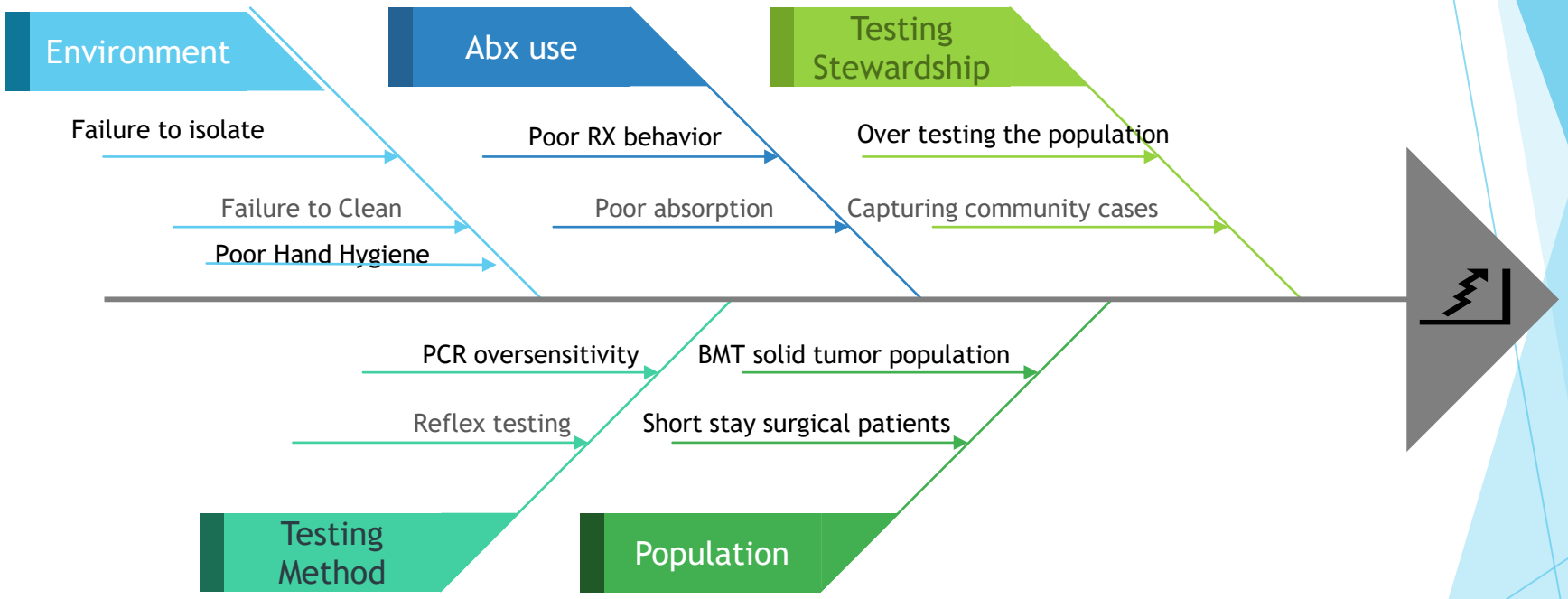
- Reduce testing in low-risk for CDI
- Reduce repeat testing

$$SIR = \frac{\text{True CDI} + \text{Colonized}}{\text{Expected}}$$

- Earlier / more complete identification of CO-CDI

Slide created by Rob El-Kareh, M.D.

Cause and Effect for High *C. difficile* SIR



Measuring the effect of your intervention

- SIR given by NHSN quarterly
- But that means
  - Interventions can only be measured if start of the quarter
  - A whole quarter of useless interventions
    - With attributable costs associated with the intervention
    - And attributable patients developing HO CDI
- Using excel and the formula for SIR a C diff SIR can be calculated monthly

Developing a Monthly C diff SIR

21			
22	**orgID: 53636**		
23	Component	Value	Coefficient
24			
25	Patient days	20918	
26	Intercept		-8.9463
27	CO prevalence rate	0.341	0.7339
28	CDI test type = EIA	0	-0.1579
29	CDI test type = NAAT	1	0.1307
30	ICU beds > 43	1	0.7465
31	ICU beds 20-42	0	0.7145
32	ICU beds 10-19	0	0.6261
33	ICU beds 5-9	0	0.4394
34	Oncology hospital	0	1.242
35	General hospital	1	0.374
36	Total facility bed size	381	0.0003
37	Reporting from ED or 24 hr Obs	1	0.1119
38	Teaching hospital	1	0.0331
39			
40	HO CDI predicted	**15.84454**	

Observed HO CDI	14
Expected HO CDI	15.84454
Site SIR	0.883585

	LJ # CO cases	LJ # admissions	LJ CO prev	HC # CO cases	HC # admissions	HC CO prev
Jul-21	2	1500	0.133	4	1112	0.36
Aug-21	3	1503	0.2	7	1154	0.607
Sep-21	0	1490	0	0	959	0

	LJ # CO cases	LJ # admissions	LJ CO prev	HC # CO cases	HC # admissions	HC CO prev
Jul-21	2	1500	0.133	4	1112	0.36
Aug-21	3	1503	0.2	7	1154	0.607
Sep-21	0	1490	0	0	959	0
Oct-21	3	1412	0.212	0	1033	0
Nov-21	3	1085	0.276	1	943	0.106
Dec-21	2	1476	0.136	4	1028	0.389
Jan-22	4	1327	0.301	1	983	0.102
Feb-22	2	1372	0.146	1	963	0.104
Mar-22			#DIV/0!			#DIV/0!
Apr-22			#DIV/0!			#DIV/0!
May-22			#DIV/0!			#DIV/0!
Jun-22			#DIV/0!			#DIV/0!
Jun21-Sep21	5	4493	0.111	11	3225	0.341
Oct21-Dec21	8	3973	0.201	5	3004	0.166
Jan22-Mar22	6	2699	0.222	2	1946	0.103
Apr22-Jun22	0	0	#DIV/0!	0	0	#DIV/0!
YTD	19	11165	0.17	18	8175	0.22

Environment

- More Contact Precautions (or Expanded Contact Precautions)
- Room as Risk
- BETR study
- WGS data
- Better hand hygiene

Is Cleaning the Issue (Or is it contact precautions?!?)

