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Modifying the CDCs Guidelines for Isolation Precautions for Multi-Drug Resistant Organisms (MDROs): Using Contact Precautions Only for Clearly Defined Portals of Exit

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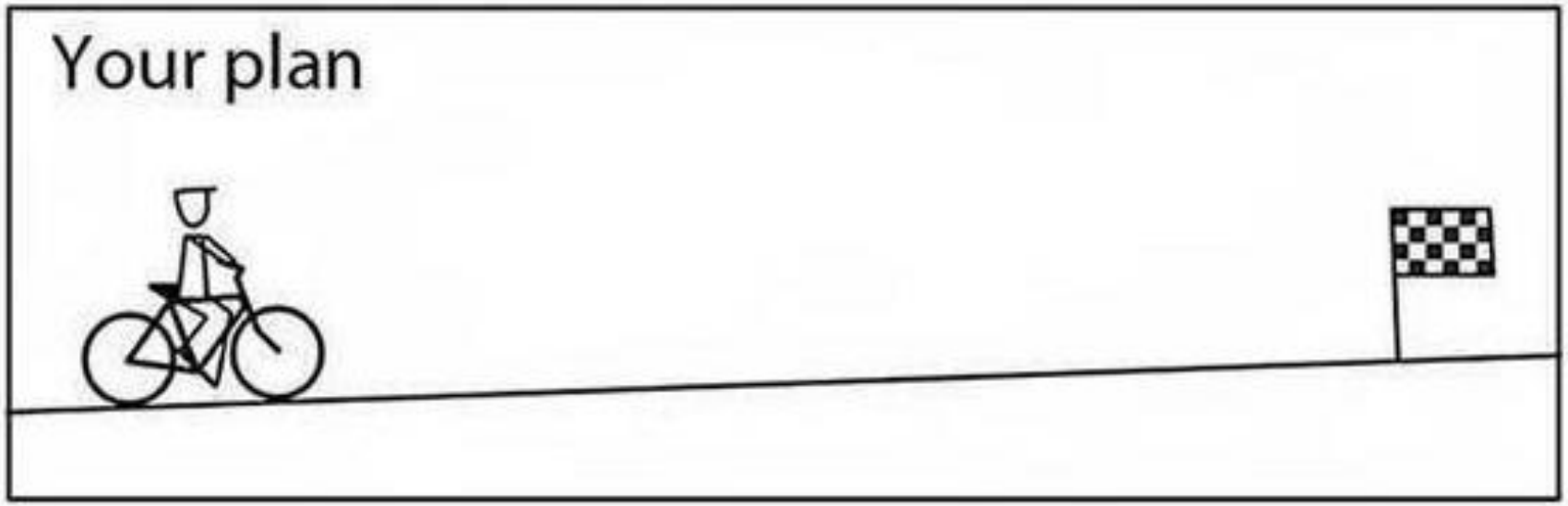
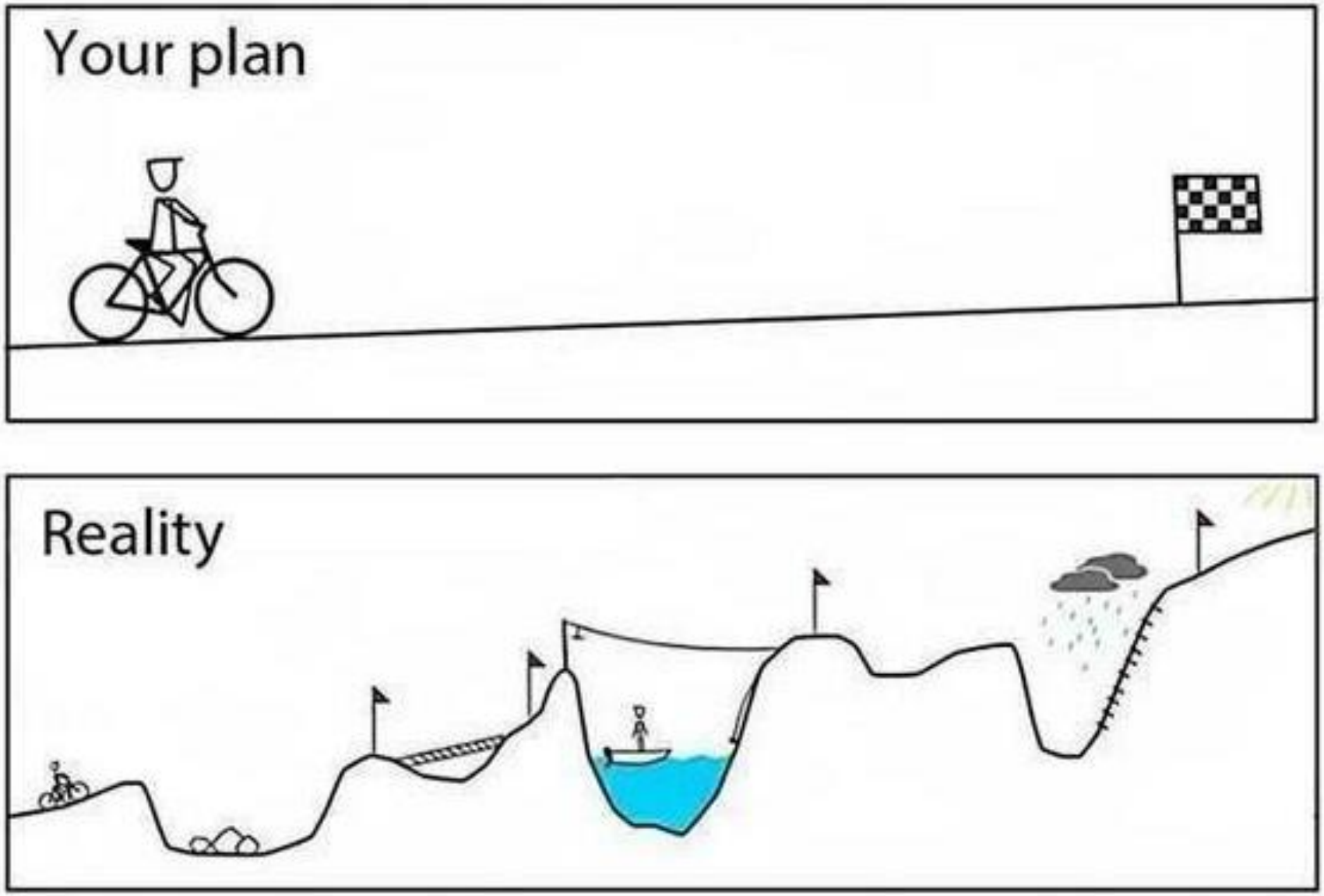
Objectives

1. Describe the rationale for substantially altering the use of Contact Precautions for MDROs
2. State three advantages for hospital operations by using a substantially modified Isolation Precautions approach for MDROs
3. State three challenges with modifying the CDC's Isolation Guidelines for MDROs

Modifying the CDCs Guidelines…

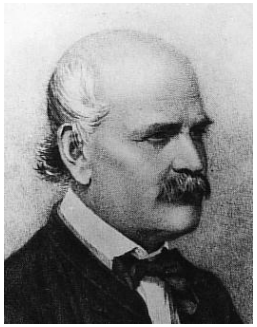
- Challenging, but possible
- We all modify them at least a bit, right?
- Maybe we could call it “re-interpreting…”


Your plan


Your plan
Reality

Isolation Precautions Background

- Healthcare-based Isolation Practices have a surprisingly lengthy history
- Mid-1800s: Hospital Infection Prevention starts
  - Semmelweis (Austria) – 1847
  - Pasteur (France) – 1857
- 1853-54: Our first significant “IP” hospital model came from Florence Nightingale
- Mid-1870s: US began Infectious Disease Hospitals, closed in 1950s (TB ones in 1960s)
- 1910: began the Cubicle System = Barrier Nursing Practices, the earliest modern isolation system



The CDC Finally Gets Involved

- 1970: the CDC's first guidelines, 7 categories of precautions
- 1975 & 1983: CDC updated guidelines, "Blood and Body Fluid," deleted Protective Precautions
- 1985: Universal Precautions replaced Blood & Body Fluid Precautions

- 1987: Body Substance Isolation

- 1991: OSHA Bloodborne Pathogens Standard

Modern Era – Isolation Precautions

- 1996: CDC/HICPAC group updated isolation guidelines
  - Established Standard Precautions
  - Established Airborne, Droplet, & Contact Precautions, used alone or in appropriate combination

- 2006: CDC issued lengthy multi-drug resistant organism (MDRO) guidelines
  - reviewed epidemiology
  - graded recommendations for control and prevention

Present-Day CDC Guidelines

- 2007: CDC's current Isolation Guidelines
  - Standard + Airborne – Droplet – Contact Precautions continued
  - Added guidance for non-hospital settings
  - Broadened guidance for emerging and evolving pathogens
  - Respiratory Hygiene/Cough Etiquette
  - Safe injection practices
  - Use of masks for insertion of catheters or injection of material into spinal or epidural spaces
  - Increased emphasis on environmental controls for at-risk patient populations
  - Added focus on MDROs and Healthcare Associated Infections (HAIs)

Newest CDC Guidelines

- 2009: Guidance for Control of Infections with [CRE]… in Acute Care Facilities (MMWR 3/20/2009)
- "Controlling" CRE may be challenging; It's in our communities, and thus our hospitals
  - **"in some areas of the United States, notably New York City, *CRE are routinely recovered, including from many patients who are admitted from the community.*** In these settings, point prevalence surveys in response to detected clinical cases might be less useful in controlling transmission of CRE. ***Facilities in regions where CRE are endemic should monitor clinical cases of CRE and implement the intensified (i.e., Tier 2) infection control strategies outlined in the 2006 HICPAC guidelines if rates of CRE are not decreasing (2)."***

Newest CDC Guidelines

- 2015: Updated the 2009/2012 CRE Control Guidelines:
- Simplified recommendations from two tiers into one
- Continued call for Hand Hygiene and Contact Precautions for all patients colonized and infected with CRE
- Expanded information about types of CRE and laboratory guidance / testing methodology
- Detailed multiple surveillance culture strategies
- Tried to differentiate how to manage CRE in acute vs. long term care settings
- Referred back to 2006 MDRO guidelines

Limitations of CDC Guidelines?

