

# Impact of a two-step diagnostic bundle on hospital-onset *Clostridioides difficile* infection rates and *C. difficile* treatment across a large health system



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Poster # 180

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## Background & Purpose

- Distinguishing acute *Clostridioides difficile* Infection (CDI) from colonization is a challenge due to high rates of colonization.
- Polymerase chain reaction (PCR) testing alone is not able to distinguish colonization from infection, leading to over-diagnosis and unnecessary treatment.
- Despite interventions including pre-approval by antimicrobial stewardship programs (ASP), reportable hospital-onset CDI (HO-CDI) standardized infection rates (SIR) remained high.
- In 2021, we implemented a *C. difficile* PCR with reflex toxin enzyme immunoassay (EIA) testing strategy to improve diagnostic accuracy and treatment outcomes.
- The purpose of this study was to evaluate the impact of this two-step testing algorithm bundled with education, ASP support and order set changes on HO-CDI rates and *C. difficile* treatment across our health system.

## Methods

- Two-step testing algorithm (PCR with EIA) was implemented between May and August 2021 across seven hospitals within the Northwestern Medicine Health System (Figure 1).
- Multifaceted education was delivered to leadership and clinicians in person as well as electronically. ASP performed daily diagnostic prospective audit, result interpretation, and management support.
- Clinical decision support (CDS) was incorporated into order sets to promote diagnostic stewardship (Table 1, Figure 1).
- Standardization of analyst-developed tracking reports allowed for longitudinal monitoring across the system and at each facility, including unit- and patient-level data.

Table 1: Updated *C. Difficile* Testing algorithm

Index Result	CDI Test Performed in Past 7 days	CDI Test Performed in Past 8-30 days
PCR-	Retest blocked	OK to retest
PCR+/toxin EIA-	Retest blocked	OK to retest
PCR+/toxin EIA+	Retest blocked	Retest blocked

