Reducing *Clostridium difficile* Infection in the Acute Care Setting

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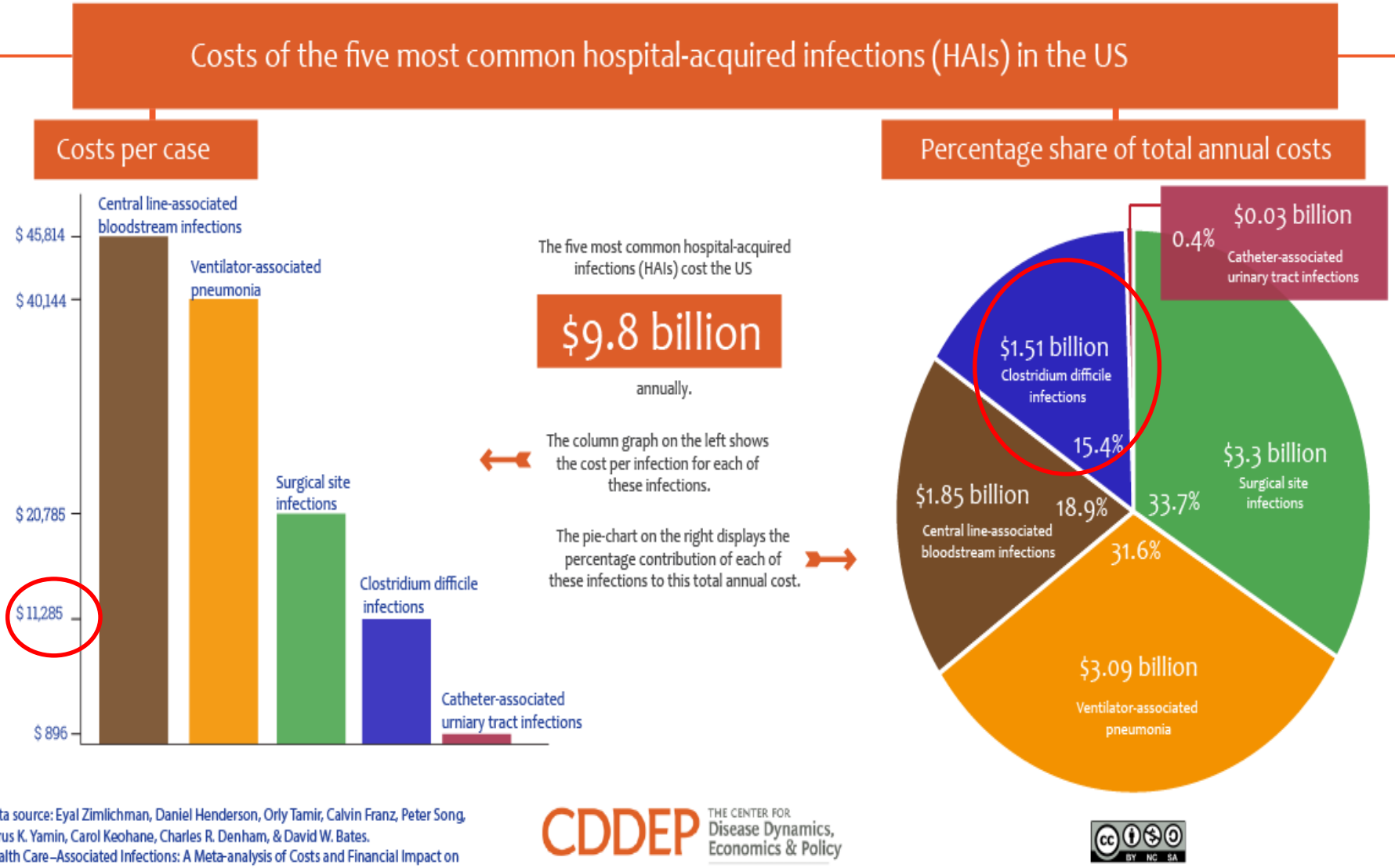
St Luke's
UNIVERSITY HOSPITAL
BETHLEHEM

Background/Local Problem

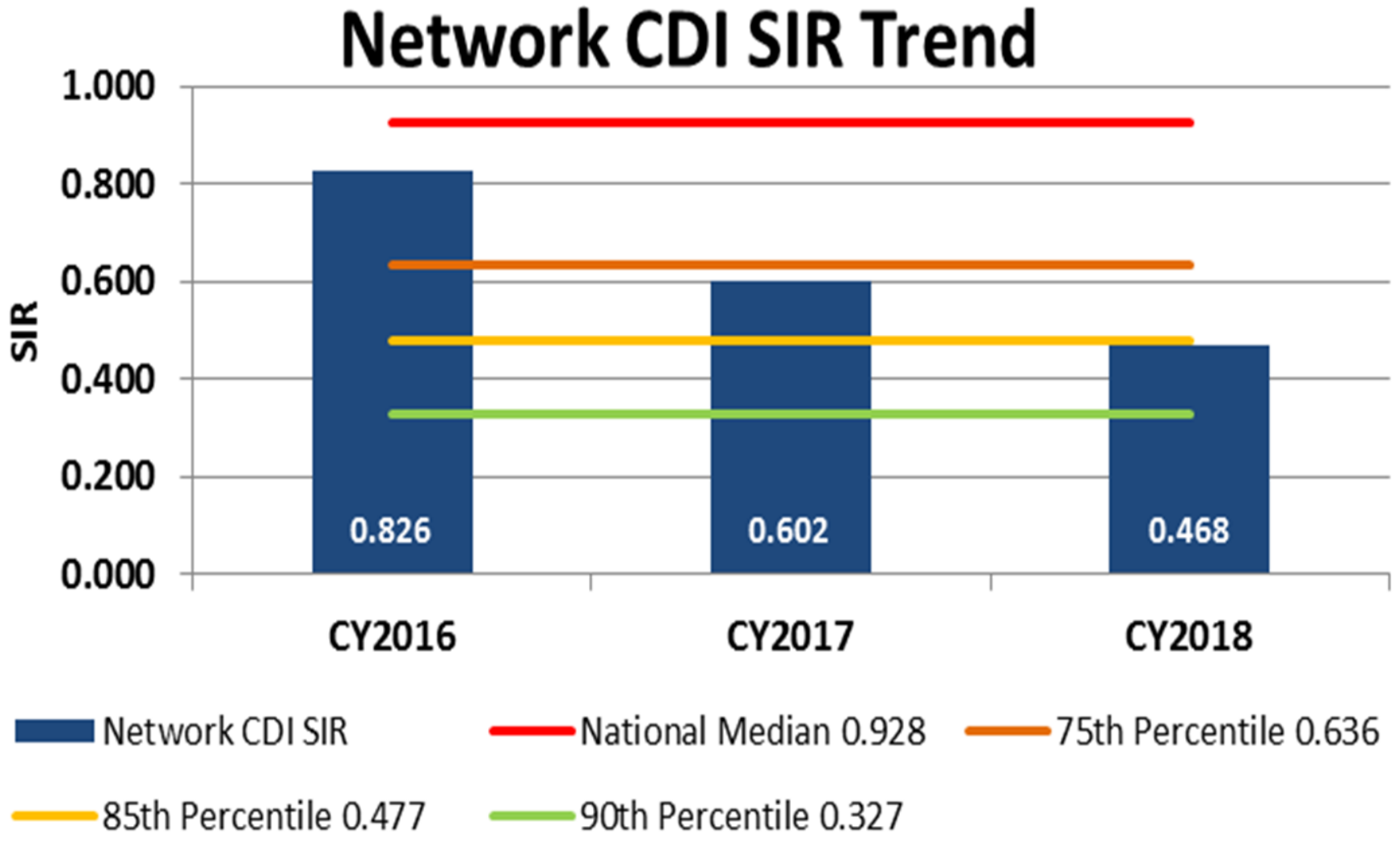


Background/Local Problem

C. difficile Infection (Hospital Onset)	CY2016	CY2017	CY2018
SLA	17	14	13
SLB	49	37	36
SLRA	24	17	10
SLMI	9	7	1
SLMO* open Oct 2016	5	13	7
SLQ	6	1	0
SLWA	15	15	8
Raw Number of Infections	**125**	**104**	**75**
Rate per 10k Patient Days	**5.81**	**4.62**	**3.07**