- Initiation/discontinuation information for Contact Precautions emphasized need for “more studies,” with no clarity on when to discontinue precautions
- “Patients with MDROs/MDRO carriers [may be] colonized permanently and manage them accordingly.”
- Long Term Care – *may* need Contact Precautions “when there is continued transmission”
- Ambulatory/Home care – the “risk of [MDRO] transmission…has not been defined. Consistent use of Standard Precautions may suffice in these settings, but more information is needed.”

Brief Commentary on Guidelines

- HICPAC is methodological, detailed, thorough, well-researched, consensus-seeking, and often ***slow***.
- Strategies for MDRO control are complex, time intensive, expensive, with little evidence for success
- Guidelines pre-date era of public reporting
- Rigid, one-size fits all, for acute care
- Lack evidence for managing multiple sites of care differently (e.g., outpatient vs. inpatient)
- Assume colonization creates same risk as infection with active portal of exit
- Insufficiently address community burden of MDROs

State of the State/Reality

- Our world: NYU Langone Medical Center, NYC
  - Main Hospital is Tisch & HCC Pavilions (705 beds)
  - Hospital for Joint Diseases ~ 190 beds
  - Lutheran Medical Center (450 beds) – new as of 1/1/16
- Tisch-HCC-HJD - 15,000 employees, ~65 Operating Rms, ~ 95 ICU beds, ~39,000 Admissions, ~4,600 Births, >650,000 Outpatient Visits
- IPC Department = 7 RNs, ~1:150 ratio, 5 Data Staff, 1 Administrative Assistant, 1 MD Hospital Epidemiologist, & 4 p/t MD Associate Epidemiologists (~1.2 FTE total)

State of the State: NYU Pre-07/2015

- Inpatient Rooms – mostly 2 patient rooms, a few singles, a few quads or triples – most are “step down units”
- EMR gave reliable alerts for past MDRO infections (2007)
- Patients were readmitted to Contact Precautions (CP) if past MDRO infection was within about 1 year (managed on a case-by-case)
- Nov. 1, 2012 to mid-Jan 2013: Hospital CLOSED – due to Superstorm Sandy
- Since reopening, census as high / higher than pre-Sandy
- Past ~ 12 months – daily alerts about hallway patients, PACU borders, regardless of season, precautions-stress

State of the State: NYU Pre-07/2015

- NYU IPC department follows 2007 CDC guidelines for isolation precautions pretty much "by the book" *… but …*
- PPE needed when in the "patient zone" (remember – 2 patient room structure)
- Pediatric patients with viral respiratory pathogens – Contact and Droplet Precautions for duration of illness
  - Biofire PCR respiratory viral panel testing (2013)
- Patients with diarrhea – CP until symptom-free for 48 hours (2008)
  - *C. difficile* – mandatory private room/blocked bed, or cohort and CP until symptom-free for 48 hours; now use PCR testing (2012)

State of the State: NYU Pre-07/2015

- MDROs (2008): Use CP
  - Blood – if patient had any form of a central line
  - Respiratory, Wound, or Urine (unless pt voiding independently)
  - Body site with any portal of exit (e.g., bile with a drain)
- CP stopped when acute infection “resolved”
- Cohorted like organisms only, meant lots of blocked beds

- MRSA – no CP for nasal colonized pts
- VRE – no CP (2008)
- Stool with MDROs – No CP

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Control of Pathogens: Current State

Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006

Jane D. Siegel, MD; Emily Rhinehart, RN MPH CIC; Marguerite Jackson, PhD; Linda Chiarello, RN MS; the Healthcare Infection Control Practices Advisory Committee

Acknowledgement:
The authors and HICPAC gratefully acknowlege Dr. Larry Strausbaugh for his many contributions and valued guidance in the preparation of this guideline.

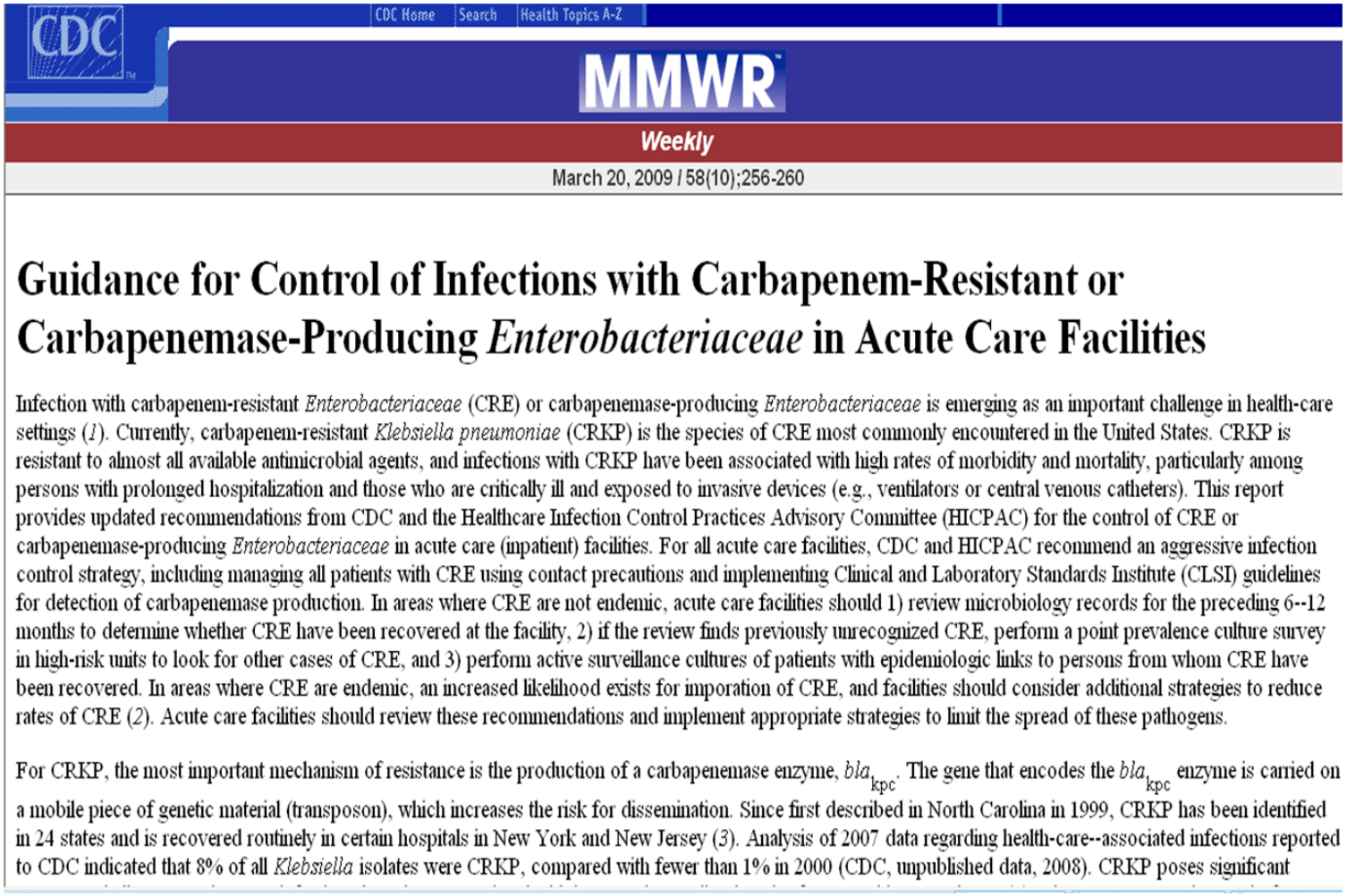
- Rules based
- Prevention efforts not focused

Control of Pathogens: Current State

2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

Jane D. Siegel, MD; Emily Rhinehart, RN MPH CIC; Marguerite Jackson, PhD; Linda Chiarello, RN MS; the Healthcare Infection Control Practices Advisory Committee

Klebsiella pneumoniae Carbapenemase (KPC) Guidelines



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MMWR

Weekly

March 20, 2009 / 58(10);256-260

Guidance for Control of Infections with Carbapenem-Resistant or Carbapenemase-Producing *Enterobacteriaceae* in Acute Care Facilities

Infection with carbapenem-resistant *Enterobacteriaceae* (CRE) or carbapenemase-producing *Enterobacteriaceae* is emerging as an important challenge in health-care settings (*1*). Currently, carbapenem-resistant *Klebsiella pneumoniae* (CRKP) is the species of CRE most commonly encountered in the United States. CRKP is resistant to almost all available antimicrobial agents, and infections with CRKP have been associated with high rates of morbidity and mortality, particularly among persons with prolonged hospitalization and those who are critically ill and exposed to invasive devices (e.g., ventilators or central venous catheters). This report provides updated recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC) for the control of CRE or carbapenemase-producing *Enterobacteriaceae* in acute care (inpatient) facilities. For all acute care facilities, CDC and HICPAC recommend an aggressive infection control strategy, including managing all patients with CRE using contact precautions and implementing Clinical and Laboratory Standards Institute (CLSI) guidelines for detection of carbapenemase production. In areas where CRE are not endemic, acute care facilities should 1) review microbiology records for the preceding 6--12 months to determine whether CRE have been recovered at the facility, 2) if the review finds previously unrecognized CRE, perform a point prevalence culture survey in high-risk units to look for other cases of CRE, and 3) perform active surveillance cultures of patients with epidemiologic links to persons from whom CRE have been recovered. In areas where CRE are endemic, an increased likelihood exists for imporation of CRE, and facilities should consider additional strategies to reduce rates of CRE (*2*). Acute care facilities should review these recommendations and implement appropriate strategies to limit the spread of these pathogens.

