



IMPROVING HEALTH CARE, IMPROVING LIVES™

Prevention of MRSA Infections and Transmission

The Collaborative Model

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What we've heard....



Prevention of Methicillin-resistant *Staphylococcus aureus* (MRSA)

- Rates of infection and colonization rising dramatically in the US
 - Nearly 300,000 infections annually (likely underreported)
 - ~95,000 with invasive infections and about 20,000 deaths annually
 - 95 million carry *S. aureus* and about 2.5 million are colonized with MRSA

The majority of infections are acquired from the healthcare setting (whether an inpatient or outpatient).



Costs Associated with MRSA

- The annual nationwide cost to treat hospitalized patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections is estimated to be between \$3.2 billion to \$4.2 billion
- Direct medical costs range from \$27,083 to \$34,900 per case!

It is easy to make a business case for activities related to the prevention of MRSA infections



Surgical Site Infections due to MRSA

- SSI due to MRSA had significantly worse outcome
- Additional charges associated with SSI due to MRSA were approximately \$40,000

Anderson DJ, et al. Clinical and fiscal outcomes of surgical site infection (SSI) due to methicillin-resistant *Staphylococcus aureus* (MRSA) [Abstract K-597] 48th Annual ICAAC/IDSA 46th Annual Meeting. Washington, DC. 2008



Prevention of MRSA

What's the evidence?

- Part of a group of organisms called, “Multi-drug resistant organisms” (MDRO)
 - Once in the healthcare setting, transmission and persistence determined by:
 - Presence of vulnerable patients
 - Selective pressure exerted by antimicrobial use (often excess use)*
 - Transmission from colonized patients*
 - Lack of adherence to preventive measures*

****We can do something about these!***



Prevention of MRSA

What's the evidence?

- Many risk factors for MRSA infection
 - Certain populations (e.g., nursing home residents, dialysis patients, chronic wound care patients, diabetic patients)
 - Patients with invasive lines (especially central intravenous lines and urinary catheters)
 - Patients with severe disease, immunocompromised, recent surgery, and ICU patients (ICU is often a reservoir in the hospital)

Patients with MRSA infection often move between multiple healthcare facilities!



Prevention of Methicillin-resistant *Staphylococcus aureus* (MRSA) *What's the evidence?*

- You can reduce the incidence and can reduce transmission of MRSA!
 - Multiple studies have demonstrated reductions
 - Strict adherence to infection control practices
 - Other interventions IF infection control practices are implemented effectively and it does not work



The single most important thing we can do to reduce transmission of MRSA!

Alcohol hand rub is also effective and may be easier for HCWs.



Prudent Use of Antimicrobials

- Use them only for documented infection or appropriately for prophylaxis
 - As narrow spectrum as possible
 - For as short a time as possible
 - Avoid use of vancomycin
 - Many MDROs now linked to excess use of fluoroquinolones



Why is the Emergence of MRSA as a Healthcare Pathogen Important?

- High prevalence major influence on unfavorable antibiotic prescribing, which contributes to further spread of resistance
 - prevalent MRSA → more glycopeptide use → more glycopeptide resistance (VRE → VRSA) → more linezolid/daptomycin use → more resistance

Vancomycin is a glycopeptide antibiotic.



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The Model for Improvement

A Method to Adapt, Implement, and Spread Changes



Three Fundamental Questions for Improvement

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What changes can we make that will result in an improvement?



What are we trying to accomplish?

- Reduce the incidence and transmission of MRSA infection
 - You may have many intermediate goals
 - Improve compliance with hand hygiene
 - Ensure identification of patients with previous MRSA colonization/infection
 - Improve compliance with care bundles



How will we know that a change is an improvement?

- Measurement
 - Measures of the processes of care that we implement
 - e.g., hand washing/hand hygiene compliance rates
 - Compliance with care bundles
 - Consider culture surveillance of rooms inhabited by MRSA positive patients AFTER cleaning
 - Compliance with contact isolation
 - Time from identification of positive MRSA culture to notification of care team