Conditions	% Toilets clean (less than 10% of bioluminescence marker left)
Isolation: signoff to document cleaning (9 patients each day for duration of stay)	64.7%
Isolation: routine cleaning (7 patients for duration of hospitalization)	56.5%
No Isolation: routine cleaning (10 patients over duration of hospitalization)	72.9%

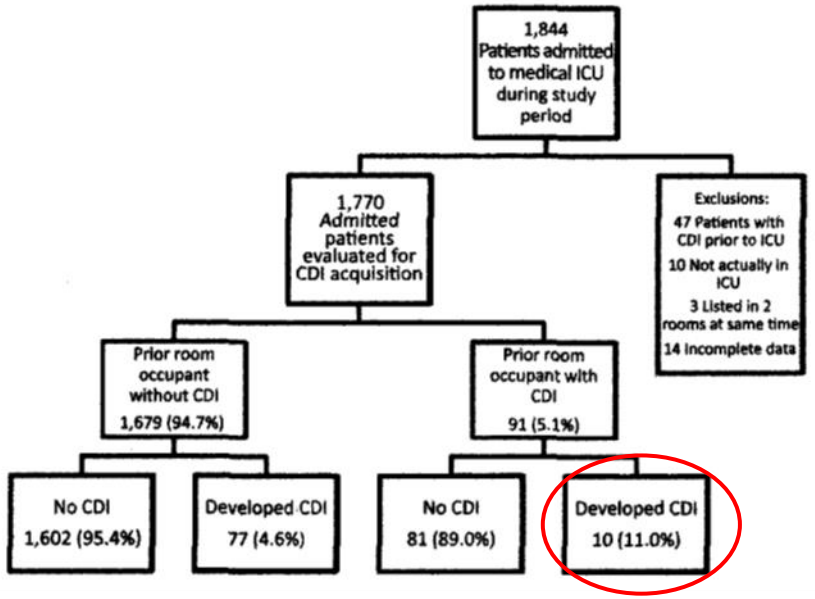
Unpublished data Michelle Alfa. Ph.D.

It’s Us, Clean the Room and Wash your Hands Dummy!

- Shaughnessy MK et al Evaluation of Hospital Room Assignment and Acquisition of Clostridium difficile Infection INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY MARCH 2011, VOL. 32, NO. 3
  - Shows that occupying a room previously occupied by a patient with C diff increases your hazard ratio by 2.35 (1.21-4.54 95% CI p=0.01) AFTER adjusting for patient's age, APACHE III score, exposure to proton pump inhibitors, and antibiotic use!

Do you believe everything you read?

- Taking the study at face value This chart is problematic.



6.9% of all cases after adjusting for baseline transmissi

HPV the first wave of environmental intervention against *Clostridiodes difficile*

TABLE. Quantities of Antimicrobials Used During the Preintervention and Intervention Periods

	Quantity used, DDDs per 1,000 patient-days					
	Full comparison periods			Subperiods when epidemic strain was present[a]		
Agent(s)	Preintervention (Jun 2004 to Mar 2005)	Intervention (Jun 2005 to Mar 2006)	*P*	Preintervention (Nov 2004 to Mar 2005)	Intervention (Nov 2005 to Mar 2006)	*P*
All antibiotics	805.7	764.1	.10	814.6	766.4	.25
Proton pump inhibitors	300.4	298.9	.9	300.6	312.8	.83
All fluoroquinolones	158.9	146	.003	158	150	.12
Levofloxacin	138.5	140.5	.97	142.2	145.2	.60
Cephalosporins						
Second generation	10.2	7.5	.001	10.8	7.6	.02
Third generation	31.5	39.1	.21	31.6	41.4	.025
Fourth generation	32.0	29.7	.27	33	27.4	.11
Clindamycin	10.5	8.5	.07	9.8	7.6	.19

NOTE. DDD, defined daily dose.

[a] *Clostridium difficile* North American pulsed-field 1 (NAP1) strain.

Boyce JM, Havill NL, Otter JA, et al. Impact of hydrogen peroxide vapor room decontamination on Clostridium difficile environmental contamination and transmission in a healthcare setting. Infect Control Hosp Epidemiol 2008;29:723-9.

The Benefits of Enhanced Terminal Room (BETR) Disinfection Study: A Cluster Randomized, Multicenter Crossover Study with 2x2 Factorial Design to Evaluate the Impact of Enhanced Terminal Room Disinfection on Acquisition and Infection Caused by Multidrug-Resistant Organisms (MDRO)

- Designed by CDC and UV disinfecting machine manufacturers to demonstrate ROI for UV machines
- While reductions were demonstrated it failed to met the ROI that had been agreed upon.

BETR own conclusion

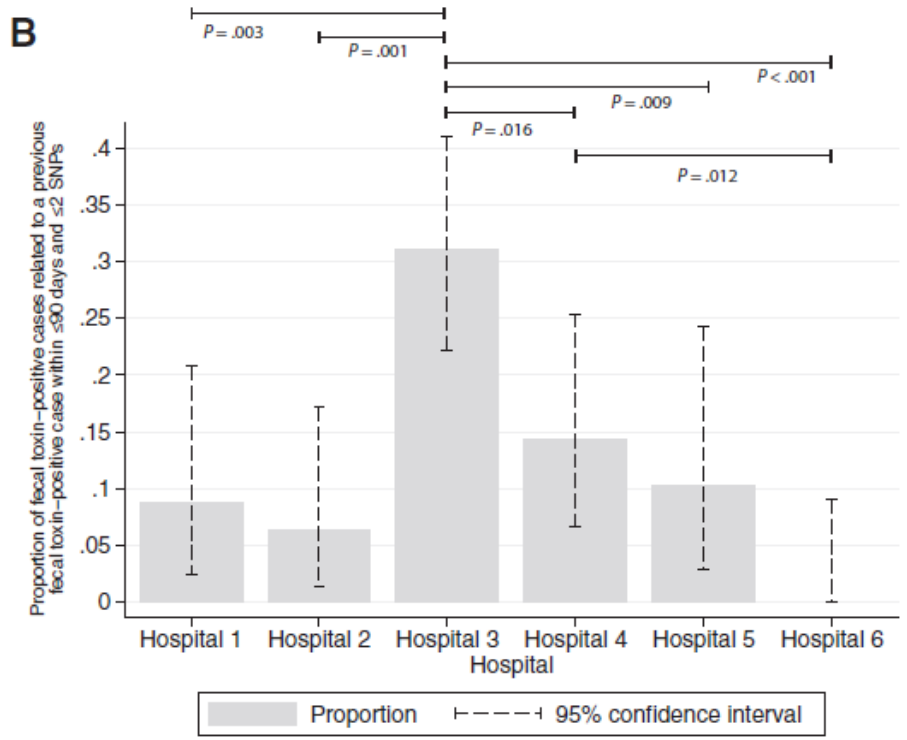
www.thelancet.com Vol 389 February 25, 2017

- “Findings: 31 226 patients were exposed; 21 395 (69%) met all inclusion criteria, including 4916 in the reference group, 5178 in the UV group, 5438 in the bleach group, and 5863 in the bleach and UV group. 115 patients had the primary outcome during 22 426 exposure days in the reference group (51·3 per 10 000 exposure days). The incidence of target organisms among exposed patients was significantly lower after adding UV to standard cleaning strategies (n=76; 33·9 cases per 10 000 exposure days; relative risk [RR] 0·70, 95% CI 0·50–0·98; p=0·036). The primary outcome was not statistically lower with bleach (n=101; 41·6 cases per 10 000 exposure days; RR 0·85, 95% CI 0·69–1·04; p=0·116), or bleach and UV (n=131; 45·6 cases per 10 000 exposure days; RR 0·91, 95% CI 0·76–1·09; p=0·303) among exposed patients. **Similarly, the incidence of C difficile infection among exposed patients was not changed after adding UV to cleaning with bleach (n=38 vs 36; 30·4 cases vs 31·6 cases per 10 000 exposure days; RR 1·0, 95% CI 0·57–1·75; p=0·997).”**