For CRKP, the most important mechanism of resistance is the production of a carbapenemase enzyme, bla_{kpc}. The gene that encodes the bla_{kpc} enzyme is carried on a mobile piece of genetic material (transposon), which increases the risk for dissemination. Since first described in North Carolina in 1999, CRKP has been identified in 24 states and is recovered routinely in certain hospitals in New York and New Jersey (*3*). Analysis of 2007 data regarding health-care--associated infections reported to CDC indicated that 8% of all *Klebsiella* isolates were CRKP, compared with fewer than 1% in 2000 (CDC, unpublished data, 2008). CRKP poses significant

Control of Pathogens: Current State

Facility Guidance for Control of Carbapenem-Resistant *Enterobacteriaceae* (CRE) November 2015 Update

This document updates CDC's Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE): 2012 CRE Toolkit. Unless otherwise specified, the term healthcare facility refers to all acute care hospitals and any long-term care facility tha has patients who remain overnight and regularly require medical or nursing care (e.g maintenance of indwelling devices, intravenous injections, wound care, etc.). This includes all long-term acute care hospitals and nursing homes providing skilled nurs

Benefits of Contact Precautions

- Minimize pathogen transmission
- Reduce hospital acquired infections
- Lower morbidity
- When used as a multipronged approach to outbreaks, can increase improvement
- More cost effective to pay for control measures than potential spread of infections

Harms from Contact Precautions

- Less patient-health care worker contact
- Changes/delays in systems of care
- Increased symptoms of depression/anxiety
- Decreased patient satisfaction
- Impact on patient safety (falls, pressure sores)
- Increased costs and waste
- Uncomfortable for family members
- CP was a problem even a decade ago!

Rationale for Changing CP

- Growing evidence between contact precautions and increased complications
- Mitigating risks for patients who truly need isolation vs patients who can go without
- Optimizing patient safety while promoting patient centered care
- CP compliance is challenging
- Improved patient throughput
- Decrease cost of isolation care

Changed CP

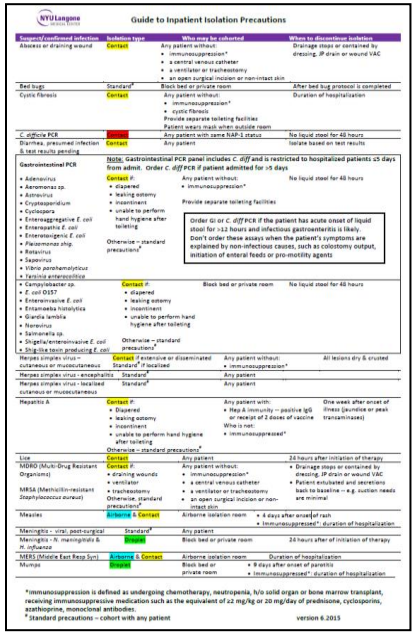
- CP policies modified to be used only when:
  - Draining wounds
  - Ventilator, tracheostomy with significant secretions
- No CP for
  - Wounds CDI
  - Urinary catheters, central lines, drains, etc.
  - Respiratory infection w/o significant sputum production

Change Management

- Revised hospital policies and protocols
- Developed new guidelines
- Strategic roll-out
  - Massive education/inservices
  - Unit based and executive meetings
  - Distribution of large, laminated guides
- Updates to intranet site
- Education is a never-ending activity

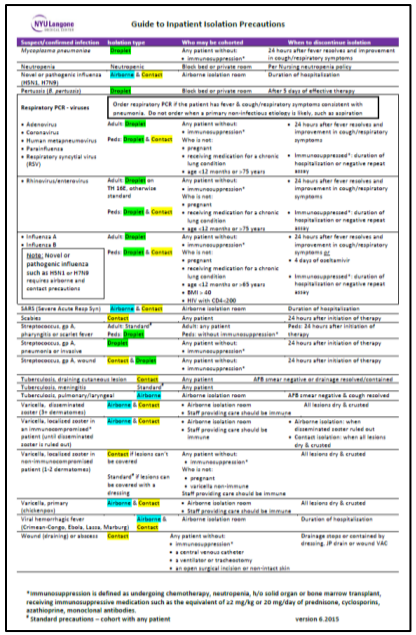
NYULMC CP Policy 07/2015

2. **Patient Placement**
    a. Patients should be placed in a private room or in a room with an adjacent blocked bed. When a private room is not available, place the patient in a room with another patient who is infected/colonized with the same microorganism (cohorting).
    b. When a private room is not available and cohorting is not achievable, consider the epidemiology of the microorganism and the patient population when determining appropriate patient placement. The following criteria must be satisfied if a private room is not available and cohorting is not achievable:
        - 3 feet of separation between the beds of the patient requiring Contact Precautions and other patients.
        - Separate toileting arrangement for patient requiring Contact Precautions and other patients.
        - The patient in bed next to the patient on Contact Precautions is expected to have a short length of stay and is at low risk for infectious complications.



Guide to Inpatient Isolation Precautions

Suspect/confirmed infection	Isolation type	Who may be cohorted	When to discontinue isolation
Abscess or draining wound	Contact	Any patient without: • immunosuppression* • a central venous catheter • a ventilator or tracheostomy • an open surgical incision or non-intact skin	Drainage stops or contained by dressing, JP drain or wound VAC
Bed bugs	Standard#	Block bed or private room	After bed bug protocol is completed
Cystic Fibrosis	Contact	Any patient without: • immunosuppression* • cystic fibrosis Provide separate toileting facilities Patient wears mask when outside room	Duration of hospitalization
C. difficile PCR	Contact	Any patient with same NAP-1 status	No liquid stool for 48 hours
Diarrhea, presumed infection & test results pending	Contact	Any patient	Isolate based on test results
Gastrointestinal PCR • Adenovirus • Aeromonas sp. • Astrovirus • Cryptosporidium • Cyclospora • Enteroaggregative *E. coli* • Enteropathic *E. coli* • Enterotoxigenic *E. coli* • Plesiomonas shig. • Rotavirus • Sapovirus • *Vibrio parahemolyticus* • Yersinia enterocolitica	Note: Gastrointestinal PCR panel includes *C. diff* and is restricted to hospitalized patients ≤5 days from admit. Order *C. diff* PCR if patient admitted for >5 days Contact if: • diapered • leaking ostomy • incontinent • unable to perform hand hygiene after toileting Otherwise – standard precautions#	Any patient without: • immunosuppression* Provide separate toileting facilities Order GI or *C. diff* PCR if the patient has acute onset of liquid stool for >12 hours and infectious gastroenteritis is likely. Don't order these assays when the patient's symptoms are explained by non-infectious causes, such as colostomy output, initiation of enteral feeds or pro-motility agents	No liquid stool for 48 hours
• Campylobacter sp. • *E. coli* O157 • Enteroinvasive *E. coli* • Entamoeba histolytica • Giardia lamblia • Norovirus • Salmonella sp. • Shigella/enteroinvasive *E. coli* • Shig-like toxin producing *E. coli*	Contact if: • diapered • leaking ostomy • incontinent • unable to perform hand hygiene after toileting Otherwise – standard precautions#	Block bed or private room	No liquid stool for 48 hours
Herpes simplex virus – cutaneous or mucocutaneous	Contact if extensive or disseminated Standard# if localized	Any patient without: • immunosuppression*	All lesions dry & crusted
Herpes simplex virus - encephalitis	Standard#	Any patient	
Herpes simplex virus - localized cutanous or mucocutaneous	Standard#	Any patient	
Hepatitis A	Contact if: • Diapered • leaking ostomy • incontinent • unable to perform hand hygiene after toileting Otherwise – standard precautions#	Any patient with: • Hep A immunity -- positive IgG or receipt of 2 doses of vaccine Who is not: • immunosuppressed*	One week after onset of illness (jaundice or peak transaminases)