Excludes GH and SH Campuses

Standardized Infection Ratio (SIR)



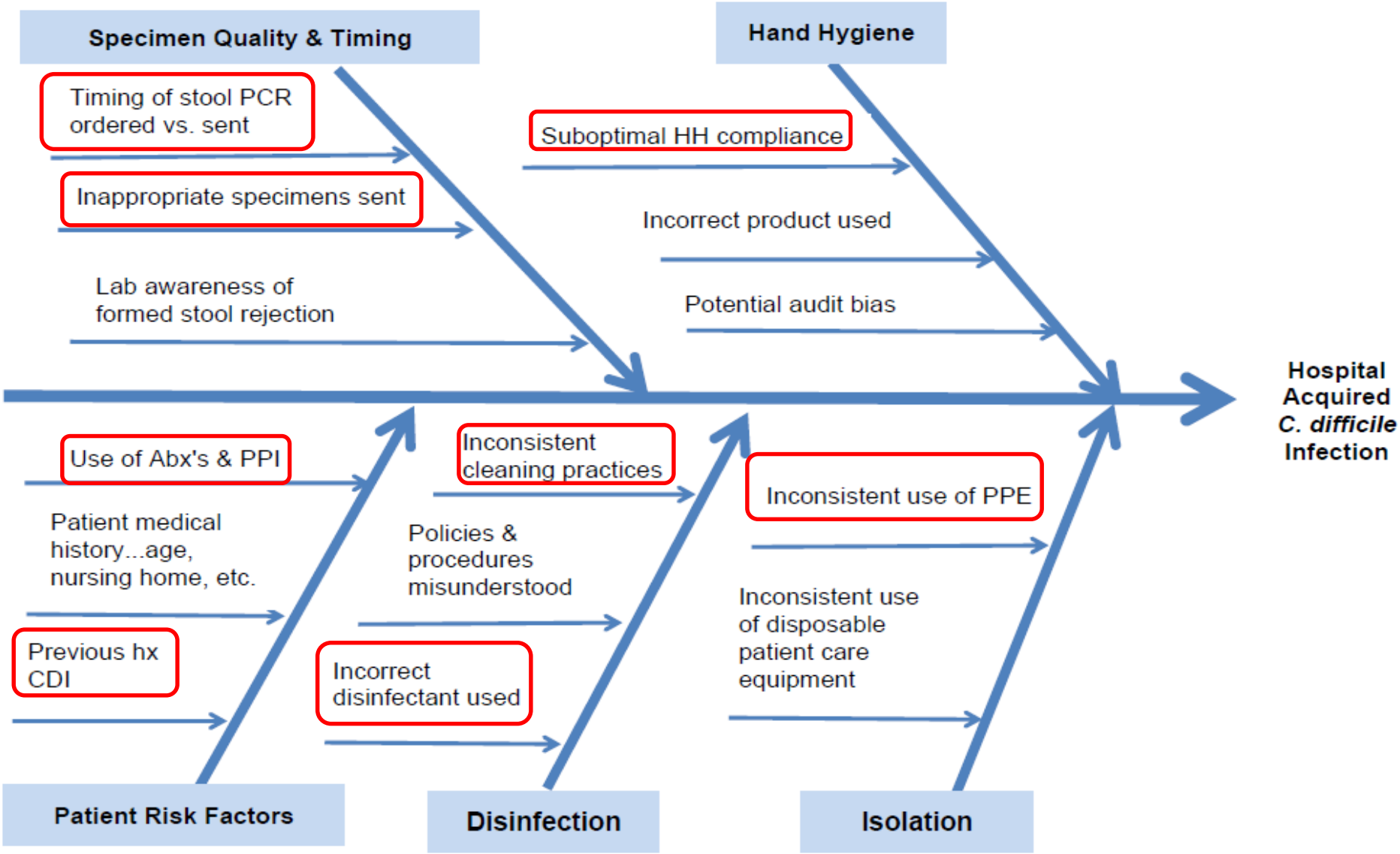
CMS Hospital Compare

Local Peers	Hospital Onset CDI SIR Performance (Data Period 10/1/16 to 9/30/17)
St. Luke's Allentown/Bethlehem	Better than National Benchmark
St. Luke's Miners	No different than National Benchmark
St. Luke's Quakertown	No different than National Benchmark
St. Luke's Anderson	No different than National Benchmark
St. Luke's Warren	No different than National Benchmark
St. Luke's Monroe	No different than National Benchmark
Easton Hospital	No different than National Benchmark
Grandview Hospital	No different than National Benchmark
Geisinger Hospital	Worse than National Benchmark
LVHN-Cedar Crest	Better than National Benchmark
LVHN-Muhlenberg	No different than National Benchmark
LVHN-Pocono	Better than National Benchmark
Palmerton Hospital	Results cannot be calculated for this reporting period
Gnaden Huetten Hospital	No different than National Benchmark
Sacred Heart Hospital	Better than National Benchmark

Key Players to Success

- Multidisciplinary Team:
  - Administrative Support
  - Infectious Disease Physician
  - Infection Preventionist
  - Environmental Services
  - Gastroenterologist
  - Infectious Disease Pharmacist
  - Microbiology Laboratory

Identified Causes



Plan: Initial Strategies Used

- Used process improvement cycle approach (Plan-Do-Check-Act)
- Developed a *C. difficile* order screening tool and imbedded in the order set
- Provided education regarding stool consistency requirements and canceling at lab if criteria not met
- Switched from targeted cleaning of CDI rooms with bleach to universal cleaning with a sporicidal
- Infectious Disease Pharmacist reviewed hospital onset CDI cases for antibiotic stewardship opportunities
- Infection Prevention reviewed each case for trends

Hand Hygiene Accountability

- The Joint Commission TST Program used to observe hand hygiene compliance; Just in time coaching performed when missed opportunity identified
- Monthly reports of compliance by type healthcare worker reported to hospital leadership; low performers report PI action plans at Infection Control Committee
- Investigated potential for use of electronic monitoring of hand hygiene compliance
- Implemented increased observations and monthly leadership rounding with real time feedback on units