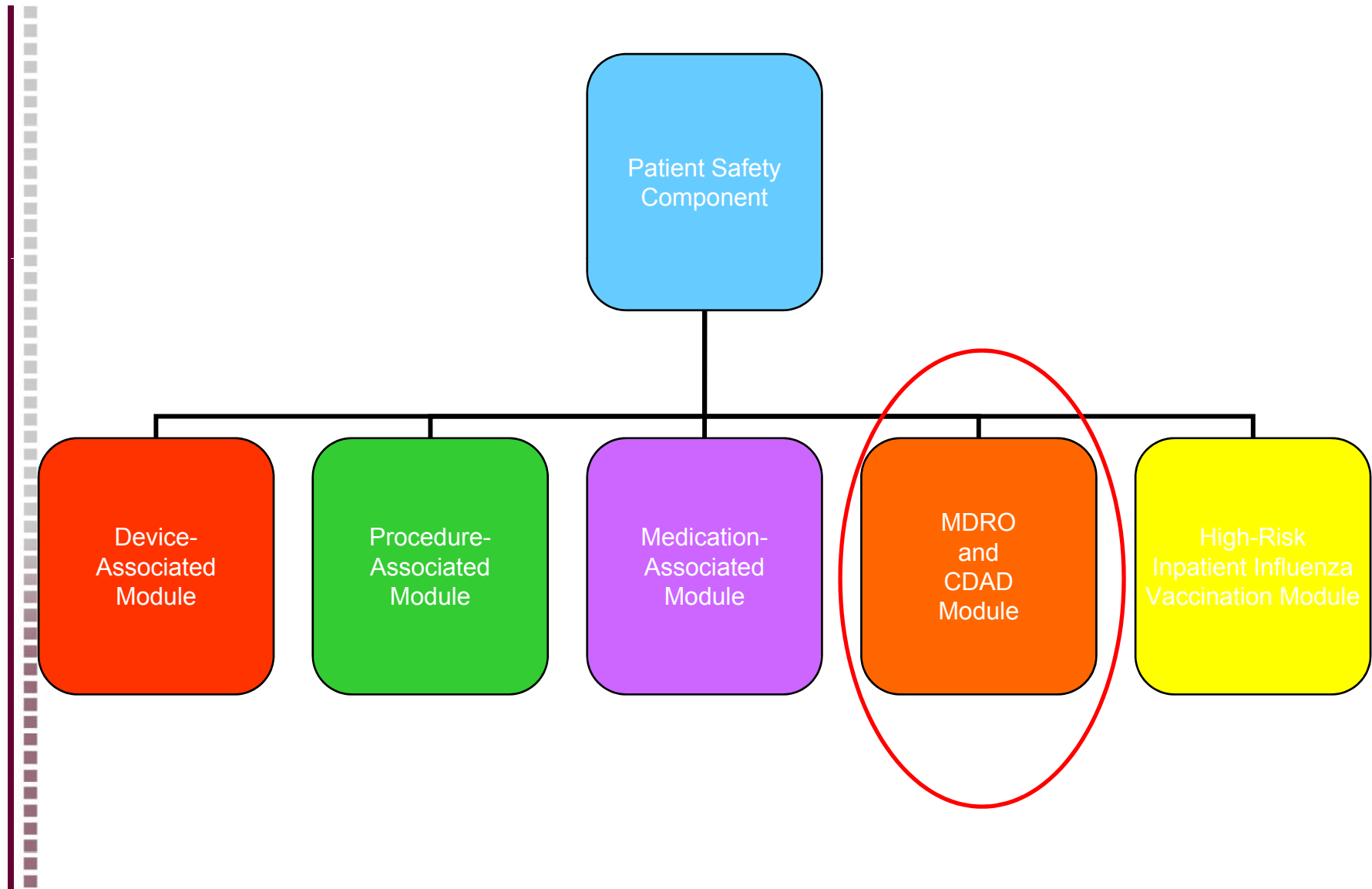
Multidrug-Resistant Organism (MDRO)
and
Clostridium difficile-Associated Disease (CDAD)
Module



Department of Health and Human Services
Centers for Disease Control and Prevention



National Healthcare Safety Network (NHSN)





MDRO Module Measures

Metric	Description	Calculation	Comment
1	Nosocomial MRSA Infection Rate	# NHSN MRSA infections/1000 pt-days	By selected patient-care location only (i.e., MICU, SICU, etc.); uses NHSN criteria to define infections
2	Incidence Rate of Hospital-Onset MRSA Based on Clinical Cultures	# 1 st MRSA specimens /1000 pt-days	Hospital-wide is easiest, can also restrict to selected locations; evaluating same locations as Metric 1 may be most useful; uses positive culture data only
3a	Incidence Rate of Hospital-Onset MRSA Bloodstream Infections (BSI) Based on Clinical Cultures	# MRSA BSI specimens /1000 pt-days	
3b	Admission Prevalence MRSA BSI Rate (community-onset infections)	# MRSA BSI specimens /1000 admissions	
4	Direct MRSA Acquisition	# new MRSA cultures /1000 pt-days	Requires data from active surveillance testing (AST) program; selected locations only
5	Adherence to Process Measures	Compliance Rate	Requires data from observational assessment and/or from AST program; selected locations only
6	Central Line-Associated Bloodstream Infections (CLABSI) (all pathogens)	# CLABSI/1000 line days	By selected locations only; requires following the Device-Associated Module-CLABSI protocol



What changes can we make that will result in an improvement?