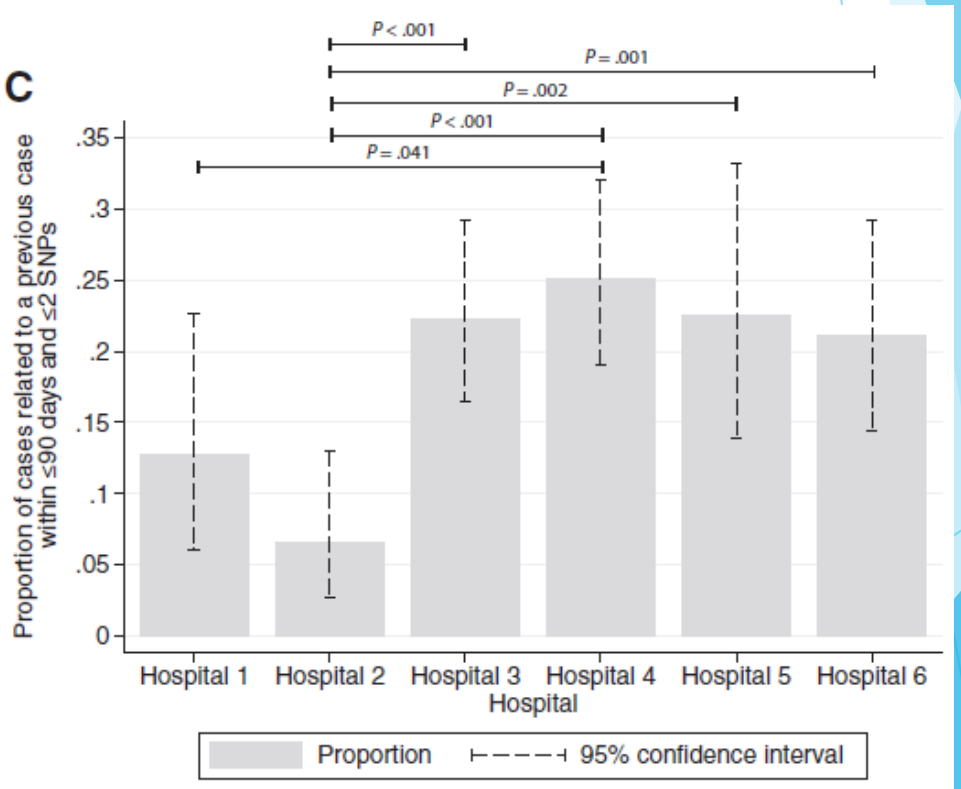
UK health system looks at C. difficile relatedness

- Eyre DW et al. Diverse Sources of C. difficile Infection Identified on Whole-Genome Sequencing NEJM September 26, 2013 vol. 369 no. 13
- 1250 C. difficile cases that were evaluated, 1223 (98%) were successfully sequenced.
- In a comparison of 957 samples obtained from April 2008 through March 2011 with those obtained from September 2007 onward, a total of 333 isolates (35%) had no more than 2 SNVs from at least 1 earlier case (definitive transmission), and 428 isolates (45%) had more than 10 SNVs from all previous cases (clearly unrelated).
- Of the 333 patients with no more than 2 SNVs (consistent with transmission), 126 patients (38%) had close hospital contact with another patient, and 120 patients (36%) had no hospital or community contact with another patient. So of 1223 CDI cases sequences only 126 patients had some spatial relationship with another patient and a clear genetic link (10.3% of all cases)

Wait A Minute!
DW Eyre et al. Comparison of Control of Clostridium difficile Infection in Six English Hospitals Using Whole-Genome Sequencing CID 2017:65 (1 August)



Toxin +



PCR +

Clostridiodes difficile it is the Environment!

- The authors review a series of WGS data around C. difficile and come to the conclusion that it is the environment! The authors note many WGS studies finding C. difficile in the environment and then finding identical isolates in patients with *C. difficile*.
- However, many of these studies found C. difficile on community benches or in pigs and then subsequently found them in sick patients suggesting that the community may play a significant role in acquisition of *C. difficile* colonization that may then result in infection when an antibiotic insult to the gut biome occurs. So when we say the environment plays a role that does not appear to always or the majority being the healthcare environment.

- Turner NA, Smith BA, Lewis SS (2019) Novel and emerging sources of *Clostridioides difficile* infection. PLoS Pathog 15(12): e1008125. https://doi.org/10.1371/journal.ppat.1008125

Is better hand hygiene the answer?

- Soap and water is the standard for *C. difficile* patients in CA
  - CA standard not to use alcohol based hand rubs

Handwashing doesn't work for removal of *C. difficile*

TABLE 2. Results of Hand Wash Products and Prototypes Tested for Reducing *Clostridium difficile*

Test product	No. of samples tested	Log_{10} cfu/mL reduction	Standard deviation	P^a
Tap water	18	0.76	0.11	N/A
4% chlorhexidine gluconate hand wash	18	0.77	0.11	>.05
Nonantimicrobial hand wash	6	0.78	0.16	>.05
Nonantimicrobial body wash	18	0.86	0.22	>.05
0.5% bleach and surfactant prototype	6	0.98	0.13	>.05
0.3% triclosan hand wash	6	0.99	0.13	>.05
8% hydrogen peroxide and surfactant prototype	6	0.99	0.72	>.05
Peracetic acid wipe	6	1.08	0.29	>.05
Sodium tetraborate decahydrate powder	6	1.18[b]	0.31	<.05
Ink and stain remover	12	1.21[b]	0.22	<.001
Ink and stain remover with brush	6	1.47[b]	0.10	<.0001
Peracetic acid and surfactant prototype	6	1.51[b]	0.42	<.0001

NOTE. cfu, colony-forming units; N/A, not applicable.

[a] Versus tap water.

[b] Denotes statistically superior efficacy compared with tap water.

Edmonds, S., Zapka, C., Kasper, D., Gerber, R., McCormack, R., Macinga, D., . . . Gerding, D. (2013). Effectiveness of Hand Hygiene for Removal of Clostridium difficile Spores from Hands. *Infection Control & Hospital Epidemiology, 34*(3), 302-305. doi:10.1086/669521

Using hand washing to reduce C difficile rather than alcohol based hand rubs has not been shown to reduce CDI

SHEA compendium 2014:

“Although alcohol-based hand hygiene products are ineffective at removing or disinfecting *C. difficile* spores in controlled laboratory experiments, no clinical study has demonstrated an increase in CDI with the use of these products or a decrease in CDI with soap and water.

Conversely, several of the studies did identify decreases in MRSA or VRE associated with the use of alcohol-based hand hygiene products.”

While the environment plays some role, the yield in reducing your SIR is probably low.