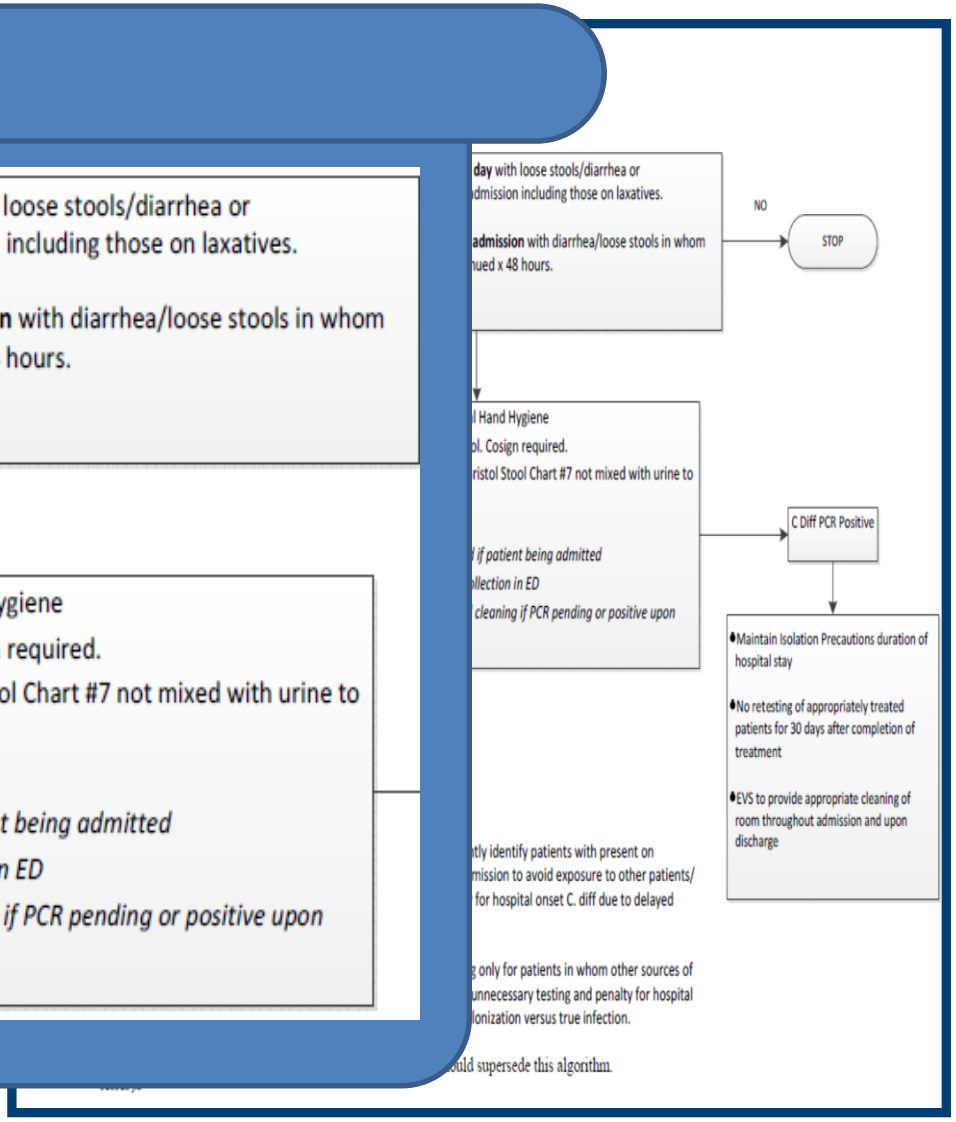
IT/Clinical Workflow Interventions

***New admit on day of admission, or following day** with loose stools/diarrhea or c/o loose stools or diarrhea 24 hours prior to admission including those on laxatives.

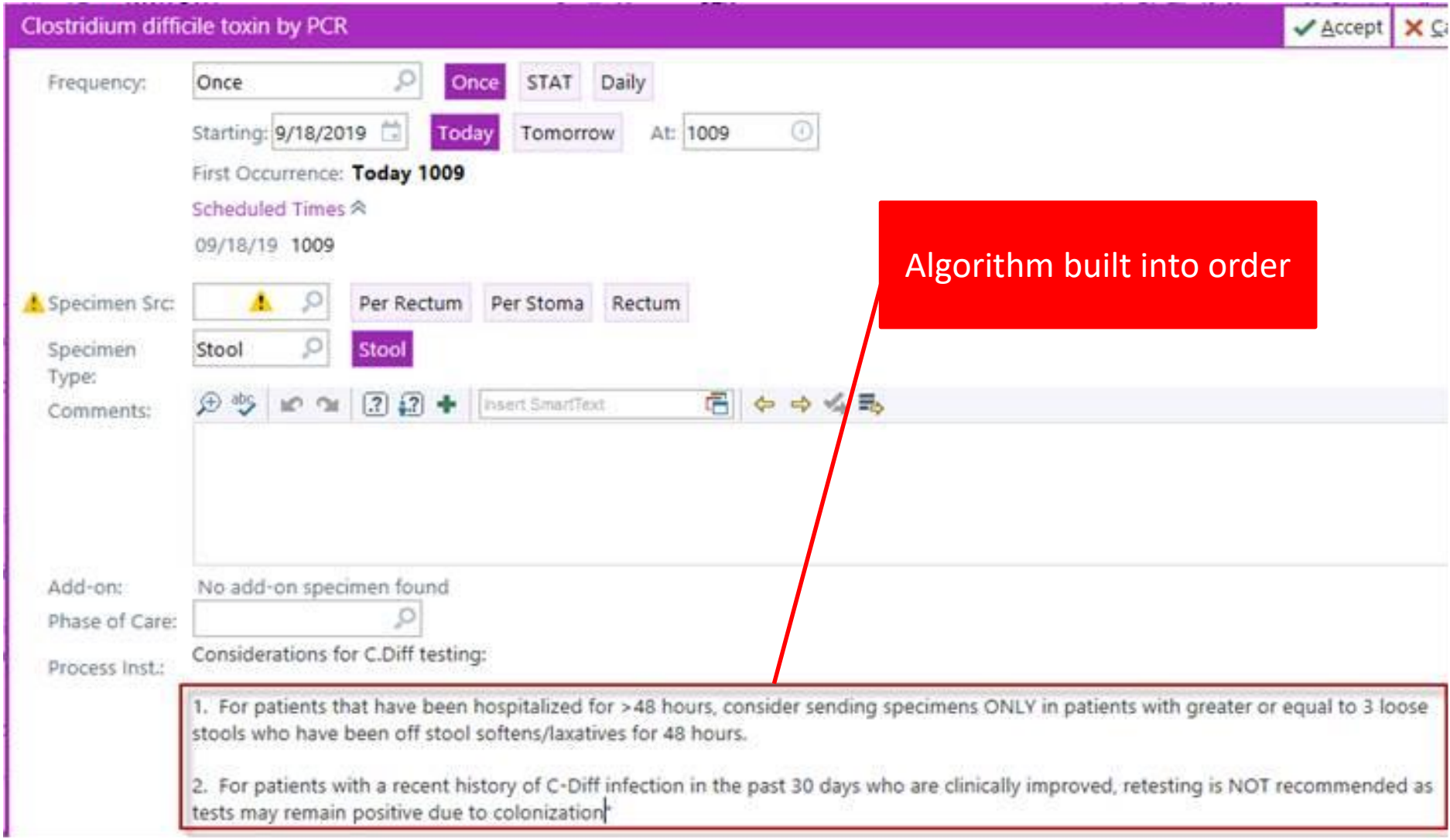
***Inpatients greater than 2 calendar days after admission** with diarrhea/loose stools in whom all stool softeners/laxatives have been discontinued x 48 hours.

YES

- Initiate Contact Precautions with Special Hand Hygiene
- Nurse to obtain C. diff order per protocol. Cosign required.
- Obtain and send stool consistent with Bristol Stool Chart #7 not mixed with urine to lab ASAP
- Provide patient education
- *ED notifies PAC of need for isolation bed if patient being admitted*
- *ED to provide commode for specimen collection in ED*
- *ED to inform EVS of need for specialized cleaning if PCR pending or positive upon discharge from ED*



IT/Clinical Workflow Interventions



Do-Check-Act

- **Problem #1:** Stool collection task completes from nursing worklist after 48 hours
  - **Solution**: EMR report setup to monitor and request orders to be cancelled if appropriate
- **Problem #2:** Patients with a previous history of *C. difficile* were more likely to develop recurrent infection during their admission.
  - **Solution**: Trialed Best Practice Advisory (BPA) at one campus to alert practitioners of patients' previous history and consider ordering PO Vancomycin…and then moved network-wide.

Clostridium difficile BPA

High-Risk for HA-C. difficile

This patient has a current or previous history of C. difficile and has been identified as being high risk for acquiring HA-Cdiff infection

@RESUFAST(CDIFFTOXINB)@

- Please limit systemic antibiotic: **use**, **spectrum**, and **duration** as much as possible
- If antibiotics need to be continued, consider adding C. difficile prophylaxis with PO Vancomycin
- If C. difficile prophylaxis will not be added, please document WHY

Order | Do Not Order

Vancomycin (VANCOCIN) Oral Solution 125 mg Q12 hrs - Continue for the duration of and for 48-72hr AFTER stopping all other antibiotics

Acknowledge Reason

Allergy/intolerant to prophylactic agent | Currently receiving C.Diff treatment | Other (specify reason in comments field)

✓ Accept

Do-Check-Act

- **Problem #3:** Improper specimen collection trends identified (e.g. laxative use, recent previous positive test, recent negative test, and watery stools not charted in last 24 hours)
  - **Solution**: Developed Best Practice Advisory (BPA) to alert practitioners of potential factors to consider before ordering

Clostridium difficile BPA

C. diff testing alert! As your patient has met one of the following criteria, C. diff testing is not recommended at this time:

- Positive C. diff result in the past 14 days
- Negative C. diff result in the past 7 days
- Laxative administered to patient in last 48 hours
- Watery stools documented < 3x in last 24 hours

Extracted from EMR Lab

Extracted from EMR Medication Administration Record and Nursing Charting

C. diff coloniz
testing is recommended only in patients
other causes (i.e. laxatives or medicatio

In addition, tests of cure or repeat testing in negative patients is not advised.