## Results

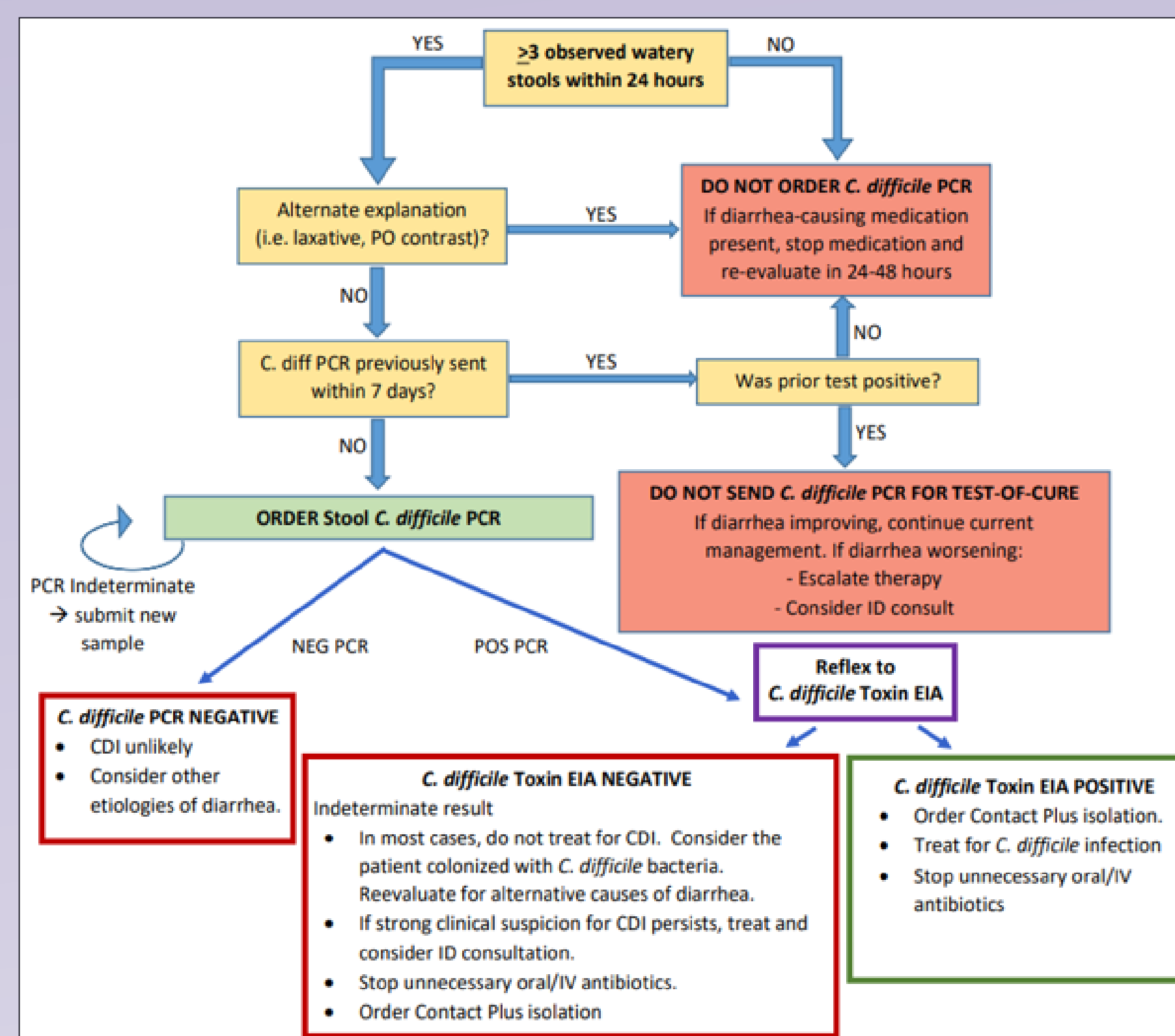


Figure 1: Two-step *C. difficile* PCR/Reflex Toxin EIA Ordering Algorithm & Result Interpretation.

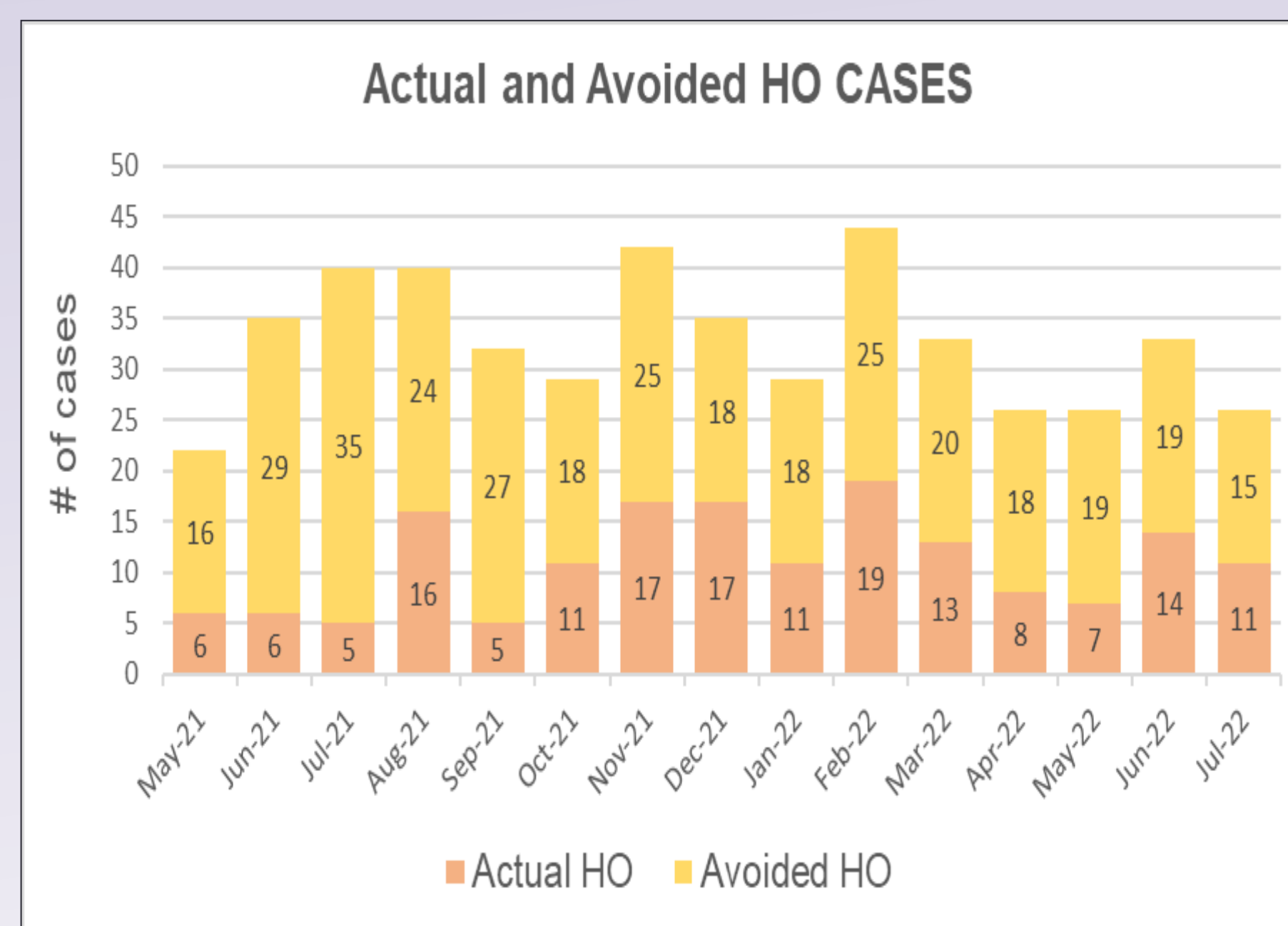


Figure 3: Rates of actual and avoided hospital onset CDI cases post implementation period.