Yes, that is still a problem

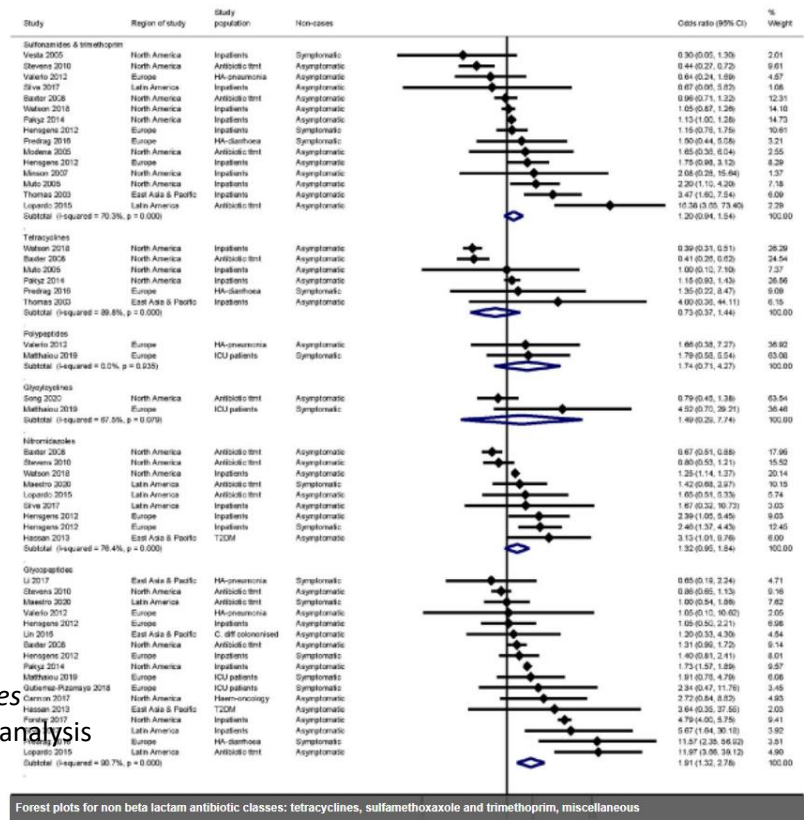
ABX stewardship

- High risk abx
  - Universal Clindamyacin
    - OR are impressive and significant but..
    - What % of your total C diff cases are on….
  - Hospital Specific
- Inappropriate Abx use
  - NHSN AUR

Antibiotic Use as a Risk Factor for C. difficile illness

- Antibiotic use associated with a 7-10 times increase in risk.
  - Symptoms onset within 5-10 days of initiation of antibiotic

Antibiotic risks appear to be hospital specific (Although there are some universals)



Forest plots for non beta lactam antibiotic classes: tetracyclines, sulfamethoxaxole and trimethoprim, miscellaneous

Antibiotics and hospital-associated *Clostridioides difficile* infection: systematic review and meta-analysis 2020 update

Claudia Slimings, Thomas V. Riley

medRxiv 2021.02.21.21252172; doi: https://doi.org/10.1101/2021.02.21.21252172

Using NHSN to Focus Antimicrobial Stewardship

All Antibacterial Agents used in adult SAAR ICUs | wards | step down units and oncology units

orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
53636	2020M07	Adult_All-Antibacterial_2017	4490	4037.34	6662	1.112	0	1.080, 1.145
53636	2020M08	Adult_All-Antibacterial_2017	4441	4037.527	6665	1.1	0	1.068, 1.133
53636	2020M09	Adult_All-Antibacterial_2017	4242	3950.324	6542	1.074	0	1.042, 1.107
53636	2020M10	Adult_All-Antibacterial_2017	4756	4281.284	7077	1.111	0	1.080, 1.143
53636	2020M11	Adult_All-Antibacterial_2017	4338	4240.954	7010	1.023	0.139	0.993, 1.054

Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR wards

orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
53636	2020M07	Adult_BSHO_Ward_2017	309	373.141	2814	0.828	0.0007	0.740, 0.924
53636	2020M08	Adult_BSHO_Ward_2017	367	380.662	2880	0.964	0.5029	0.869, 1.067
53636	2020M09	Adult_BSHO_Ward_2017	337	362.453	2735	0.93	0.1877	0.834, 1.033
53636	2020M10	Adult_BSHO_Ward_2017	434	412.614	3109	1.052	0.304	0.956, 1.154

Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR ICUs

orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
53636	2020M07	Adult_BSHO_ICU_2017	216	159.7	454	1.353	0	1.181, 1.542
53636	2020M08	Adult_BSHO_ICU_2017	233	157.238	447	1.482	0	1.300, 1.682
53636	2020M09	Adult_BSHO_ICU_2017	171	144.926	412	1.18	0.0376	1.013, 1.367

Anti MRSA agents, narrow spectrum, narrow spectrum beta-lactams, invasive candidiasis coverage

C. difficile high-risk antibiotic useage

Antibacterial agents posing the highest risk for CDI used in adult SAAR ICUs

orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
53636	2020M07	Adult_CDI_ICU_2017	77	97.788	454	0.787	0.0305	0.626, 0.979
53636	2020M08	Adult_CDI_ICU_2017	36	96.28	447	0.374	0	0.266, 0.512
53636	2020M09	Adult_CDI_ICU_2017	69	88.741	412	0.778	0.0308	0.610, 0.978

Adult Antibacterial agents posing the highest risk for CDI

This category contains antimicrobials that are part of other SAAR categories.

- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFTAZIDIME
- CEFTRIAXONE

- CIPROFLOXACIN
- CLINDAMYCIN
- GEMIFLOXACIN
- LEVOFLOXACIN
- MOXIFLOXACIN

NHSN module

- At this time does not have all unit types
- Does not adjust for clinical events (ex. outbreak of MRSA)
- All other things being equal….

Testing type

- PCR versus toxin
  - UC Davis
- Reflex testing
  - Identifying high risk
  - Does not preclude claiming PCR
- Sensitive PCR testing for ED

From: **Overdiagnosis of Clostridium difficile Infection in the Molecular Test Era**