Lab Results

Component	Value	Date/Time
CDIFFTOXINB	POSITIVE for C.difficle toxin by PCR. (A)	08/18/2019 08:50 PM

Remove the following orders?

Remove | Keep

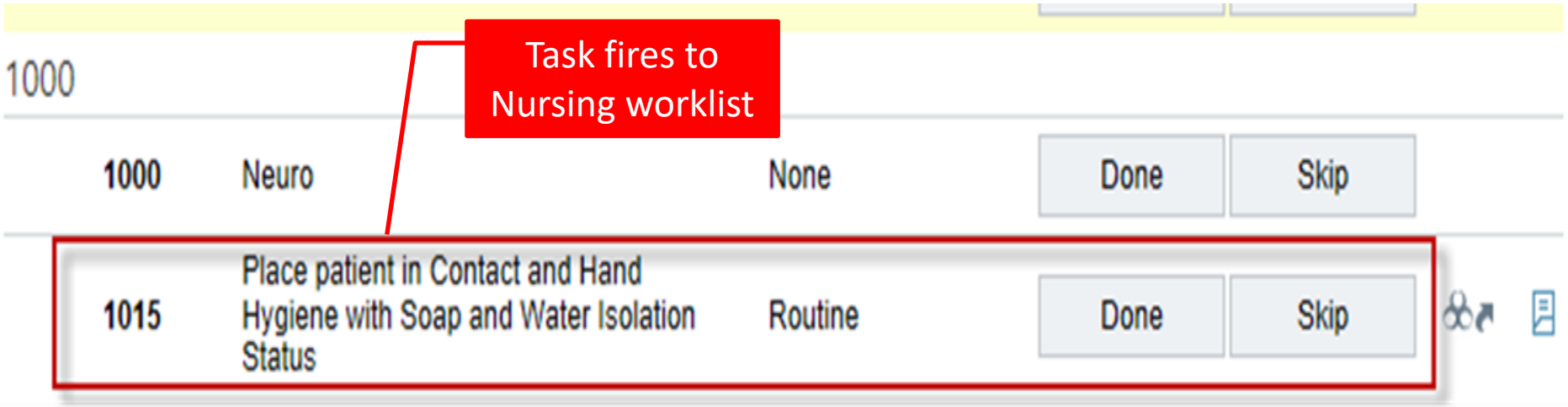
Clostridium difficile toxin by PCR
Once, First occurrence today at 1301 Stool