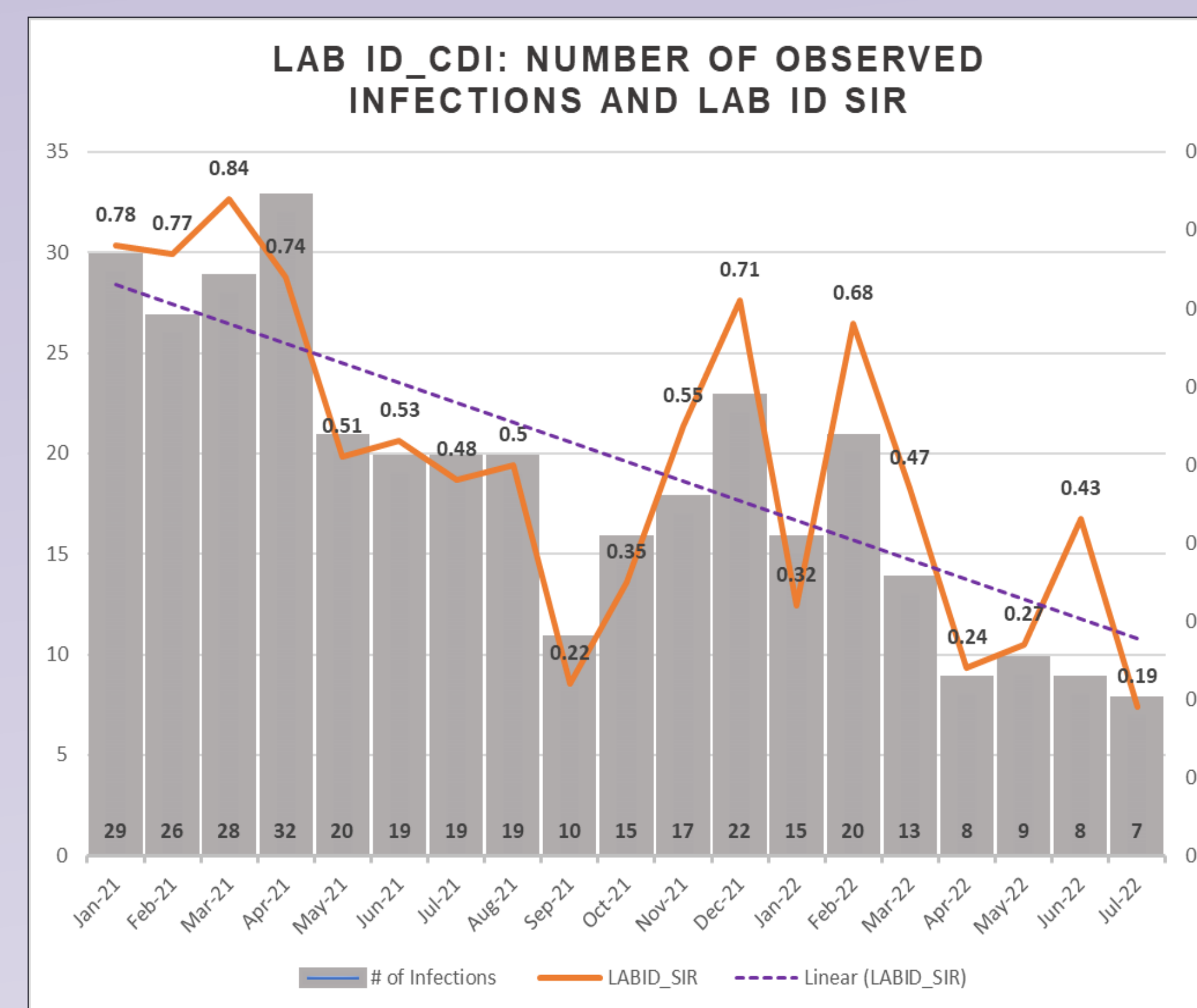


Figure 2: CDI SIR over the 12-month post implementation period.