Guide to Inpatient Isolation Precautions

Suspect/confirmed infection	Isolation type	Who may be cohorted	When to discontinue isolation
Mycoplasma pneumoniae	Droplet	Any patient without: • immunosuppression*	24 hours after fever resolves and improvement in cough/respiratory symptoms
Neutropenia	Neutropenic	Block bed or private room	Per Nursing neutropenia policy
Novel or pathogenic influenza (H5N1, H7N9)	Airborne & Contact	Airborne isolation room	Duration of hospitalization
Pertussis (*B. pertussis*)	Droplet	Block bed or private room	After 5 days of effective therapy
Respiratory PCR - viruses Order respiratory PCR if the patient has fever & cough/respiratory symptoms consistent with pneumonia. Do not order when a primary non-infectious etiology is likely, such as aspiration • Adenovirus • Coronavirus • Human metapneumovirus • Parainfluenza • Respiratory syncytial virus (RSV)	Adult: Droplet Peds: Droplet & Contact	Any patient without: • immunosuppression* Who is not: • pregnant • receiving medication for a chronic lung condition • age <12 months or >75 years	• 24 hours after fever resolves and improvement in cough/respiratory symptoms • Immunosuppressed*: duration of hospitalization or negative repeat assay
• Rhinovirus/enterovirus	Adult: Droplet on TH 16E, otherwise standard Peds: Droplet & Contact	Any patient without: • immunosuppression* Who is not: • pregnant • receiving medication for a chronic lung condition • age <12 months or >75 years	• 24 hours after fever resolves and improvement in cough/respiratory symptoms • Immunosuppressed*: duration of hospitalization or negative repeat assay
• Influenza A • Influenza B Note: Novel or pathogenic influenza such as H5N1 or H7N9 requires airborne and contact precautions	Adult: Droplet Peds: Droplet & Contact	Any patient without: • immunosuppression* Who is not: • pregnant • receiving medication for a chronic lung condition • age <12 months or >65 years • BMI > 40 • HIV with CD4<200	• 24 hours after fever resolves and improvement in cough/respiratory symptoms qc • 4 days of oseltamivir • Immunosuppressed*: duration of hospitalization or negative repeat assay
SARS (Severe Acute Resp Syn)	Airborne & Contact	Airborne isolation room	Duration of hospitalization
Scabies	Contact	Any patient	24 hours after initiation of therapy
Streptococcus, gp A, pharyngitis or scarlet fever	Adult: Standard# Peds: Droplet	Adult: any patient Peds: without immunosuppression*	Peds: 24 hours after initiation of therapy
Streptococcus, gp A, pneumonia or invasive	Droplet	Any patient without: • immunosuppression*	24 hours after initiation of therapy
Streptococcus, gp A, wound	Contact & Droplet	Any patient without: • immunosuppression*	24 hours after initiation of therapy
Tuberculosis, draining cutaneous lesion	Contact	Any patient	AFB smear negative or drainage resolved/contained
Tuberculosis, meningitis	Standard#	Any patient	
Tuberculosis, pulmonary/laryngeal	Airborne	Airborne isolation room	AFB smear negative & cough resolved
Varicella, disseminated zoster (3+ dermatomes)	Airborne & Contact	• Airborne isolation room • Staff providing care should be immune	All lesions dry & crusted
Varicella, localized zoster in an immunosuppressed* patient (until disseminated zoster is ruled out)	Airborne & Contact	• Airborne isolation room • Staff providing care should be immune	• Airborne isolation: when disseminated zoster ruled out • Contact isolation: when all lesions dry & crusted
Varicella, localized zoster in non-immunosuppressed patient (1-2 dermatomes)	Contact if lesions can't be covered Standard# if lesions can be covered with a dressing	Any patient without: • immunosuppression* Who is not: • pregnant • varicella non-immune Staff providing care should be immune	All lesions dry & crusted
Varicella, primary (chickenpox)	Airborne & Contact	• Airborne isolation room • Staff providing care should be immune	All lesions dry & crusted
Viral hemorrhagic fever (Crimean-Congo, Ebola, Lassa, Marburg)	Airborne & Contact	Airborne isolation room	Duration of hospitalization
Wound (draining) or abscess	Contact	Any patient without: • immunosuppression* • a central venous catheter • a ventilator or tracheostomy • an open surgical incision or non-intact skin	Drainage stops or contained by dressing, JP drain or wound VAC

*Immunosuppression is defined as undergoing chemotherapy, neutropenia, h/o solid organ or bone marrow transplant, receiving immunosuppressive medication such as the equivalent of ≥2 mg/kg or 20 mg/day of prednisone, cyclosporin, azathioprine, monoclonal antibodies.
Standard precautions – cohort with any patient

version 6.2015

Targeted MDROs

NYU Langone MEDICAL CENTER

Guide to Inpatient Isolation Precautions

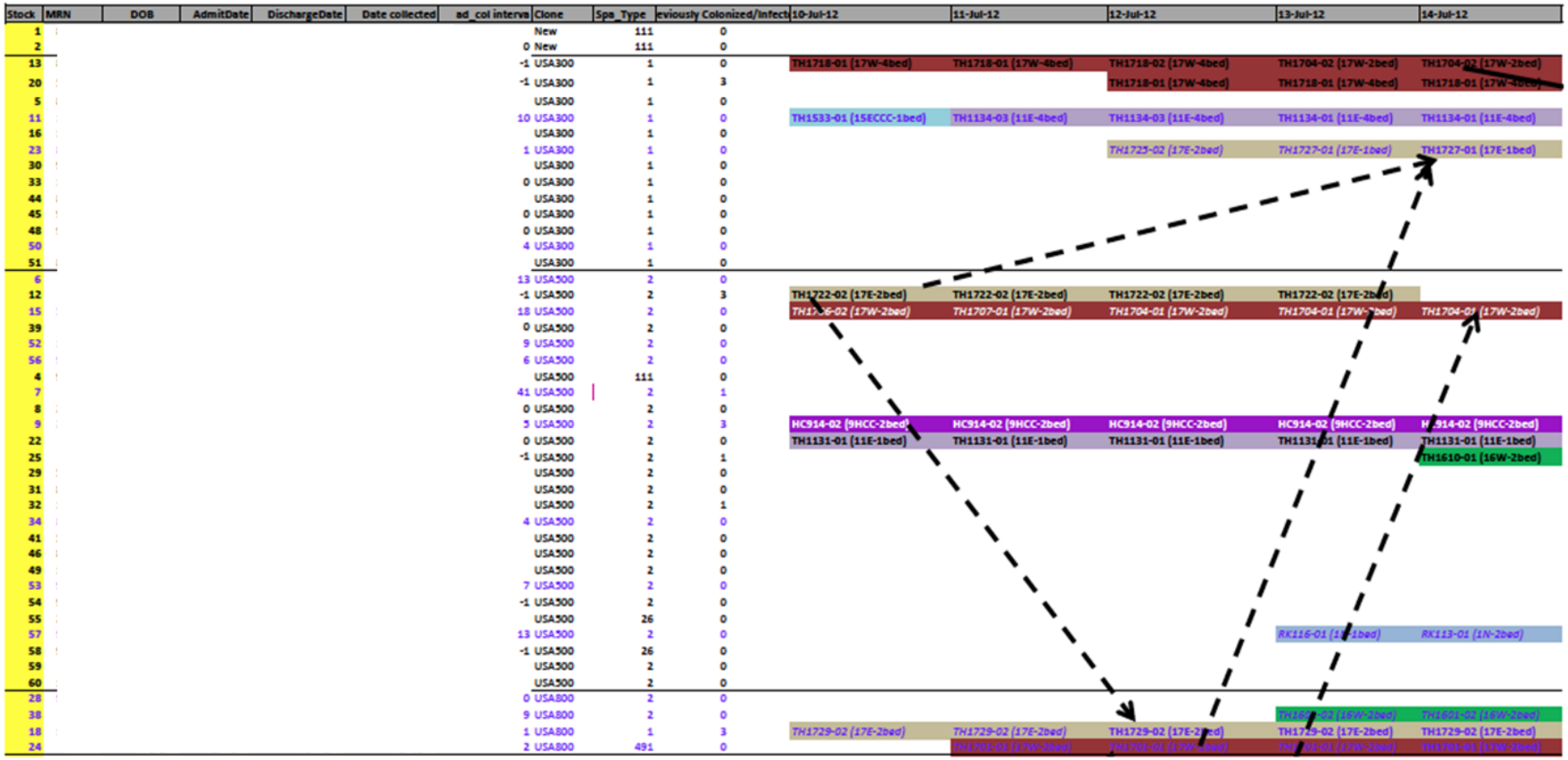
Suspected/confirmed infection	Isolation type	Who may be cohorted	When to discontinue isolation
Lice	Contact	Any patient	24 hours after initiation of therapy
MDRO (Multi-Drug Resistant Organisms) MRSA (Methicillin-resistant *Staphylococcus aureus*)	Contact if: • draining wounds • ventilator • tracheostomy Otherwise, standard precautions#	Any patient without: • immunosuppression* • a central venous catheter • a ventilator or tracheostomy • an open surgical incision or non-intact skin	• Drainage stops or contained by dressing, JP drain or wound VAC • Patient extubated and secretions back to baseline -- e.g. suction needs are minimal
Measles	Airborne & Contact	Airborne isolation room	• 4 days after onset of rash • Immunosuppressed*: duration of hospitalization
Meningitis - viral, post-surgical	Standard#	Any patient	

What is a Low-Risk Roommate??

- Private rooms – very rare
- Matching MDRO patients – very rare

- Any patient without:
  - Immunosuppression
  - A central venous catheter (invasive devices)
  - A ventilator or tracheostomy
  - An open surgical incision or non-intact skin

Traditional Surveillance



- We missed transmission events
- Is this a “cluster” or just endemic state?

New Era of Epidemiology

- Implemented SatScan/WhoNet in 2015 with changes in CP (software is free)
- Tested for about 2 years prior to launch
- Maps infections to patient rooms, alerts if “cluster” is detected
- Cluster defined differently based on organisms and location, we set these alert threshold levels
- Co-Implemented Molecular Epidemiology Lab, establishing library of organisms and DNA patterns
  - Enables us to compare isolates between patients to look for links in clusters of cases
- Analysis is run daily - automated

Cluster Detection

- Changed from rule-based to transmission-based prospective cluster assessment
  - Phase 1 – prospective detection of clusters
  - Phase 2 – sequencing isolates to determine if they are related
  - Phase 3 – traditional epidemiology “detective work” when isolates found to match

IPC Program Essentials

- Success relies on excellent hand hygiene rates
- Excellent implementation of other infection control measures
- Keeping a close eye on bacteria in the hospital
- Data analyst(s) professional is very helpful