JAMA Intern Med. 2015;175(11):1792-1801. doi:10.1001/jamainternmed.2015.4114

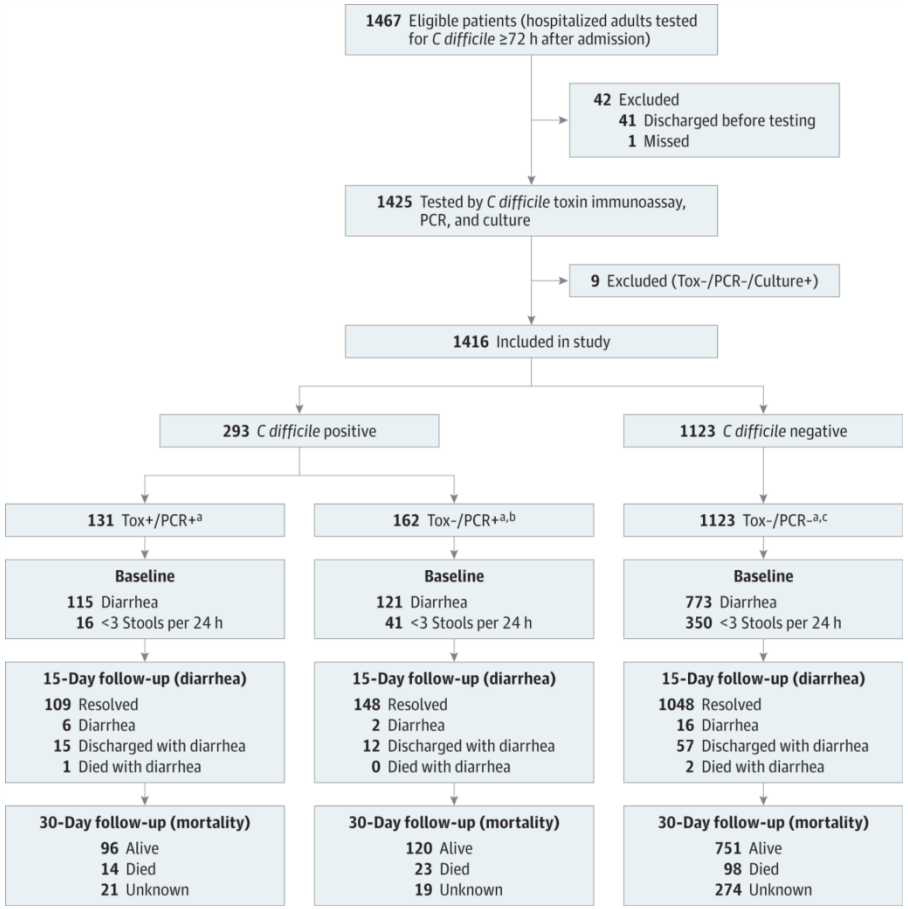


Figure Legend:

Flow of Patients Through Testing and Follow-upTox+/PCR+ indicates Clostridium difficile toxin immunoassay positive and polymerase chain reaction positive; Tox−/PCR+, C difficile toxin immunoassay negative and polymerase chain reaction positive; and Tox−/PCR−, C difficile toxin immunoassay negative and polymerase chain reaction negative.

[a]Clostridium difficile test group based on US Food and Drug Administration–approved toxin immunoassay and polymerase chain reaction results.

[b]Includes one patient with false-positive immunoassay.

[c]Includes 20 patients with false-positive immunoassay.

How much over diagnosis?

- UC Davis published "*Overdiagnosis of Clostridium difficile Infection in the Molecular Test Era"* demonstrating 55.3% (162/293) of their patients who were positive on PCR for *C. difficile* toxin producing strains were negative for *C. difficile* toxin. And that population had no different outcomes than those who had tested PCR negative.

Unresolved questions from the JAMA study

- Are these patients at risk of CDI if they are started on broad spectrum antibiotics?
- Are these patients protected from CDI by antibodies to the toxin?
- Are the PCR results causing additional people to be tested who would not have been in the past?
- Was the failure of the BETR study due to PCR testing?

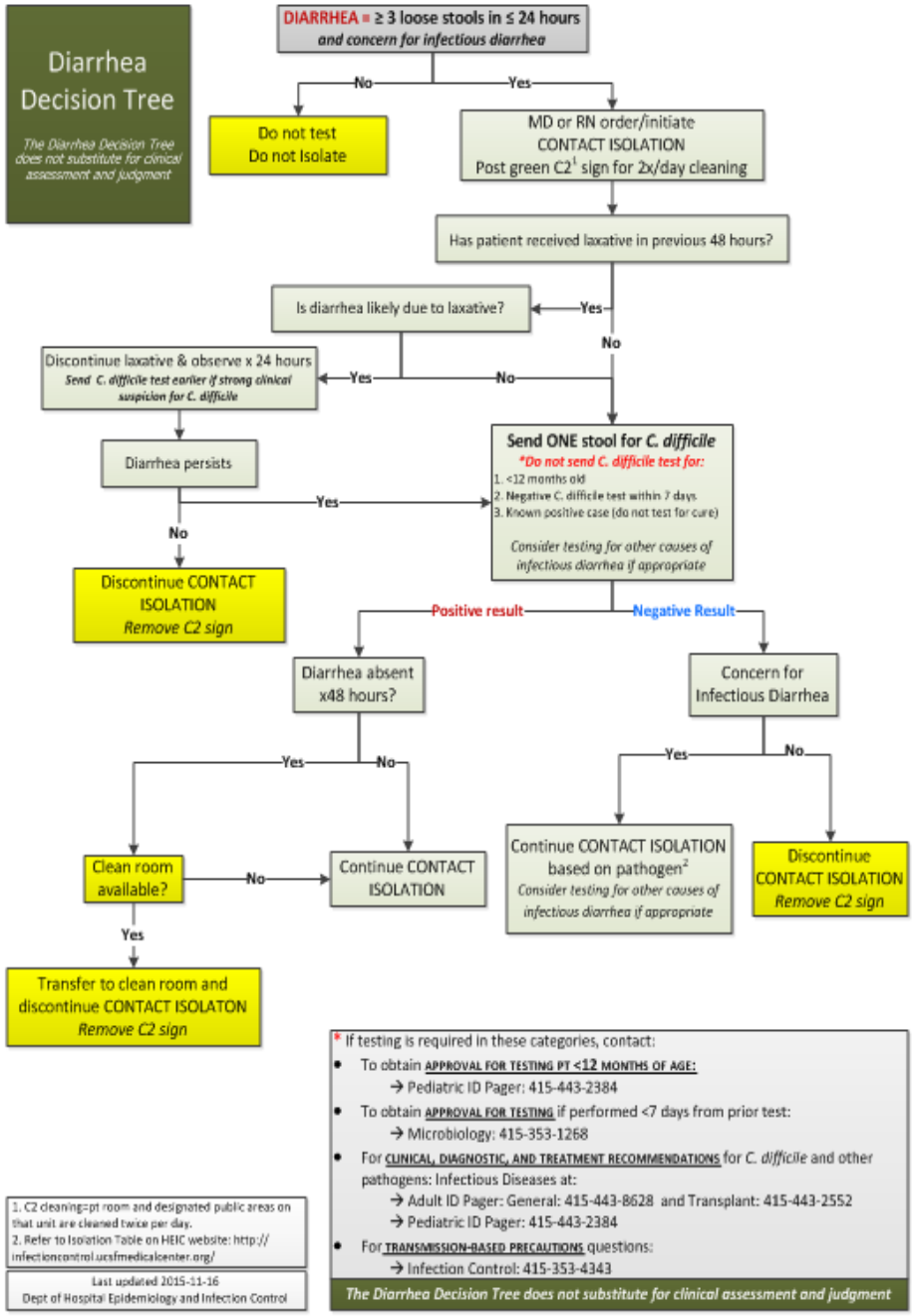
Testing Stewardship

- Basic algo
- Using the data in the EHR
  - BPA laxative
  - BPA Stool count and consistency

EMR interventions to change *C. difficile* test ordering behaviors

- Defining when it is not acceptable to order test
- Defining diarrhea
  - Teaching nursing what diarrhea is
  - Bristol stool scale
- Building a responsive override system
  - Acknowledges the need
  - Trains about the algorithm
  - Uses resources spent on *C. difficile* losses

One hospital's approach



Laxative and Diarrhea Must be C. diff?!