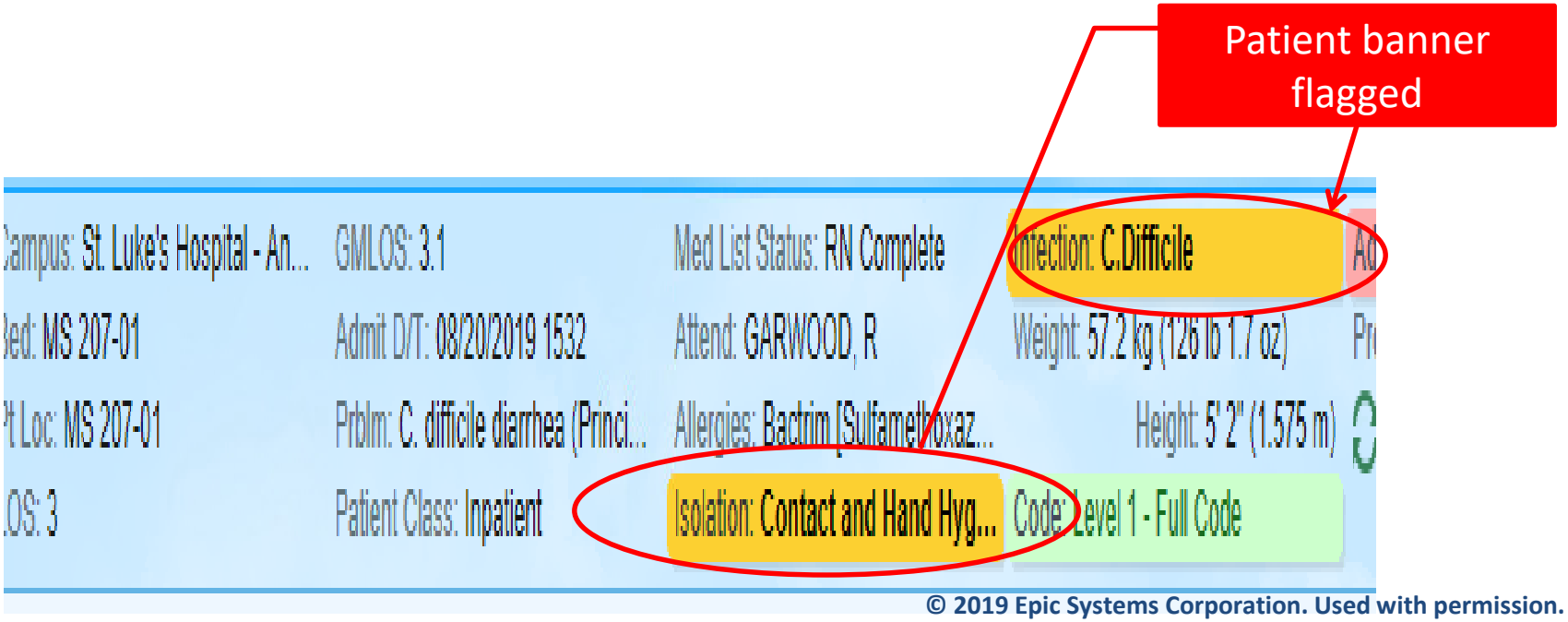
✓ Accept | Dismiss

Do-Check-Act

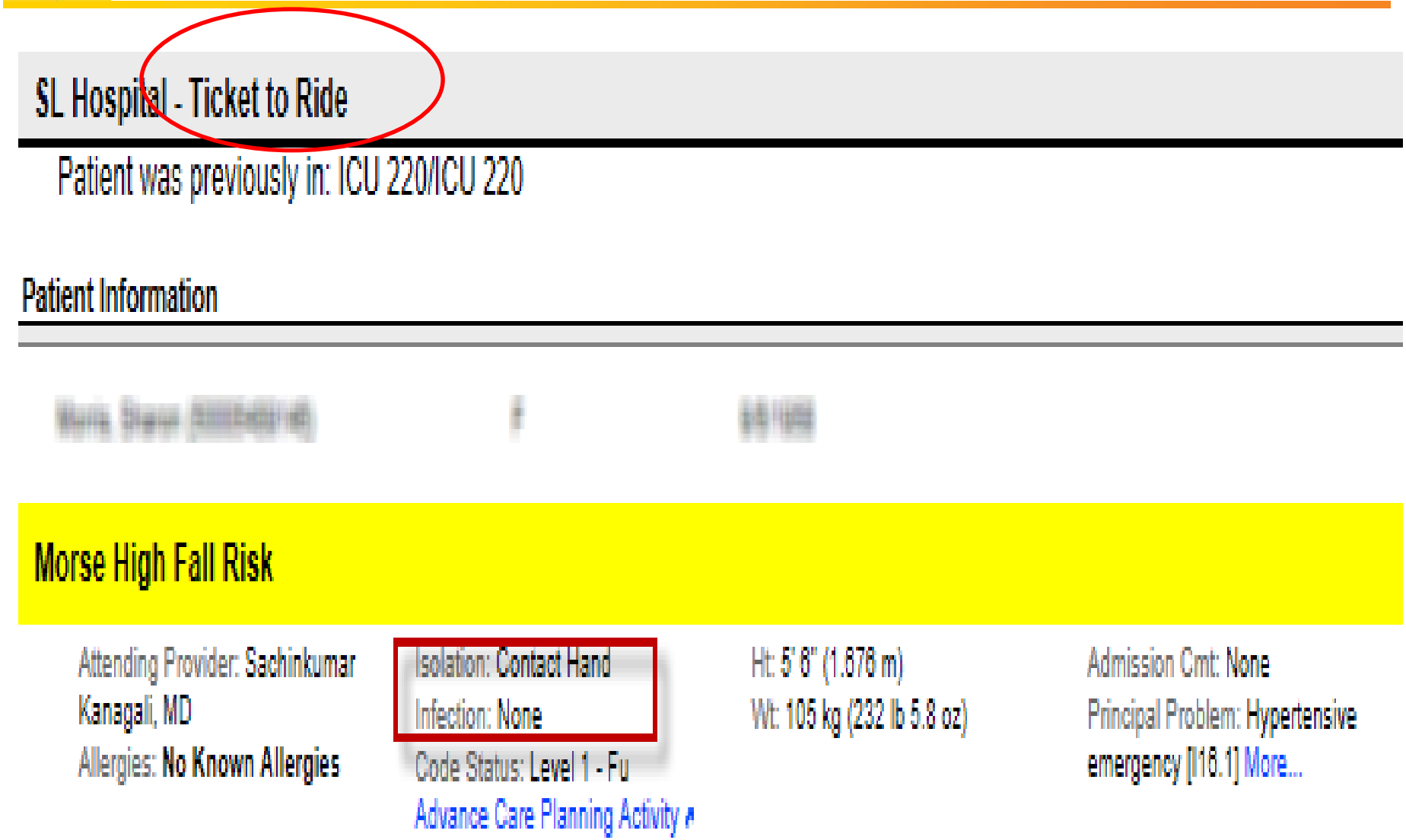
- Problem #4: Identified pattern of particular providers repeatedly bypassing BPA's when first implemented
  - **Solution**: EMR report setup to monitor ordering provider BPA trends and provided feedback/education

IT/Clinical Workflow Interventions





IT/Clinical Workflow Interventions



Environmental Services (EVS)

- EVS Command Center report alerts when patient room is for *C. difficile* isolation
- Task assigned to housekeeper and able to track
- Special daily and discharge cleaning protocol for *C. difficile* rooms implemented
- ATP testing of CDC identified high frequency touch surfaces and equipment
- ATP results are reported out quarterly at Infection Control Committee, and trends are addressed in real time by EVS manager; staff re-educated and surfaces re-cleaned and re-tested

IT/Clinical Workflow Interventions

EVS Command Center

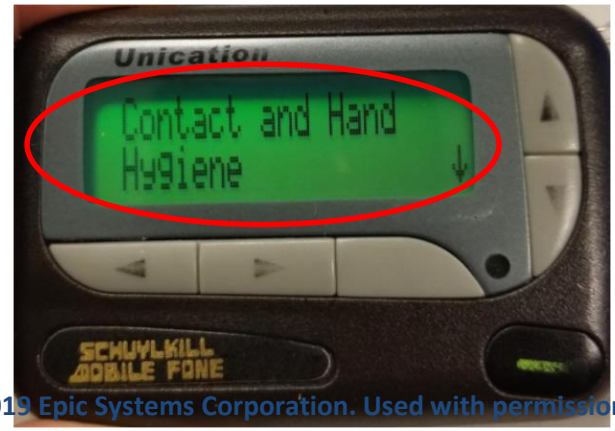
Location: St. Luke's University Hospital - Bett | Sector view | Assignments | Housekeepers

Current Assignments 2 · 0 · 0

Request	Housekeeper	Status	Priority	Cur/Tot Mins
PPHP 524-01	Remaly,Patricia	Assigned	Normal (Pt Asgn)	14/29
PPHP 828-01	Sonnon,Julie	Assigned	Normal	0/1

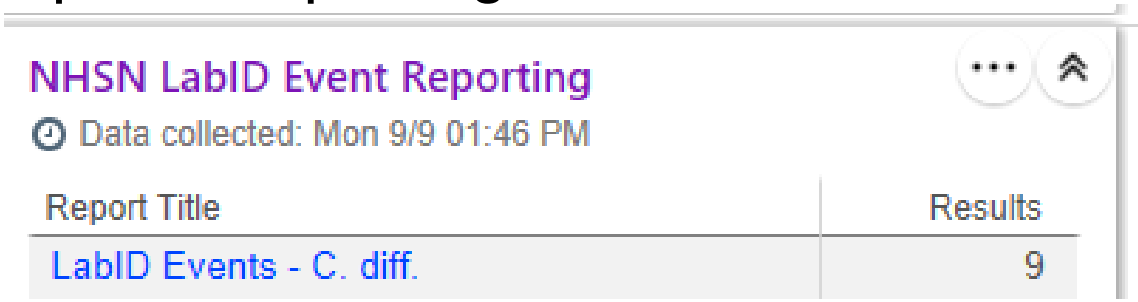
Requests 0 · 0 · 0

Request



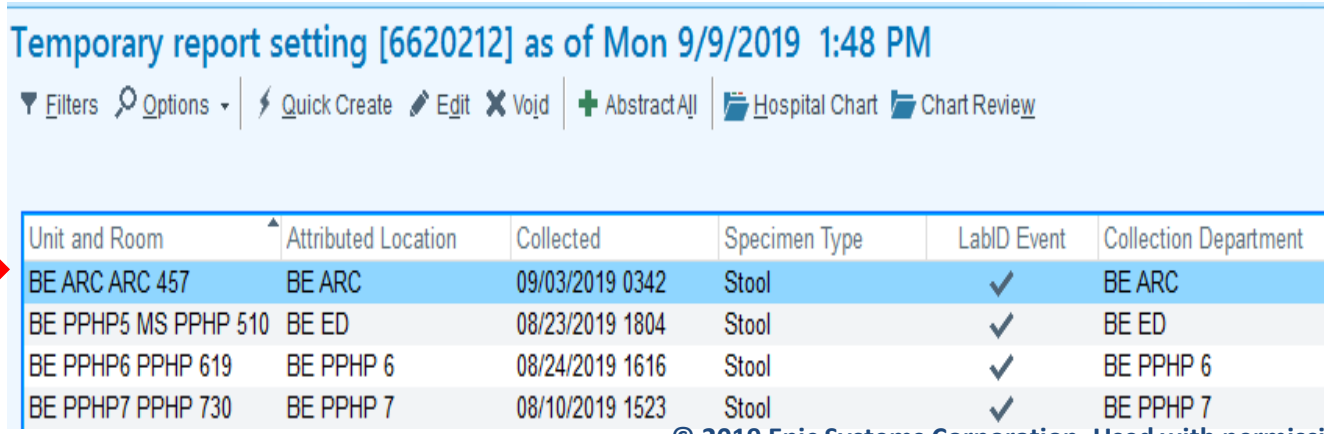
Public Reporting

- Infection Preventionists utilize an EMR Dashboard for surveillance and public reporting of HAI