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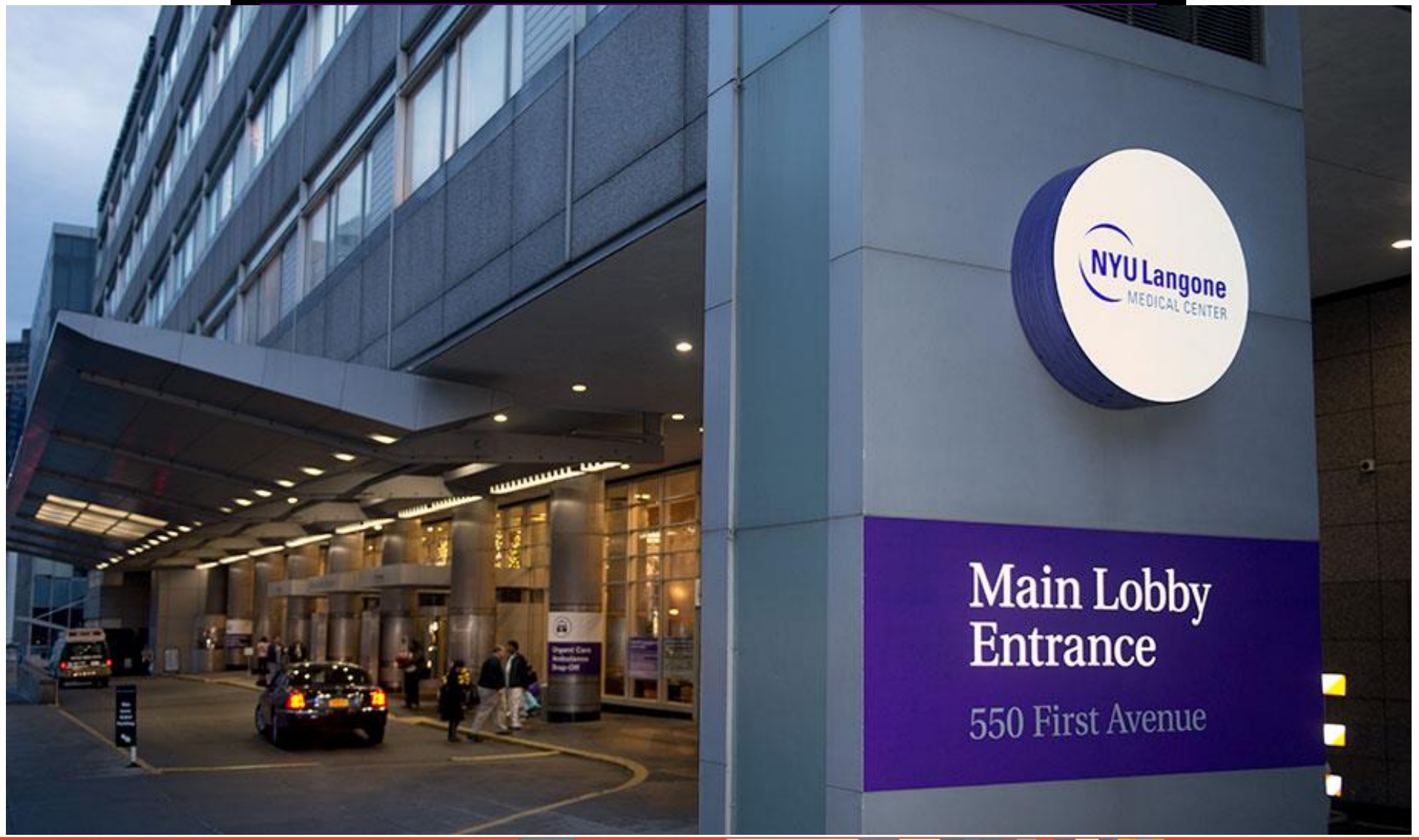


What Happened – Process

- Patients on Precautions – a process measure to evaluate the impact of our changed approach

- What would you predict?

- Airborne Precautions Patients –
- Droplet Precautions Patients –
- Contact Precautions Patients –

What Happened – Process

- Patients on Precautions – a process measure to evaluate the impact of our changed approach

- What would you predict?

- Airborne Precautions Patients – no change
- Droplet Precautions Patients –
- Contact Precautions Patients –

What Happened – Process

- Patients on Precautions – a process measure to evaluate the impact of our changed approach

- What would you predict?

- Airborne Precautions Patients – no change
- Droplet Precautions Patients – no change
- Contact Precautions Patients –

What Happened – Process

- Patients on Precautions – a process measure to evaluate the impact of our changed approach

- What would you predict?

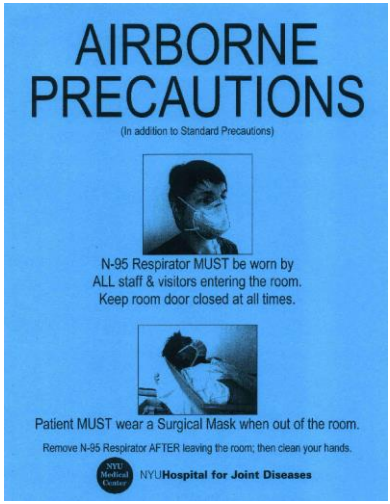
- Airborne Precautions Patients – no change
- Droplet Precautions Patients – no change
- Contact Precautions Patients – decrease

- Let's see what happened

NYUMC – TH Airborne Precautions Patient Days

11/2013 - 4/2015 vs. 8/2015 - 4/2016

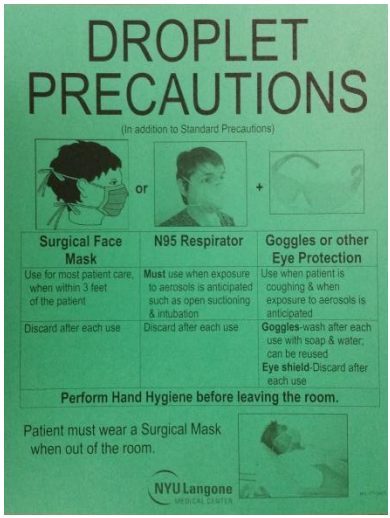
Rate: 0.51% vs. 0.47%, p = 0.71



NYUMC – TH Droplet Precautions Patient Days

11/2013 - 4/2015 vs. 8/2015 - 4/2016

Rate: 2.9% vs. 2.0%, p < 0.0001



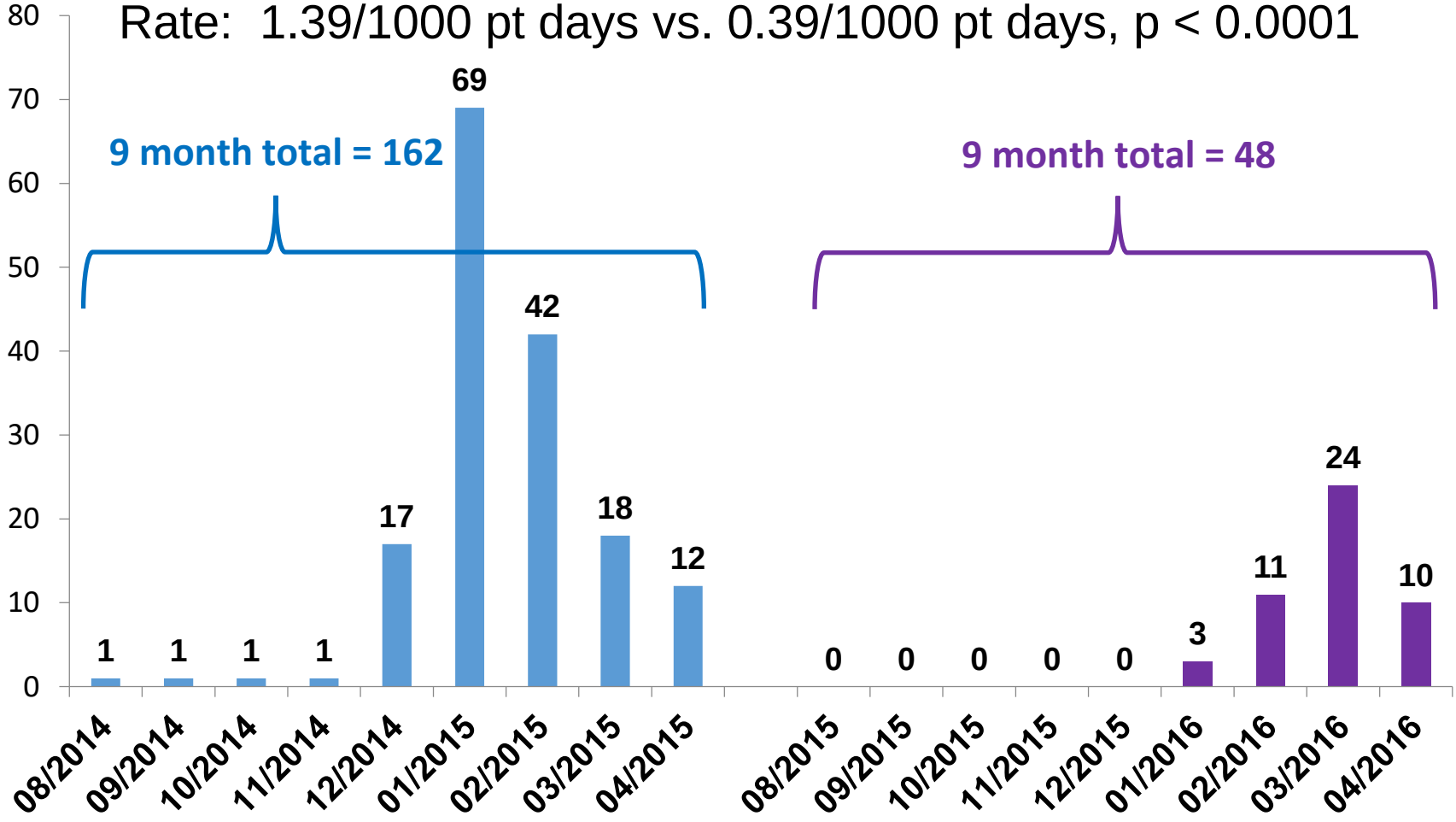
NYUMC - TH Different Flu Seasons

08/2014 - 4/2015 vs. 8/2015 - 4/2016

Rate of all flu testing: 0.072 vs. 0.075, p = 0.024

Rate of + flu tests: 1.92 % vs. 0.52%, p < 0.0001

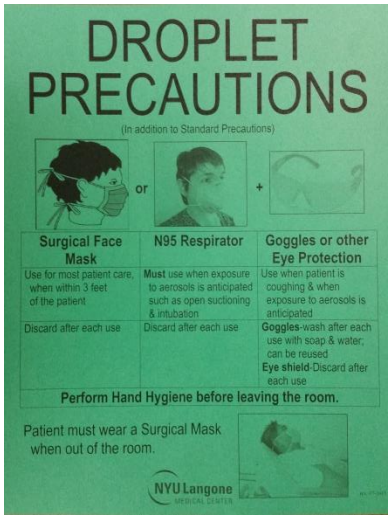
Rate: 1.39/1000 pt days vs. 0.39/1000 pt days, p < 0.0001