- Survey of 30 U

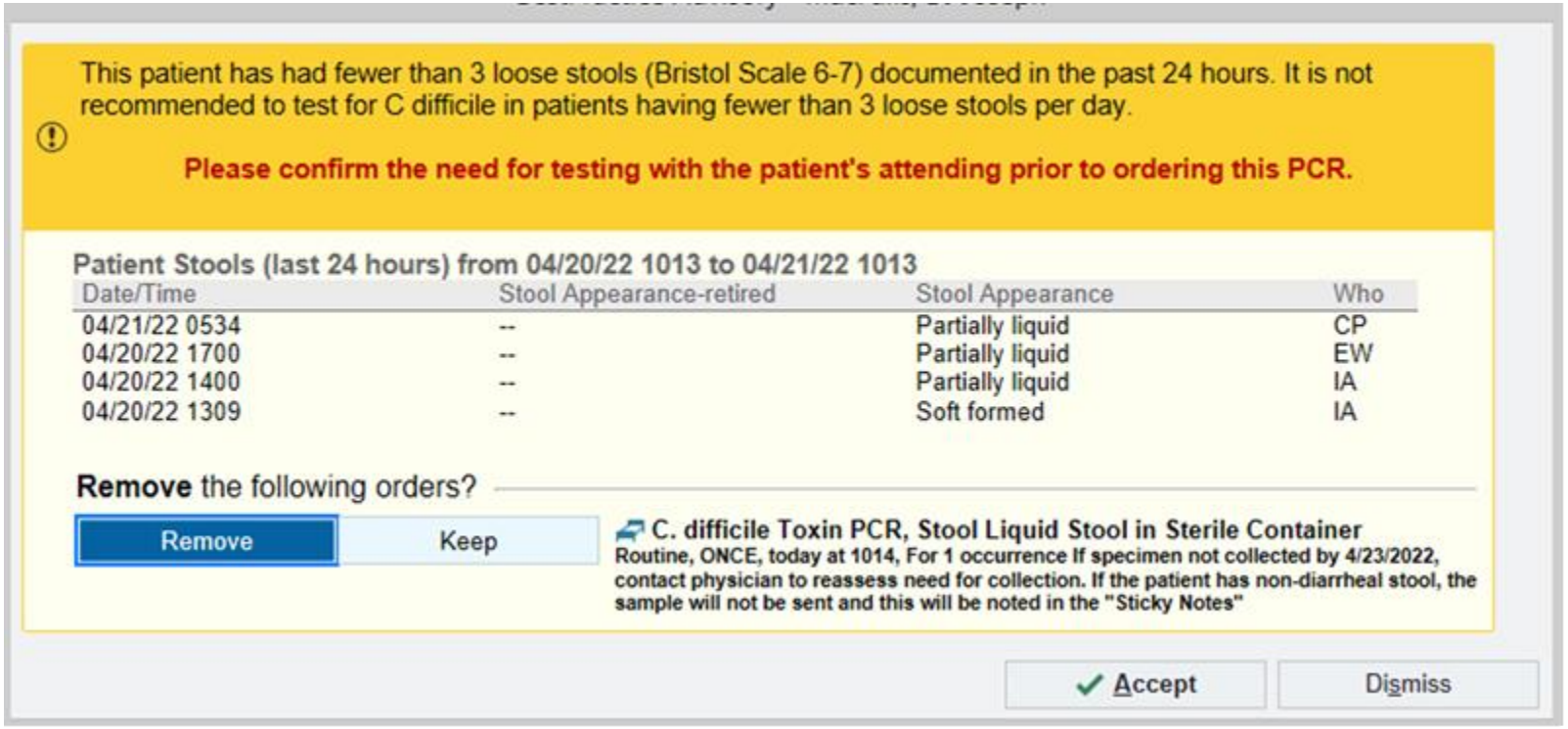
Percent of patients on laxatives 2 days before positive	Percent day before	Percent day of	Percent restarted on laxatives less than 7 days after positive PCR
56.7%	53.3%	53.3%	43.3%

  - Confidence interval (± 16.4%)
  - Some patients continued to receive laxatives the entire duration of the 10 days surveyed
- Given the over sensitivity of the PCR test for *C. difficile* testing patients on laxatives for C. difficile is probably not advisable.

Lessons Learned

- Override allowed
- 17% override BPA

Direct links to the stool data allows physicians to see the patient may not have “true” diarrhea



Issues identified

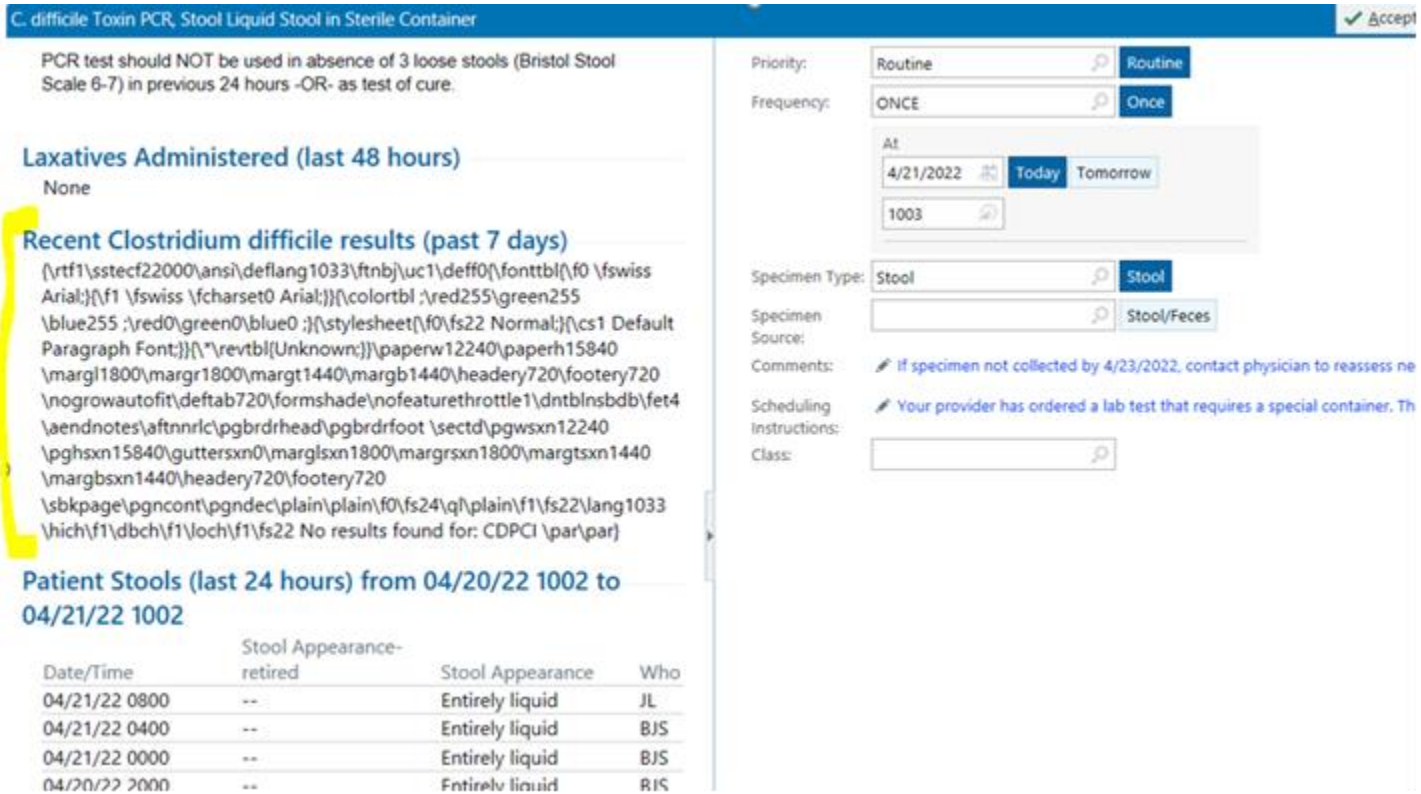
- Late nursing documentation causes BPA to fire when nursing hasn't documented YET
- Nowhere (or bandwidth) to over ride
  - BPA overridden 80% of the time
- Attestation
- Drawings in BPA