- Hand hygiene
- Isolation or cohorting
- Prudent use of antimicrobials
- Enhanced environmental cleaning
- Education
- Enhanced communication among healthcare workers and settings
- Others
 - Active surveillance
 - Decolonization
 - Bathe adult ICU patients with chlorhexidine



S62 INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2008, VOL. 29, SUPPLEMENT 1

SUPPLEMENT ARTICLE: SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Transmission of Methicillin-Resistant *Staphylococcus aureus* in Acute Care Hospitals

David P. Calfee, MD, MS; Cassandra D. Salgado, MD, MS; David Classen, MD, MS; Kathleen M. Arias, MS, CIC;
Kelly Podgorny, RN, MS, CPHQ; Deverick J. Anderson, MD, MPH; Helen Burstin, MD; Susan E. Coffin, MD, MPH;
Erik R. Dubberke, MD; Victoria Fraser, MD; Dale N. Gerding, MD; Frances A. Griffin, RRT, MPA; Peter Gross, MD;
Keith S. Kaye, MD; Michael Klompas, MD; Evelyn Lo, MD; Jonas Marschall, MD; Leonard A. Mermel, DO, ScM;
Lindsay Nicolle, MD; David A. Pegues, MD; Trish M. Perl, MD; Sanjay Saint, MD; Robert A. Weinstein, MD;
Robert Wise, MD; Deborah S. Yokoe, MD, MPH

Review Published Guidelines

Institute basic practices

- Conduct an MRSA risk assessment
- Ensure compliance with hand hygiene recommendations
- Ensure compliance with contact precautions for MRSA-colonized and -infected patients
- Ensure proper disinfection with equipment and environment
- Educate healthcare personnel regarding MRSA
- Implement an MRSA monitoring program
 - Implement an MRSA line list
 - Implement a laboratory-based alert system so that new cases of MRSA colonization or infection are immediately identified by IC program
 - Implement an alert system that identifies readmitted or transferred MRSA-colonized or -infected patients

Continue to monitor MRSA rates

- Develop a regular reporting system to relevant stakeholders, physicians, nurses, staff, and other hospital leaders
- Hold relevant individuals and groups accountable for implementing and complying with basic prevention measures

Determine if MRSA has been effectively controlled

MRSA NOT effectively controlled

Ensure compliance with basic practices

MRSA effectively controlled

- Continue basic practices
- Continue to monitor MRSA rates
- Continue MRSA reporting and accountability system

Follow guidelines...





Use of Care Bundles

- Central line bundle
- Ventilator bundle

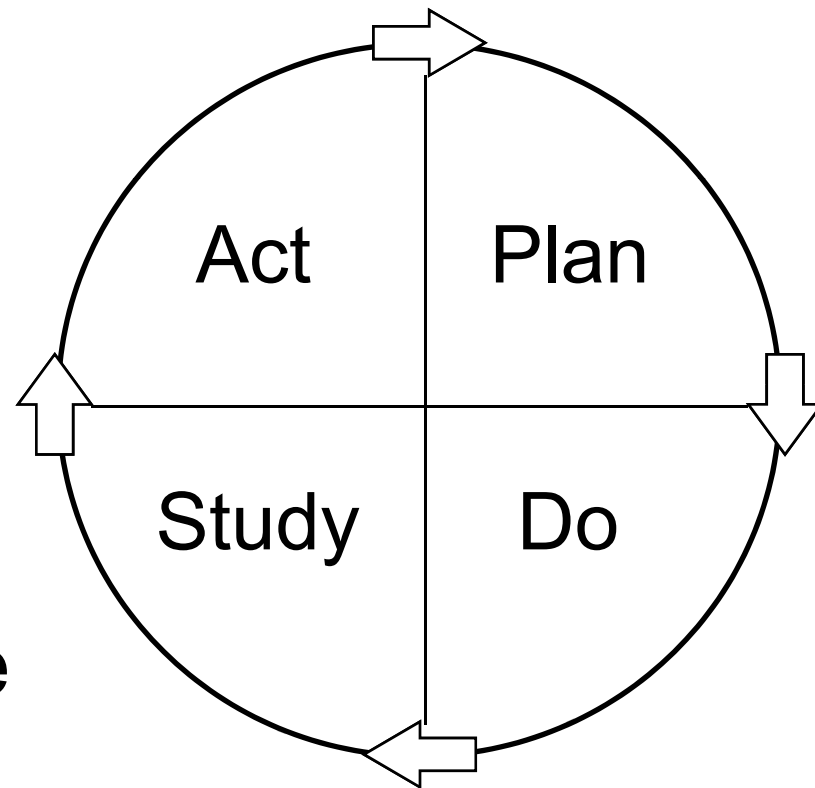


The PDSA Cycle

Four Steps: **P**lan, **D**o, **S**tudy, **A**ct

Also known as:

- Shewhart Cycle
- Deming Cycle
- Learning and Improvement Cycle



Use some systematic approach to implement your quality improvement efforts.