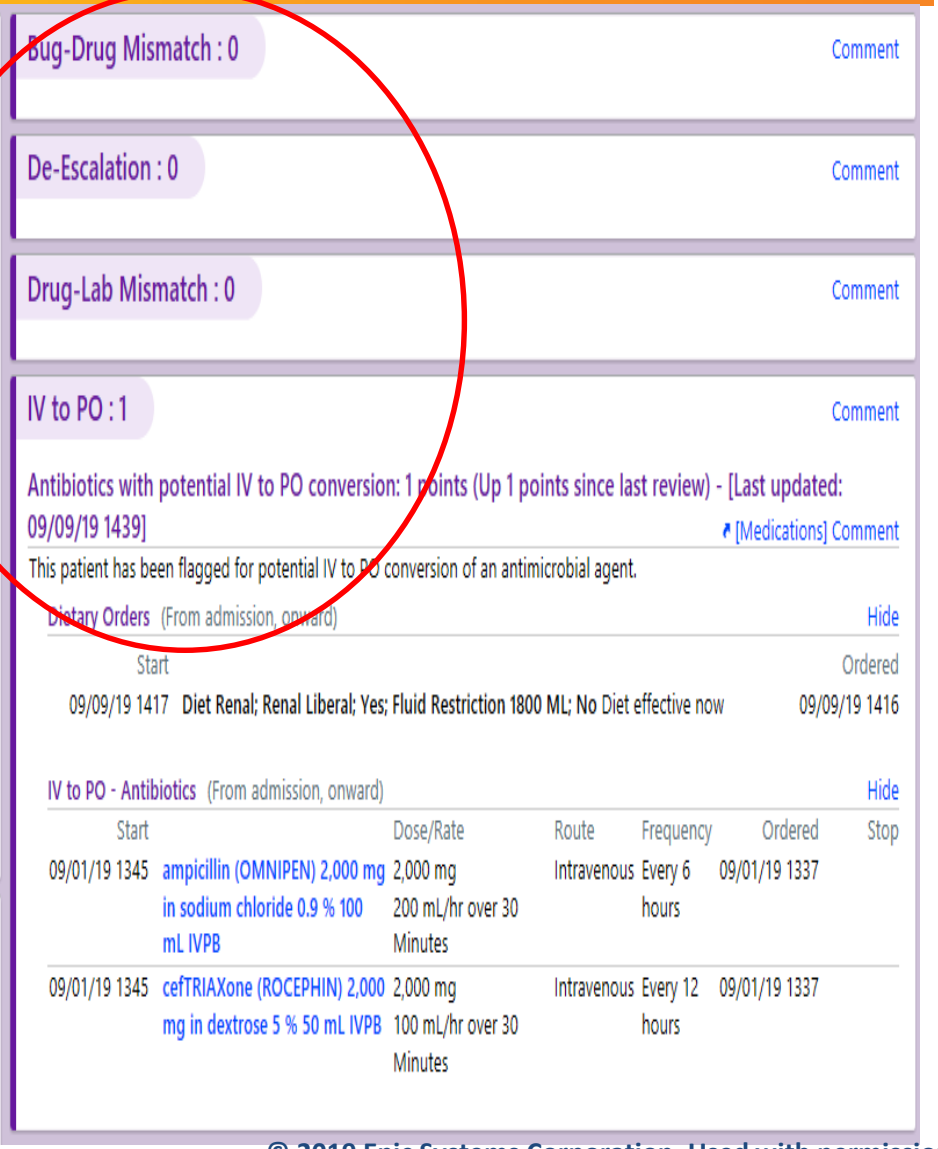


- *C. difficile* Lab ID Event data is extracted to create Clinical Document Architecture (CDA)

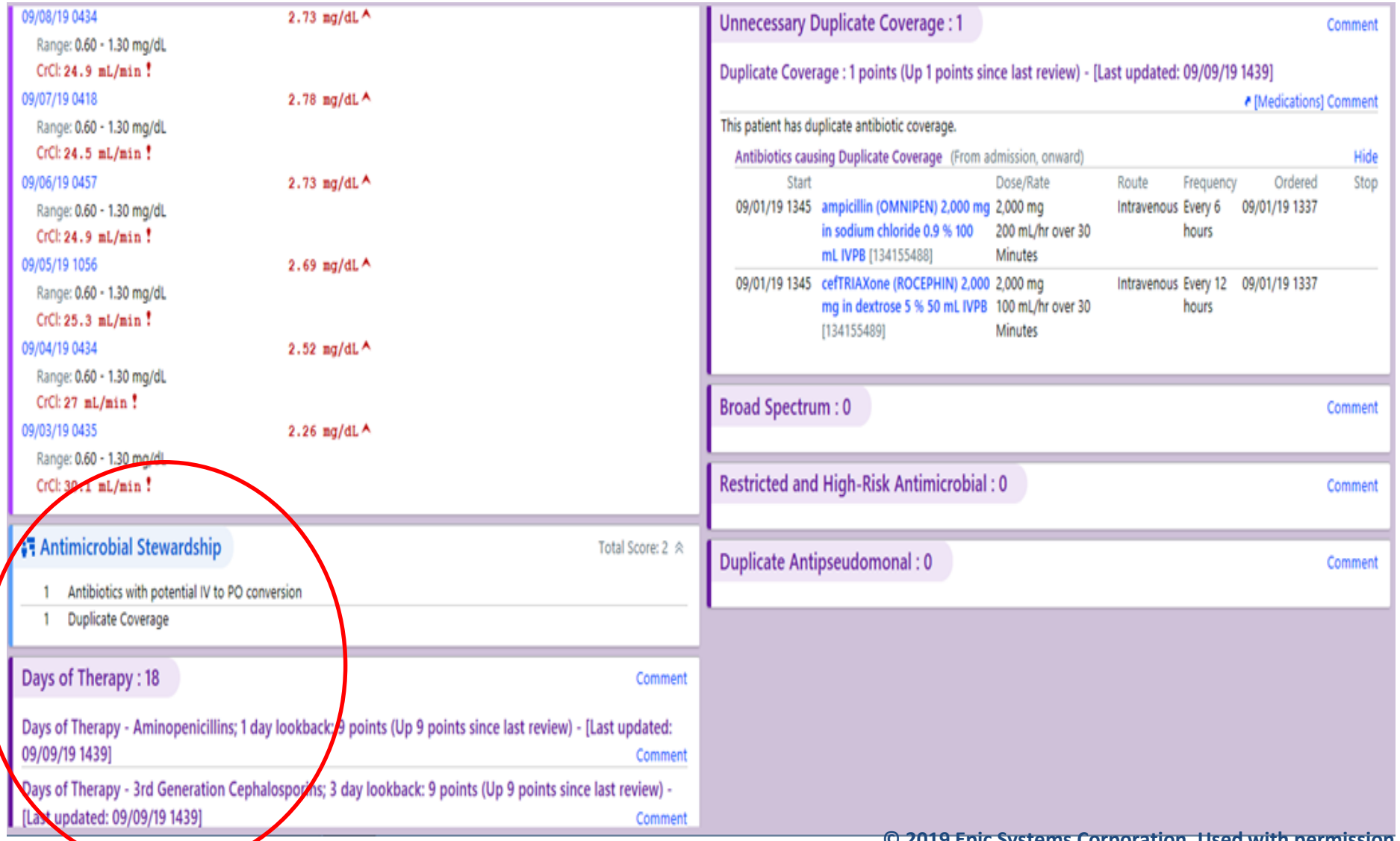
Accurately upload data to CDC NHSN



Antimicrobial Stewardship



Antimicrobial Stewardship



09/08/19 0434 2.73 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 24.9 mL/min !
09/07/19 0418 2.78 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 24.5 mL/min !
09/06/19 0457 2.73 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 24.9 mL/min !
09/05/19 1056 2.69 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 25.3 mL/min !
09/04/19 0434 2.52 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 27 mL/min !
09/03/19 0435 2.26 mg/dL ^
Range: 0.60 - 1.30 mg/dL
CrCl: 30.1 mL/min !

Antimicrobial Stewardship — Total Score: 2

1 Antibiotics with potential IV to PO conversion
1 Duplicate Coverage

Days of Therapy : 18 — Comment

Days of Therapy - Aminopenicillins; 1 day lookback: 9 points (Up 9 points since last review) - [Last updated: 09/09/19 1439] Comment

Days of Therapy - 3rd Generation Cephalosporins; 3 day lookback: 9 points (Up 9 points since last review) - [Last updated: 09/09/19 1439] Comment

Unnecessary Duplicate Coverage : 1 — Comment

Duplicate Coverage : 1 points (Up 1 points since last review) - [Last updated: 09/09/19 1439]
[Medications] Comment

This patient has duplicate antibiotic coverage.