But TOXIC MEGACOLON!

There are clearly cases where a lack of diarrhea does not indicate a lack of *C. difficile*

- But there are other ways to diagnosis (imaging)
- *Have these been explored?*

The lab result will submit to my diagnosis! Or repeat testing in the face of negative results



C. difficile Toxin PCR, Stool Liquid Stool in Sterile Container

Accept

PCR test should NOT be used in absence of 3 loose stools (Bristol Stool Scale 6-7) in previous 24 hours -OR- as test of cure.

Laxatives Administered (last 48 hours)

None

Recent Clostridium difficile results (past 7 days)

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Patient Stools (last 24 hours) from 04/20/22 1002 to 04/21/22 1002

Date/Time	Stool Appearance-retired	Stool Appearance	Who
04/21/22 0800	--	Entirely liquid	JL
04/21/22 0400	--	Entirely liquid	BJS
04/21/22 0000	--	Entirely liquid	BJS
04/20/22 2000	--	Entirely liquid	BJS

Priority: Routine — Routine

Frequency: ONCE — Once

At

4/21/2022 — Today — Tomorrow

1003

Specimen Type: Stool — Stool

Specimen Source: — Stool/Feces

Comments: If specimen not collected by 4/23/2022, contact physician to reassess ne

Scheduling Instructions: Your provider has ordered a lab test that requires a special container. Th

Class:

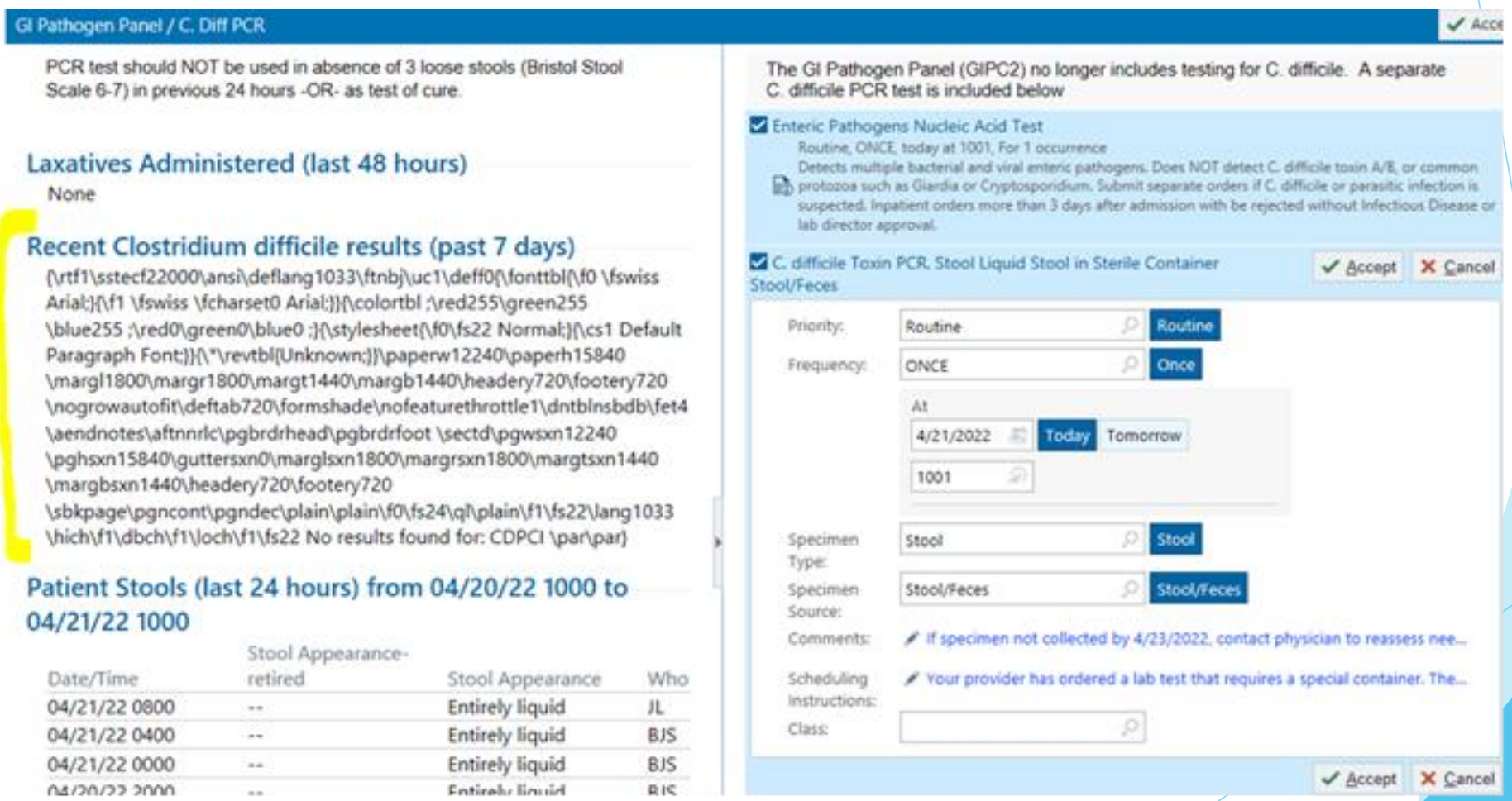
Repeat PCR testing

- “The findings from this study indicate that repeating *C. difficile tcdB* PCR within 14 days of a negative result yields little relevant clinical data, other than confirming the negative result of the initial test, in an overwhelming majority (97.5%) of tests. Additionally, repeat testing can lead to false positives. With the false positive seen on day 5 disregarded, repeat testing less than a week after the initial negative result provided new information in only 2 (0.8%) out of 266 tests, or 2 (1.0%) out of 197 patients. However, the current study does show that repeat testing, particularly between interval days 7 and 14, can be useful in a small subset of patients with high clinical suspicion for infection. Of all the cases whose results converted to positive on repeat testing, more than half involved patients with a recurrence of diarrhea after resolution of their initial episode of loose stool, suggesting a different disease process, which would explain the change in PCR results. Additionally, all these patients had multiple risk factors for *C. difficile* infection, including ongoing antibiotic usage, prolonged hospitalization, severe underlying illness, immunosuppression, and/or recent gastrointestinal procedures.”
- Luo RF, Banaei N. Is repeat PCR needed for diagnosis of Clostridium difficile infection?. *J Clin Microbiol*. 2010;48(10):3738-3741. doi:10.1128/JCM.00722-10

Lessons learned

- Some people think there is a test of cure for *C. difficile!*
- GI protocol to retest before fecal transplant
- Override option exists with ID attending consult: 20% BPA override

Identifying community onset cases earlier



How big of a problem are late identification of CDI cases?