NYUMC – HJD Droplet Precautions Patient Days

11/2013 - 4/2015 vs. 8/2015 - 4/2016

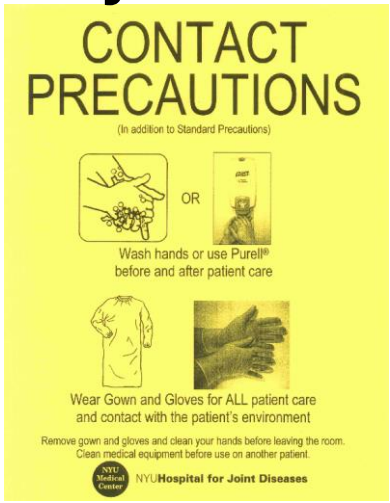
Rate: 0.11% vs. 0.16%, p < 0.52



NYUMC - TH Contact Precautions Patient Days

11/2013 - 4/2015 vs. 8/2015 - 4/2016

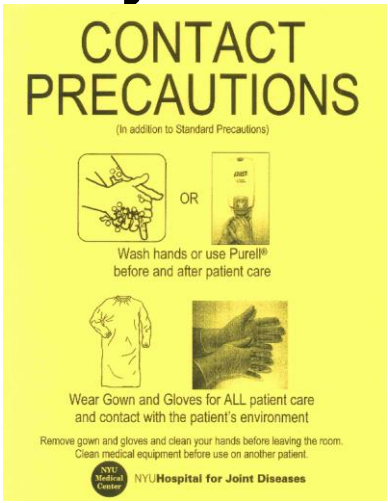
Rate: 9.0% vs. 4.6%, p < 0.0001



NYUMC - HJD Contact Precautions Patient Days

11/2013 - 4/2015 vs. 8/2015 - 4/2016

Rate: 1.8% vs. 0.68%, p = 0.0003



What Happened – Process

- Patients on Precautions – a process measure to evaluate the impact of our changed approach

- Did you predict correctly?

- Airborne Precautions Patients – no change 
- Droplet Precautions Patients – *no change* 
- Contact Precautions Patients – decrease 

What Happened – Outcome

- HAI rates should measure whether changes made affect patient safety
- HAI Rates – Data Parameters
  - Patient was in hospital greater than 3 days
  - Same-stay duplicates removed
  - 30 day readmission duplicates removed
  - p-value adjusted for community-acquired MDRO rates
  - Used acute inpatients, ED, and ED-observation only (hospice and rehab patients not counted)

What Happened – Outcome

- Organism Comparison
- VRE = *E. faecalis* & *E. faecium*
- *C. difficile* (PCR-based)
- MRSA
- Gram negative rod MDROs – Carbapenem-resistant
  - *Klebsiella pneumoniae, Klebsiella oxytoca*, and *Klebsiella* species
  - *Escherichia coli*
  - *Enterobacter aerogenes*, *Enterobacter cloacae*, *Enterobacter asburiae*, and *Enterobacter* species
- Carbapenems
  - Ertapenem, Imipemen, Meropenem, and Doripenem

What Happened – Outcome

- MDRO Comparison
  - VRE rate –
  - *C. difficile* rate –
- MRSA, other MDRO rates
- What would you predict?

What Happened – Outcome

- MDRO Comparison
  - VRE rate – control measure
  - *C. difficile* rate –
- MRSA, other MDRO rates

What Happened – Outcome

- MDRO Comparison
  - VRE rate – control measure
  - *C. difficile* rate – control measure

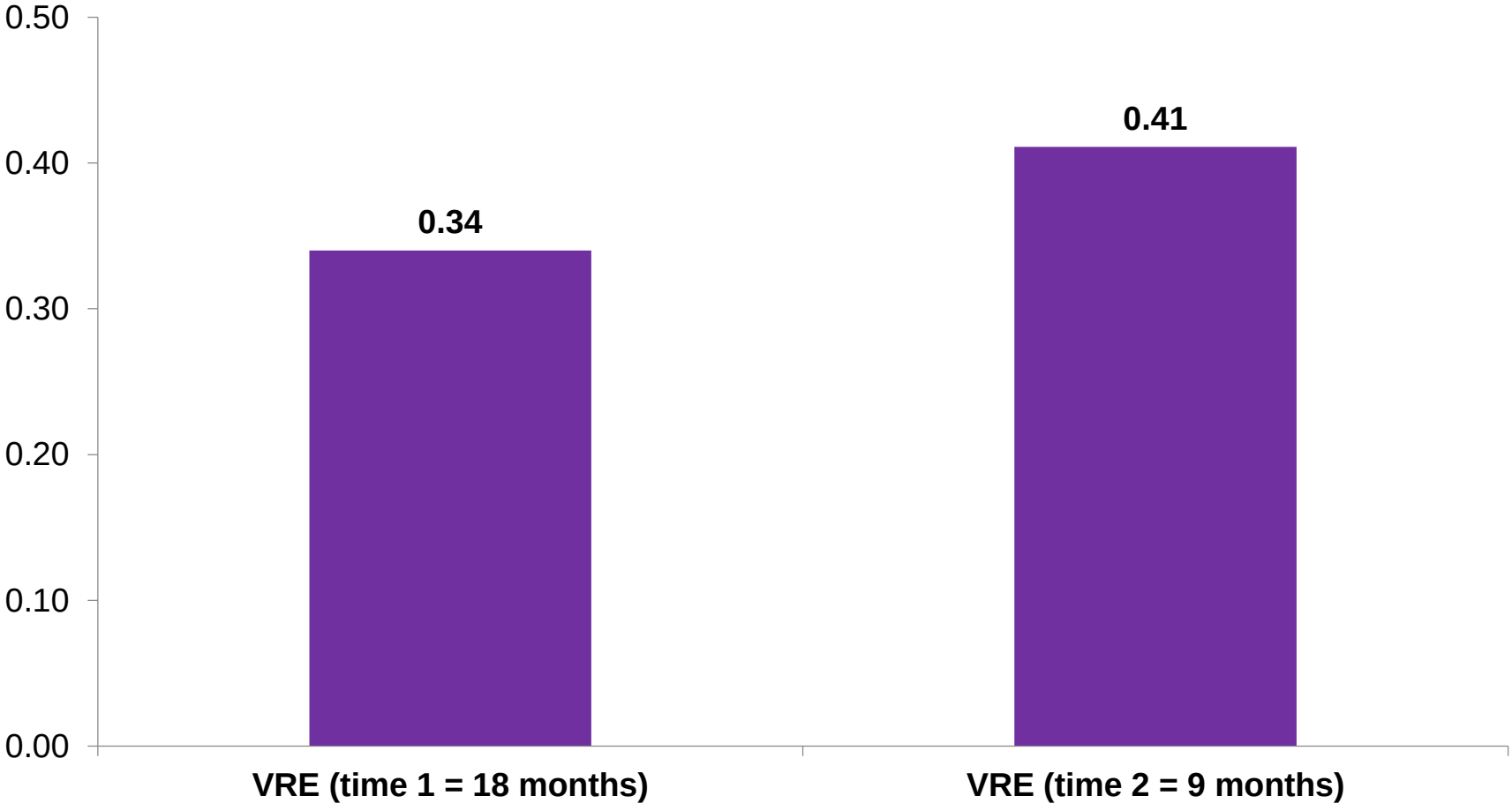
- MRSA, other MDRO rates

What Happened – Outcome

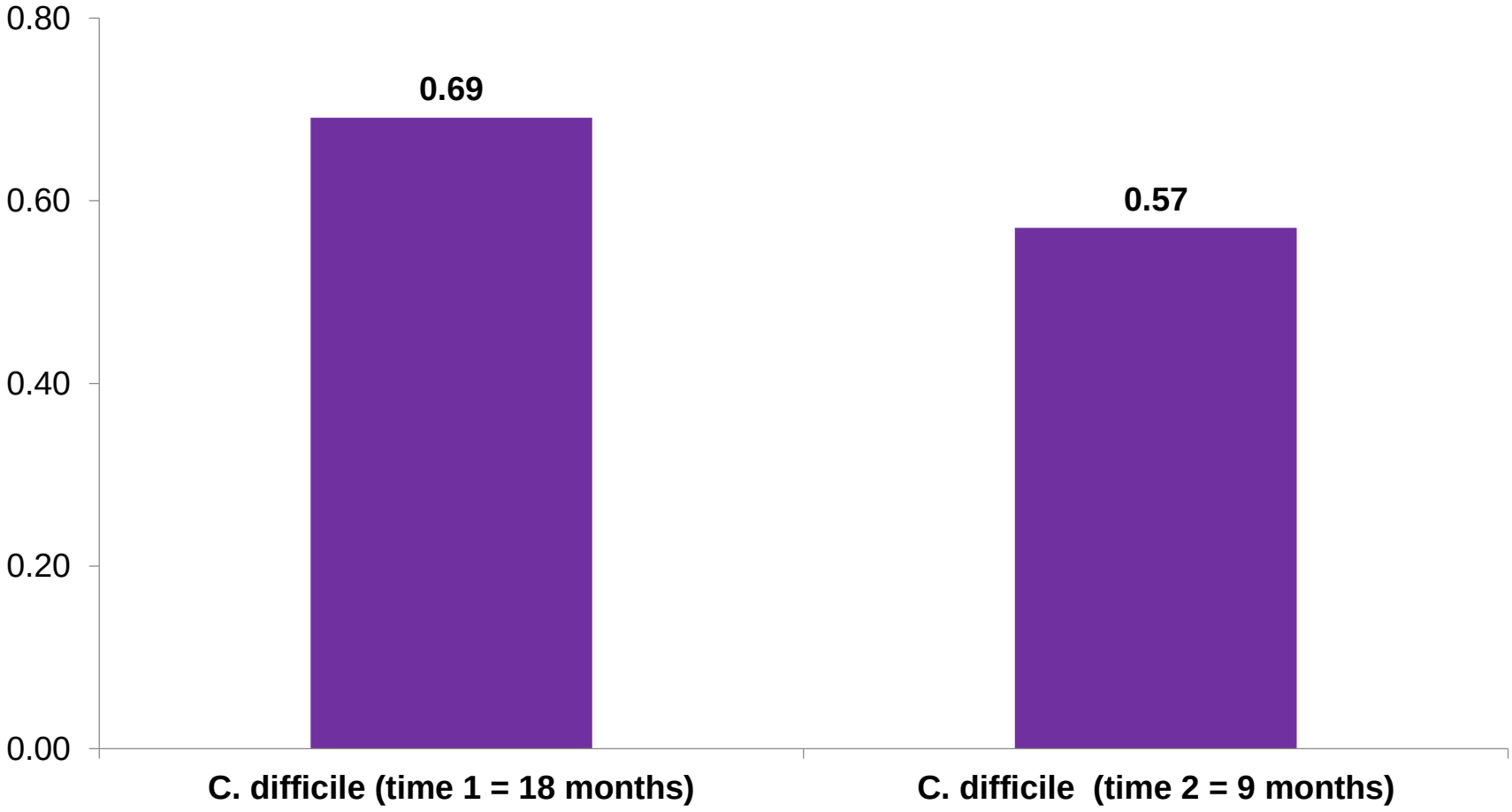
- MDRO Comparison
  - VRE rate – control measure
  - *C. difficile* rate – control measure