Antibiotics causing Duplicate Coverage (From admission, onward) — Hide

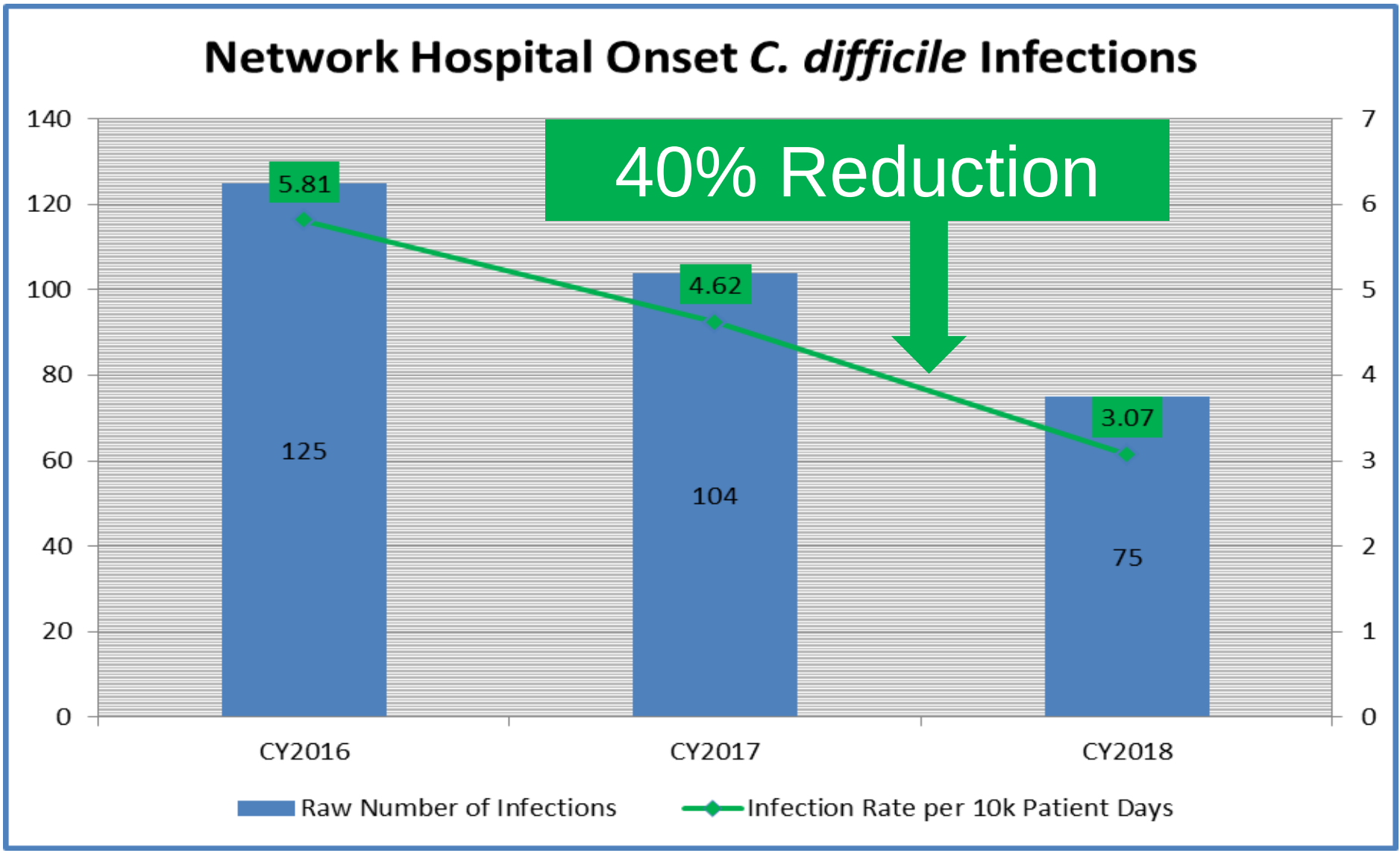
Start		Dose/Rate	Route	Frequency	Ordered	Stop
09/01/19 1345	ampicillin (OMNIPEN) 2,000 mg in sodium chloride 0.9 % 100 mL IVPB [134155488]	2,000 mg 200 mL/hr over 30 Minutes	Intravenous	Every 6 hours	09/01/19 1337	
09/01/19 1345	cefTRIAXone (ROCEPHIN) 2,000 mg in dextrose 5 % 50 mL IVPB [134155489]	2,000 mg 100 mL/hr over 30 Minutes	Intravenous	Every 12 hours	09/01/19 1337	

Broad Spectrum : 0 — Comment

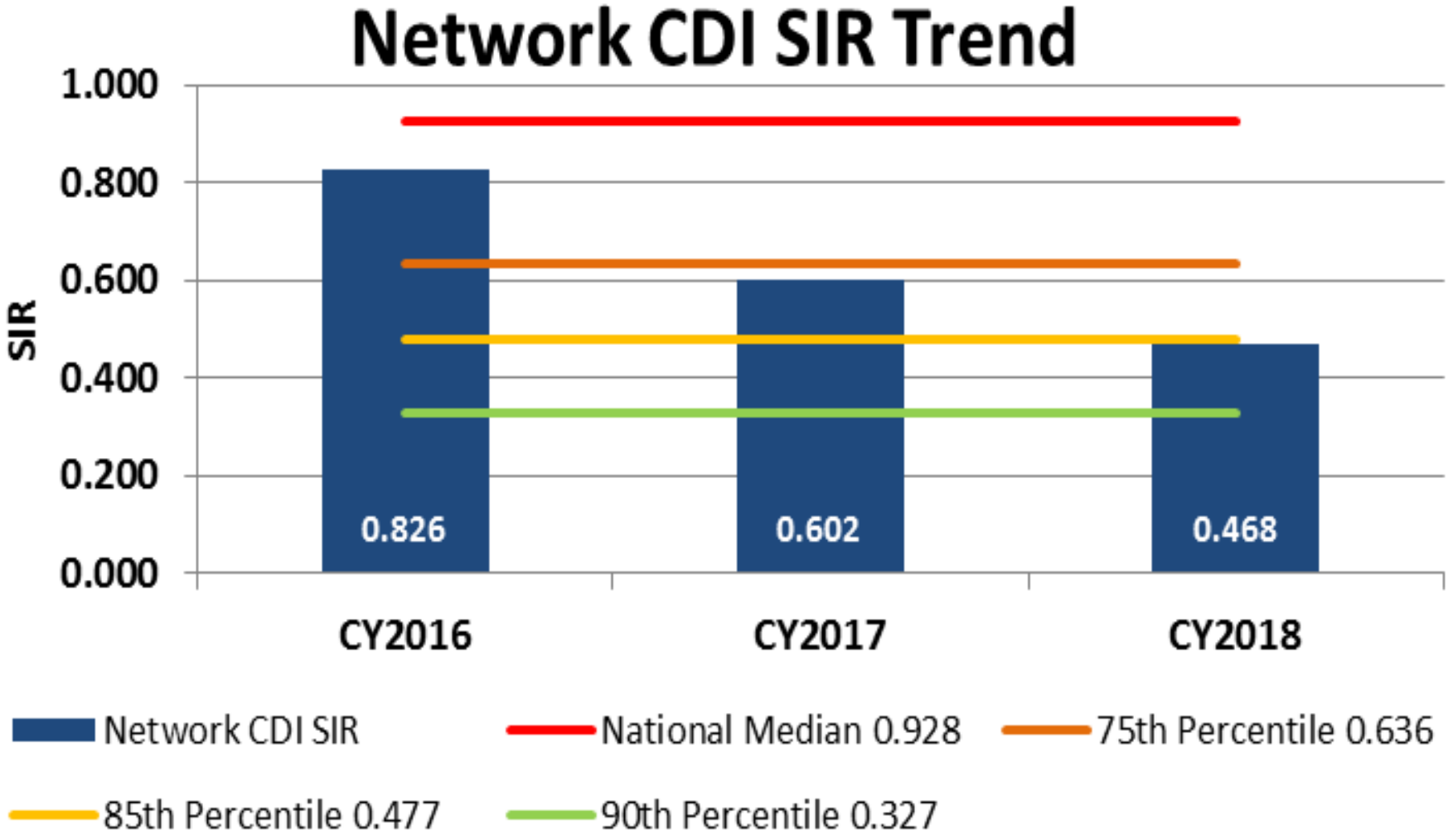
Restricted and High-Risk Antimicrobial : 0 — Comment