- Query NHSN from DOA to DOE
  - Cases on day 3 probably are missed cases
  - 50% on one campus are day 3 or 4 cases
- Review stool documentation on admission

Increased sensitivity among ED tests

- Diarrhea panels
- Ethical dilemma of over diagnosing C. difficile in ED versus missing cases

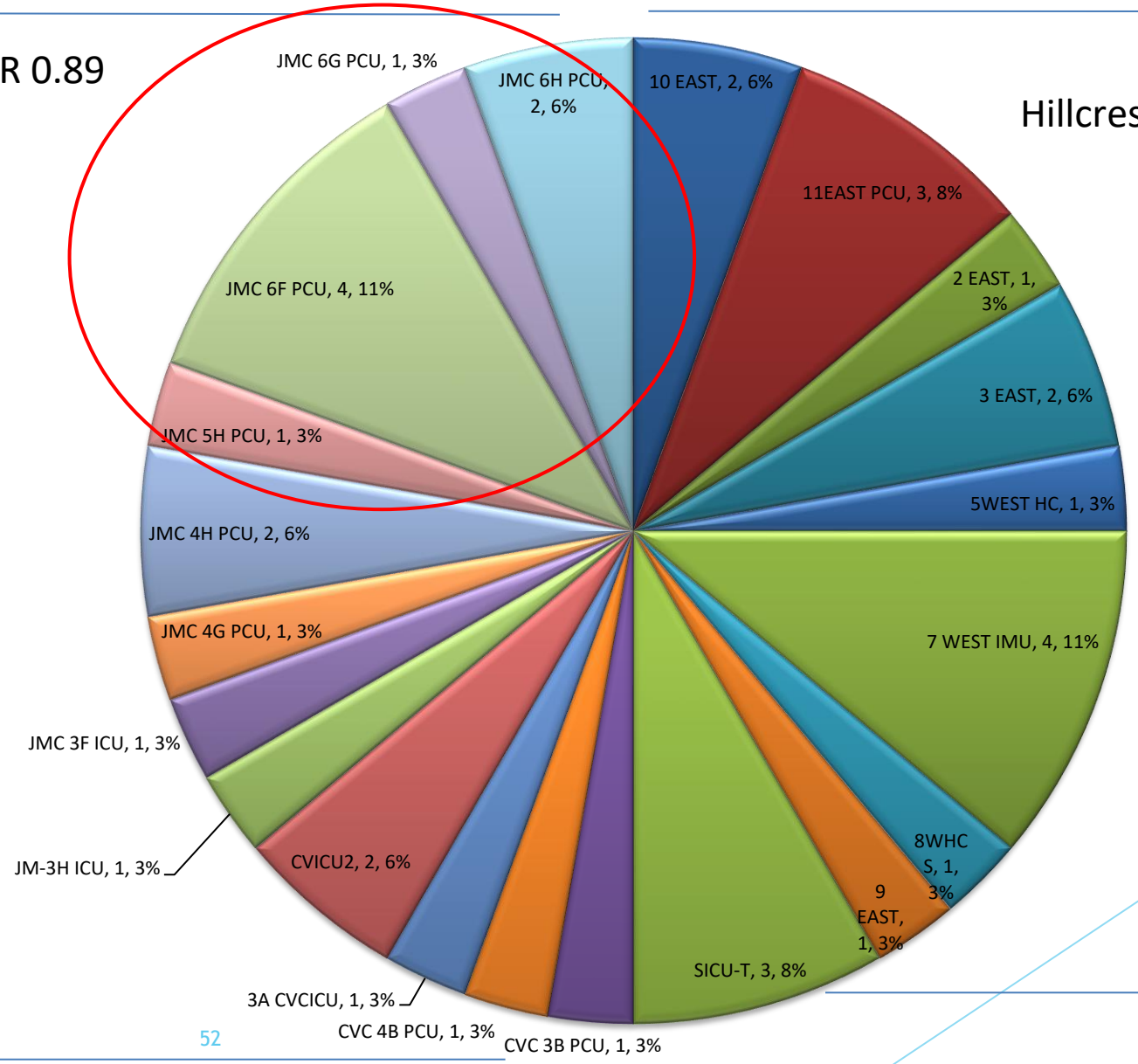
Changing the testing algorithm

- Only works for SIR reduction if using PCR
- Identifying units (or patients) with high incidences of C diff.
- Identify areas (or patients) with high rates of diarrhea likely to be caused for reasons other than C. difficile
  - Patients with BMT, receiving chemotherapy, certain psychiatric medications
- Reflex PCR to toxin
  - Have both results available
  - Not dictating to physicians which test should drive therapy decisions

C.Difficile Hospital Onset Healthcare Associated Cases Q2-2021

La Jolla: SIR 0.89

Hillcrest : SIR 1.08



Will C diff reflex testing change my testing method listed in NHSN?

- Q4: Our facility uses a combination of test methods for *C. difficile* LabID event reporting, how should we answer the question: For this quarter, what is the primary testing method for C. difficile used most often by your facility's laboratory or the outside laboratory where your facility's testing is performed?
- The response should reflect the testing method used with the majority of specimens tested. For example, a facility rotates between three testing methods, with the following proportions: NAAT only in 15% of specimens tested, GDH/EIA toxin in 45%, and GDH/EIA reflexed to NAAT for discrepant results in 40%. The appropriate response is GDH/EIA. The response to the question is to be completed in the last month of each calendar-year quarter (March, June, September, and December). If you change the testing method during the quarter, compare the counts for different testing to identify the appropriate response to the testing question.

Setting *C. difficile* orders to expire

- If it has been 24 hours and you haven't gotten a stool specimen yet
  - Maybe its because they don't have diarrhea anymore!
- Enemas for specimens
- What is your lab rejection rate?
- May interfere with outpatient testing

Review of intervention success

Intervention	Likelihood of success	Maximum gain expected
Room cleaning	Moderate	10%
Better HH	Low	<5%
More aggressive precautions	Low	<10%
Antibiotic stewardship	Varies	Varies
Testing with toxin	Low	Low
Eliminating testing on patients on laxatives	Varies	Varies
Testing only “true” diarrhea	Varies	Varies
Eliminating repeat testing	Varies	Low
Capturing outpatient cases	Varies	Varies
Reflex testing	Moderate	<25%
Expiring orders	Varies	Varies

Questions?