- MRSA, other MDRO rates – let's see what happened

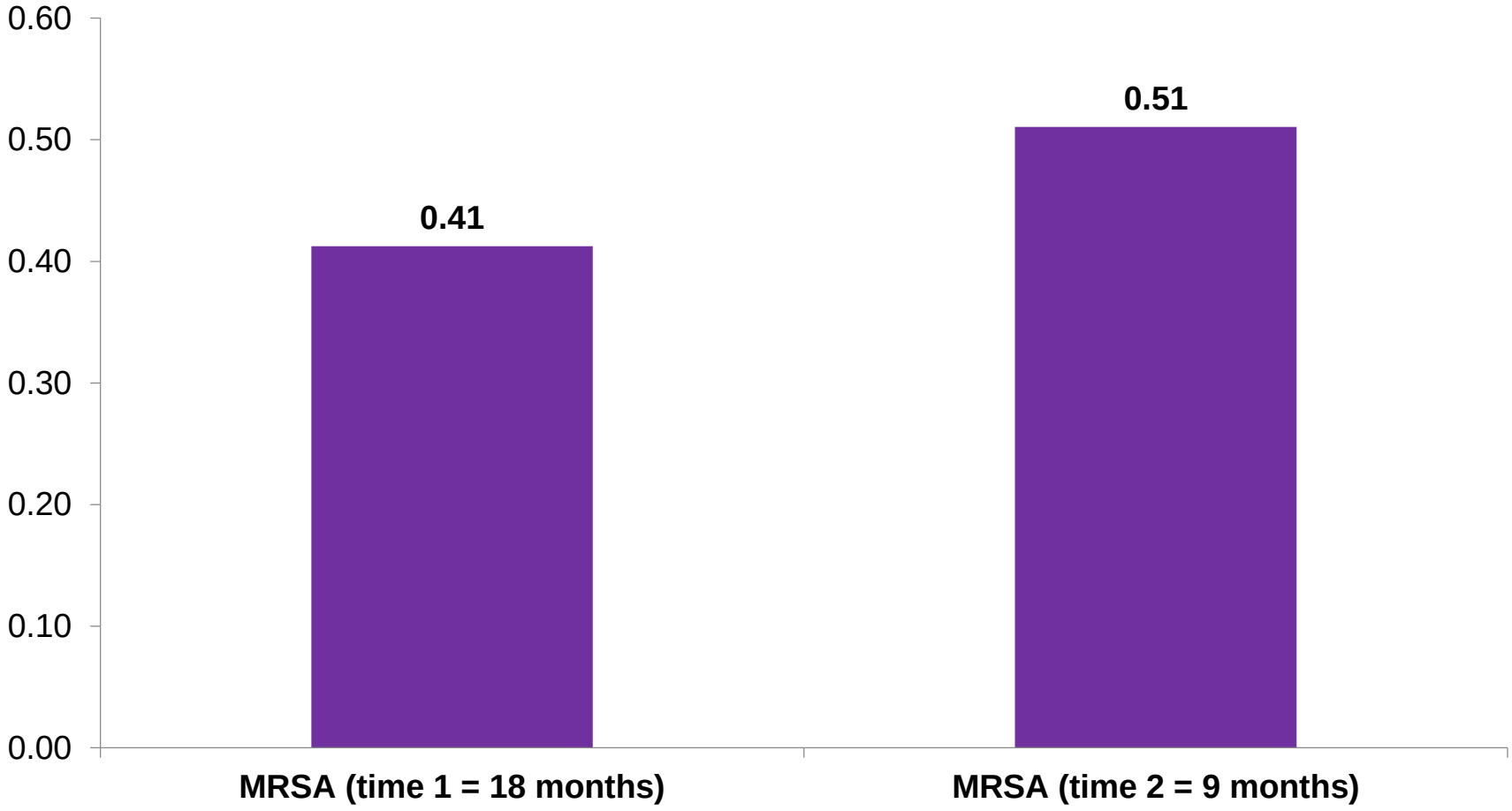
NYUMC VRE Rates/1000 pt days
11/2013 - 04/2015 vs. 08/2015 - 04/2016
(94 vs. 62) p = 0.25



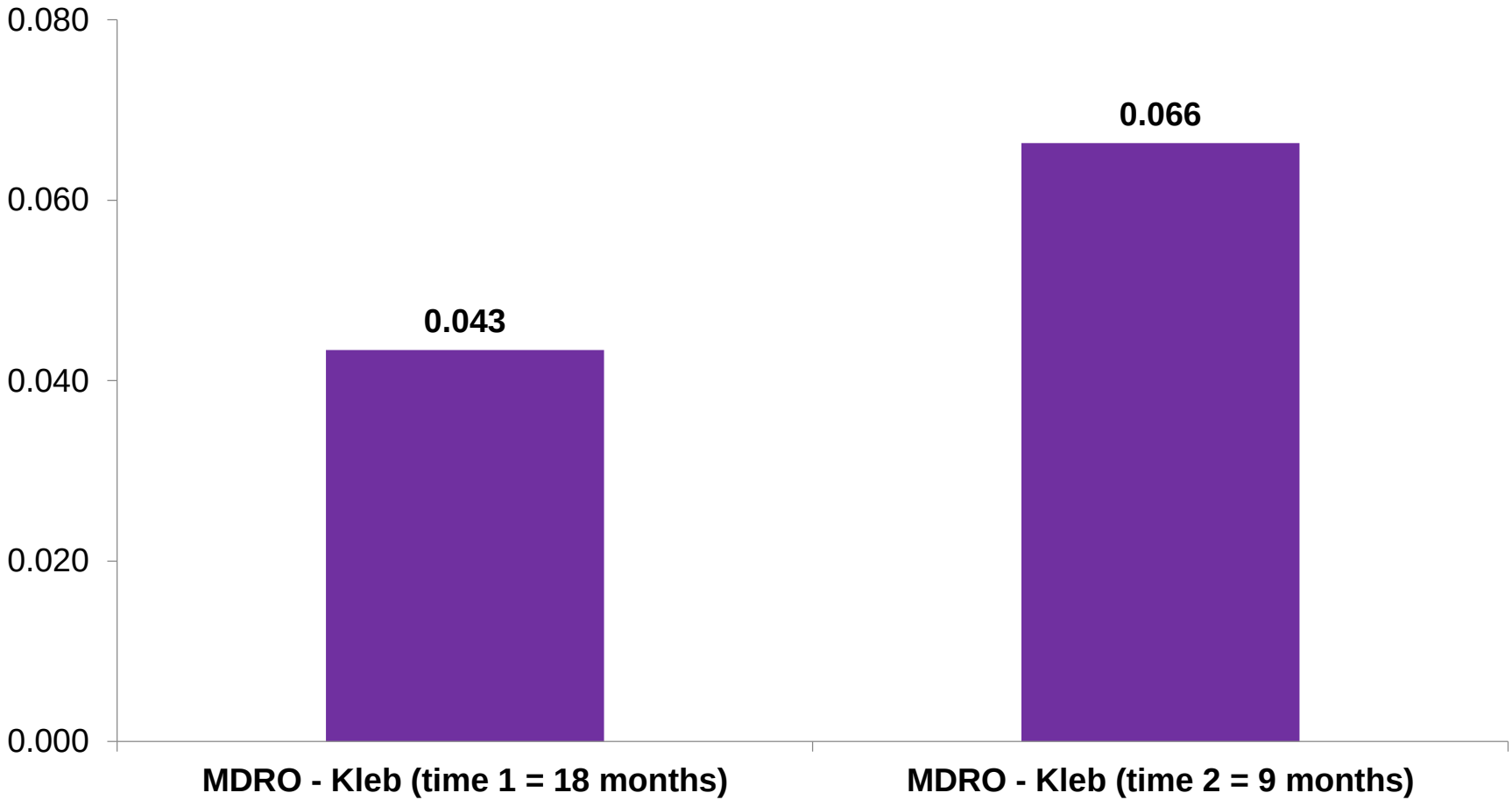
NYUMC *C. difficile* Rates/1000 pt days
11/2013 - 04/2015 vs. 08/2015 - 04/2016
(191 vs. 86) p = 0.14



NYUMC MRSA Rates/1000 pt days
11/2013 - 04/2015 vs. 08/2015 - 04/2016
(114 vs. 77) p = 0.15