Use the PDSA Cycle for :

- Helping to answer the first two questions of the model
 - What are we trying to accomplish?
 - How will we know that a change is an improvement?
- Developing a change
- Testing a change
- Implementing an improvement
- Spreading an improvement

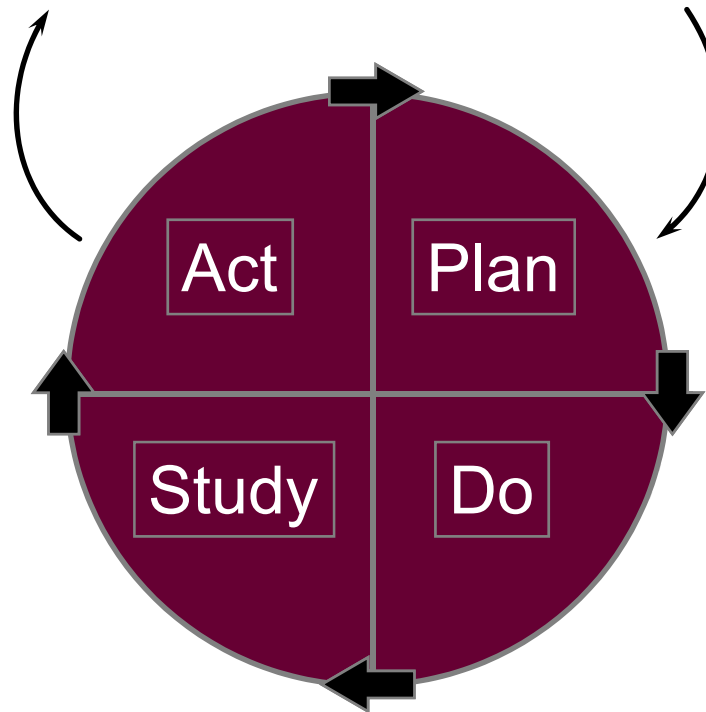


Model for Improvement

What are we trying to accomplish?

How will we know that a change is an improvement?

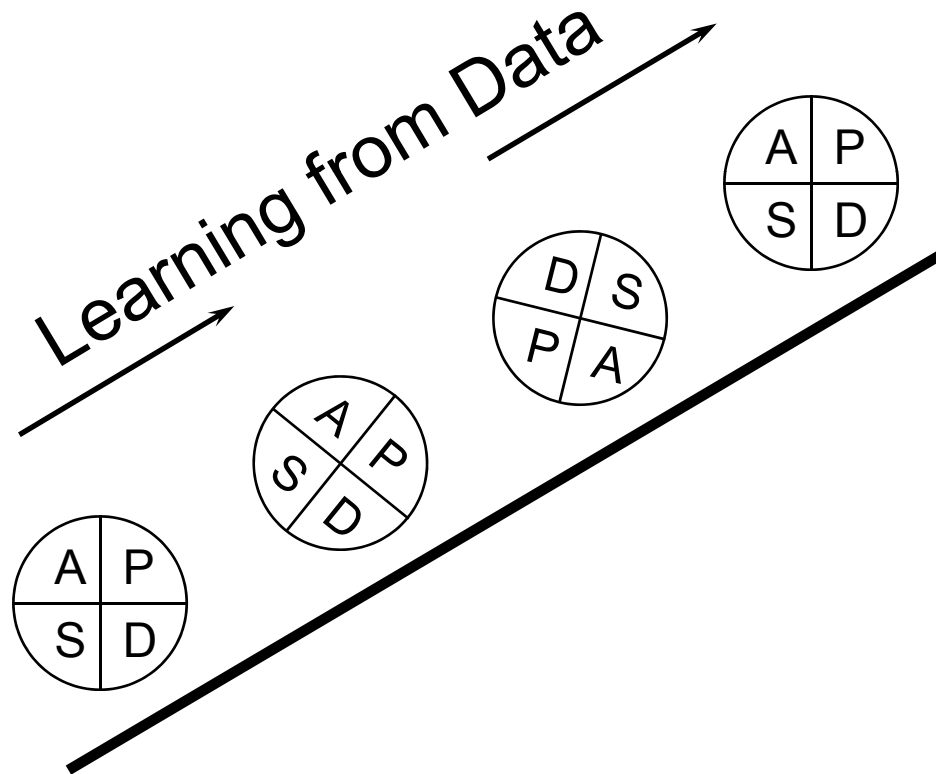
What change can we make that will result in improvement?