Duplicate Antipseudomonal : 0 — Comment

Outcome


Network Hospital Onset C. difficile Infections
40% Reduction
5.81
4.62
3.07
125
104
75
140
120
100
80
60
40
20
0
7
6
5
4
3
2
1
0
CY2016
CY2017
CY2018
Raw Number of Infections
Infection Rate per 10k Patient Days

National Benchmark Performance



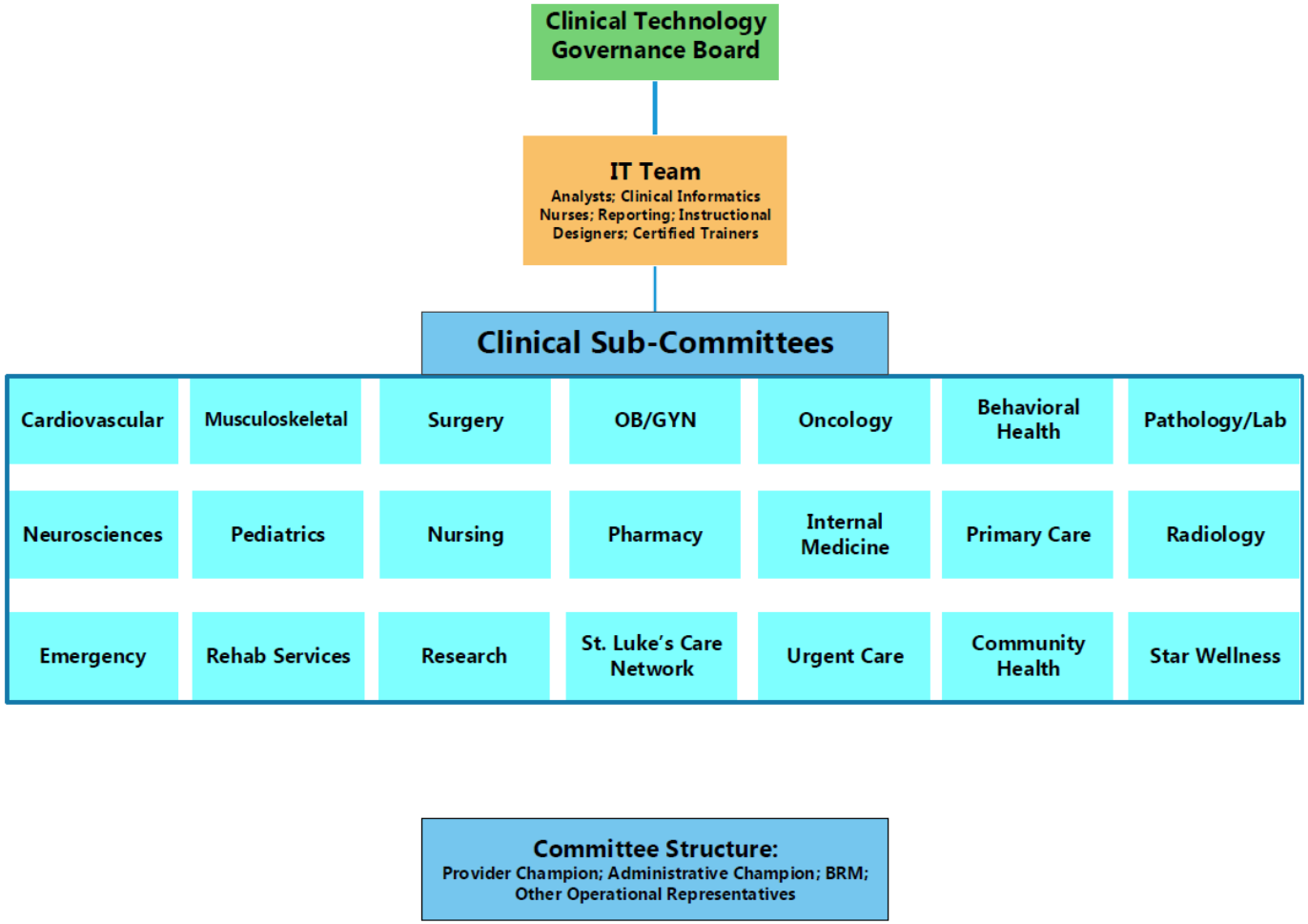
Outcome

- **Potential Cost Reduction**:
  - Cost: $11,285 per CDI in 2012 U.S. dollars
  - 50 less CDI CY2016-CY2018
  - $564,250.00 potential savings over a 3 year period

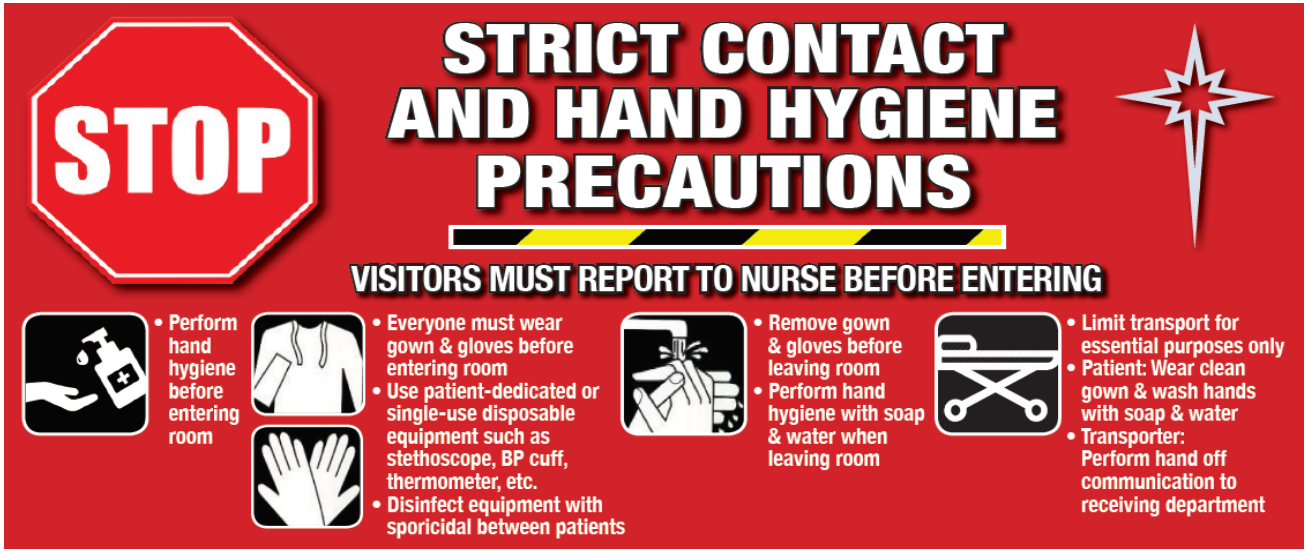
Lessons Learned

- Standardizing care and practice at each campus
- Multidisciplinary team- key players to success
- Harnessing use of IT technology
- Review loop and accountability
- Financial impacts

Clinical Technology Governance



Future State



1. New visual cue to match EMR isolation status
2. Two-step PCR to EIA reflexive testing
3. Procalcitonin trial in progress
4. Handwashing Protocols