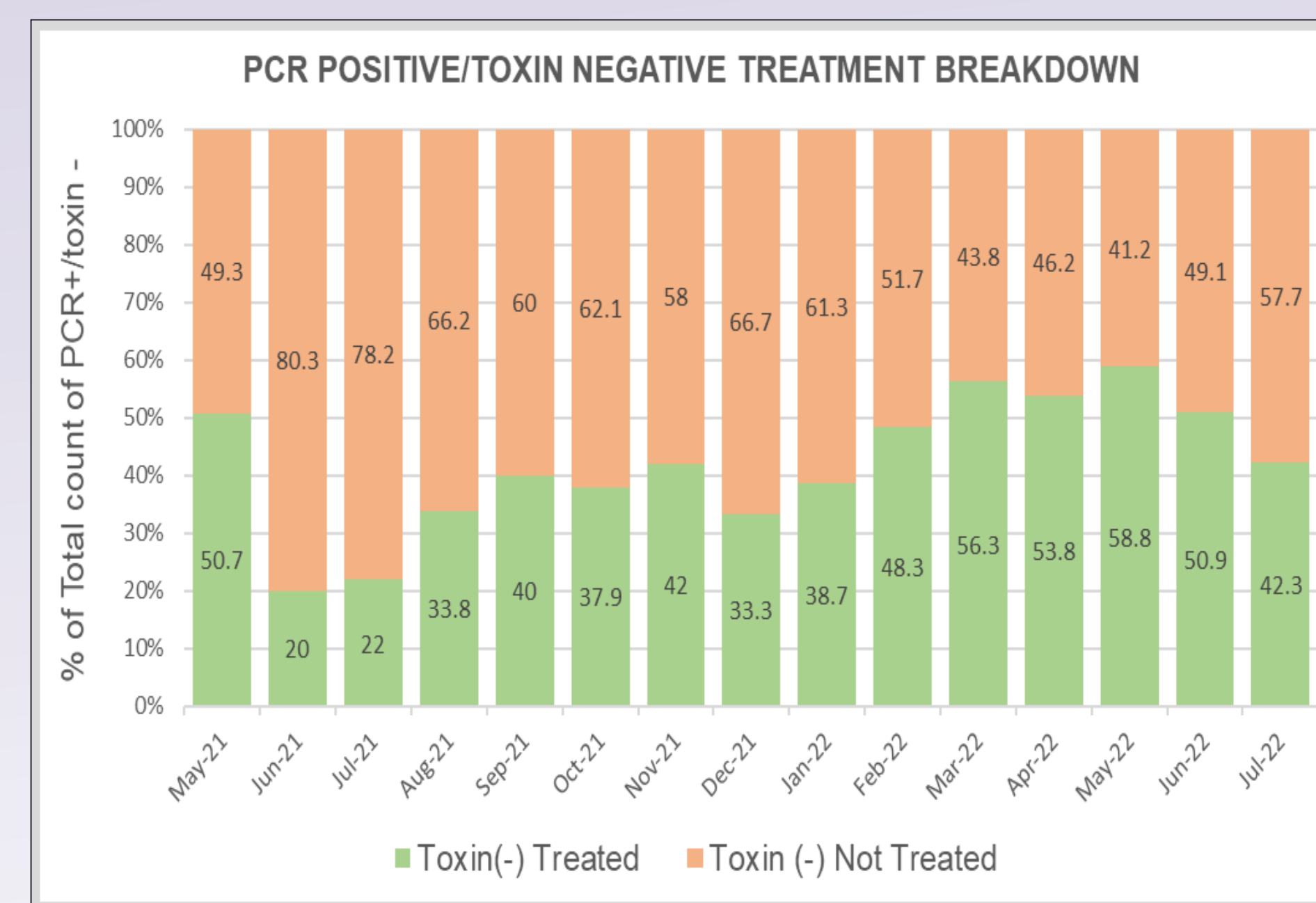


Figure 4: Rates of PCR positive/toxin negative treatment post implementation period.

## Discussion & Conclusions

### Results

- The HO-CDI SIR reduced significantly from 0.8 to 0.57 ( $p < 0.001$ ) (Figure 2)
- Reportable HO-CDI cases reduced by 238 cases across the health-system between May 2021 and March 2022. (Figure 3)
- Using the 2-step process helped avoid treatment in 40-80 percent of patients who were PCR positive/toxin negative (Figure 4)
- 10,103 samples were tested, of which 411 (4.1%) were confirmed CDI cases (PCR+/toxin+) and 1112 (11%) were toxin negative samples (PCR+/toxin-).
- Out of toxin negative samples, (PCR+/toxin-), 644 (58%) received any CDI treatment. (Figure 4)

### Conclusions:

- The two-step CDI diagnostic and treatment bundle significantly reduced the HO-CDI SIR. Although treatment of colonized patients remained high, a large number of patients safely avoided CDI treatment.
- Testing and education bundles can help advance antimicrobial and diagnostic stewardship by improving detection, treatment, and tracking of CDI.

### Limitations:

- NHSN adjusts the CDI SIR based on the test used and NAAT testing alone was the long-standing test prior to change to a two-step algorithm in May 2021.
- COVID-19 pandemic resulted in wide variations in patients admitted and staffing changes which may have skewed the results.

## Disclosures

No author of this study has any financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