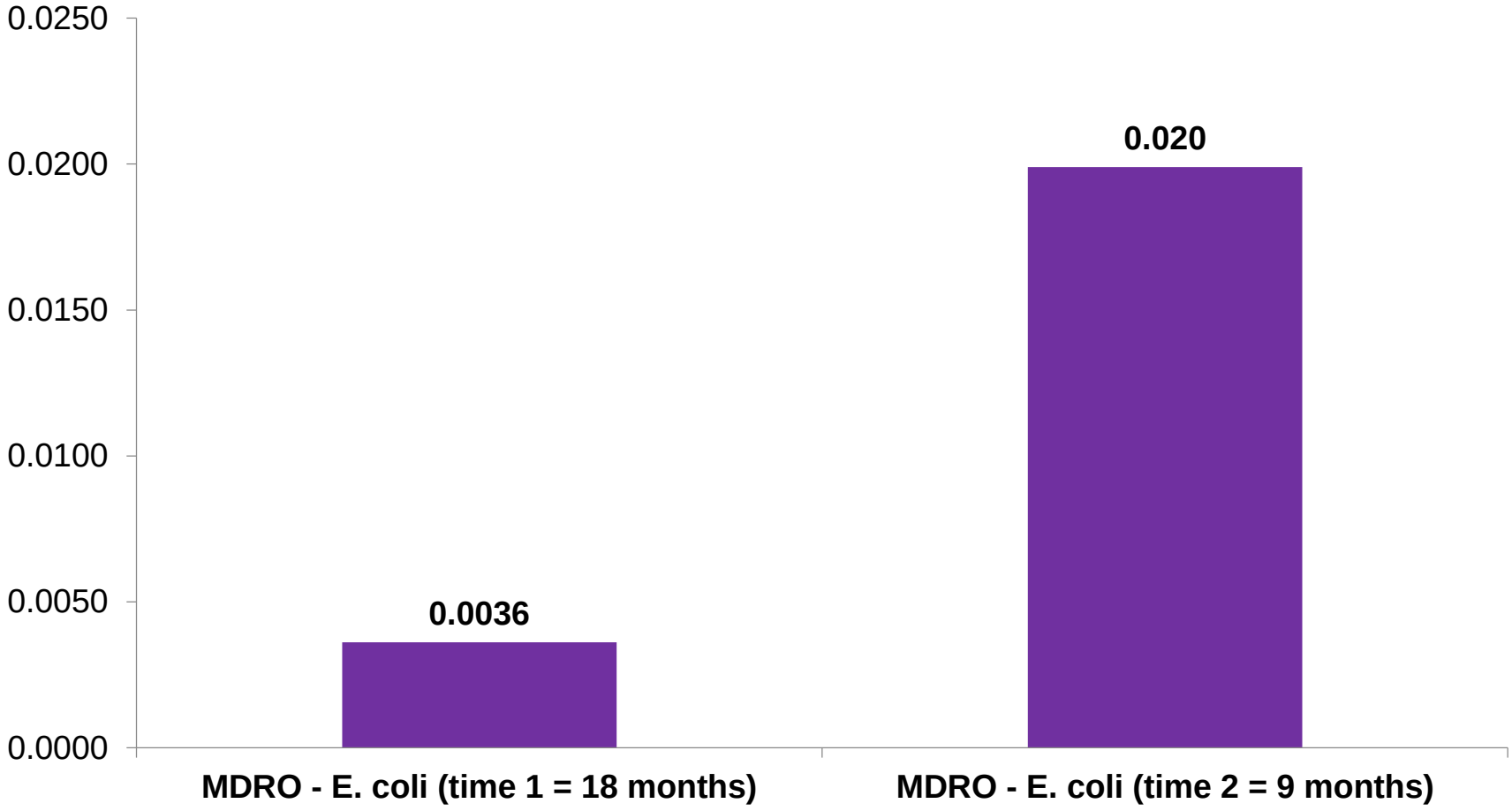
NYUMC MDRO - Kleb Rates/1000 pt days
11/2013 - 04/2015 vs. 08/2015 - 04/2016
(12 vs. 10) p = 0.32



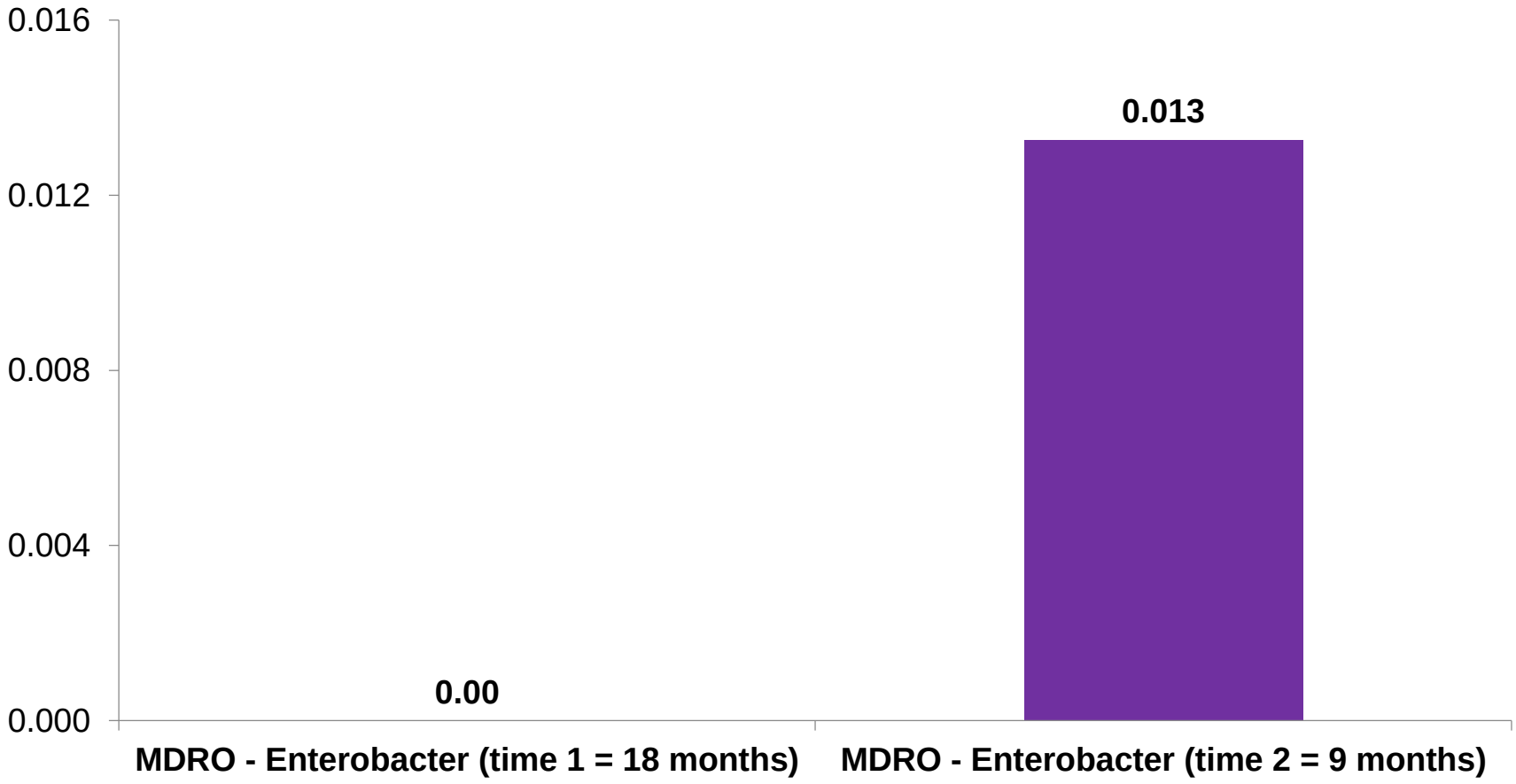
NYUMC MDRO – *E. coli* Rates/1000 pt days

11/2013 - 04/2015 vs. 08/2015 - 04/2016

(1 vs. 3) p = 0.14



NYUMC MDRO-*Enterobacter* Rates/1000 pt days
11/2013 - 04/2015 vs. 08/2015 - 04/2016
(0* vs. 2) p = 0.29
*** used a value of 1 to calculate the p-value**



What Happened - Conclusions

- MDRO rates for MRSA, GNRs not changed
- Pre-Post study design has weaknesses
- Confounders are present – Droplet Precautions rates
- Possible confounding variables
  - Antibiotic Stewardship
  - Environmental cleaning
  - Increasing census
  - Illness seasonality
  - Changes in patient population

- Other Limitations
  - small numbers of some MDRO isolates, low statistical power
  - short duration of intervention period

Challenging Questions

- Are we just creating a city of colonized patients?
- Won't colonization pressure lead to infection?

- We *already have* colonization in our communities
- Focus on basic practices – excellent control of environment (e.g., cleaning) and hand hygiene
- Resource management – where to spend time and $

- Continue to focus on MDRO patients with active portals of exit

Challenges – Past, Present, Future

- Difficult to change practices in a large facility
- Limits on education, its reach and effectiveness
- Practical application – relies on clinician's assessment
- CP requires good staff compliance, technique
- Maintaining patient safety when changing paradigms
- Patient / Family perceptions
- Wider Community / Regulatory acceptance

- Make clinical environment hard-wired to do right – for patient care, environmental cleaning, HAI prevention

Takeaway Messages

- Think outside the box – what is working, what needs to change to make your facility efficient and safe
- Evaluate effectiveness of current program
- Look for opportunities to make positive change
- Work with stakeholders (inside and beyond your facility)
- Validate impact of changes made – may require leap of faith but have measurement tools functioning
- Dare to be ruthless about making steaks from sacred cows

Thanks to the entire NYULMC IPC Team and especially our Data Group

from L to R

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Thank You!

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