Repeated Use of the PDSA Cycle

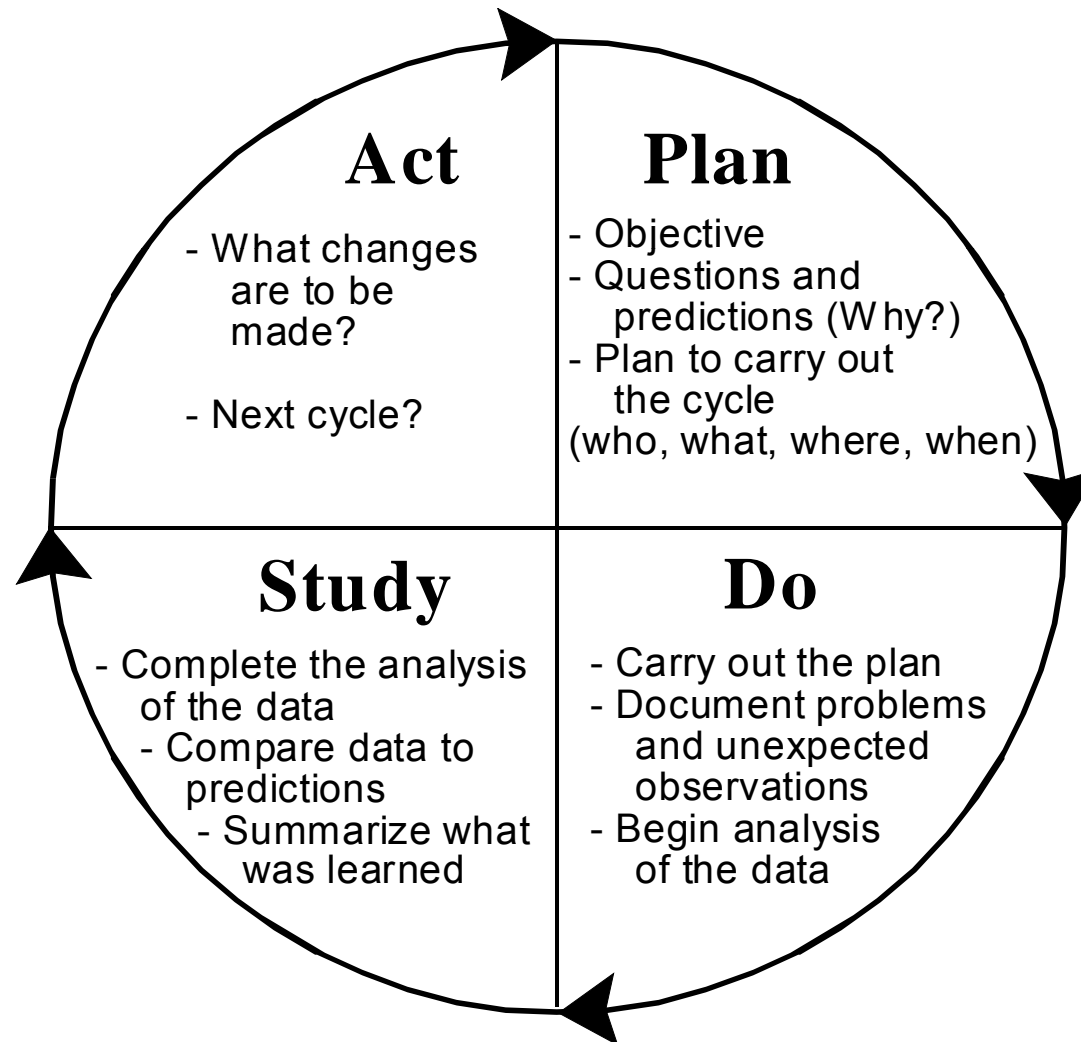
Proposals,
Theories,
Ideas



Changes That
Result in
Improvement



The PDSA Cycle for Learning and Improvement





Points to remember...

- Senior leaders in the organization should support the aim and prepare for spread. Align the aim with strategic goals of the organization
- Base your goals in the aim on data or organizational needs

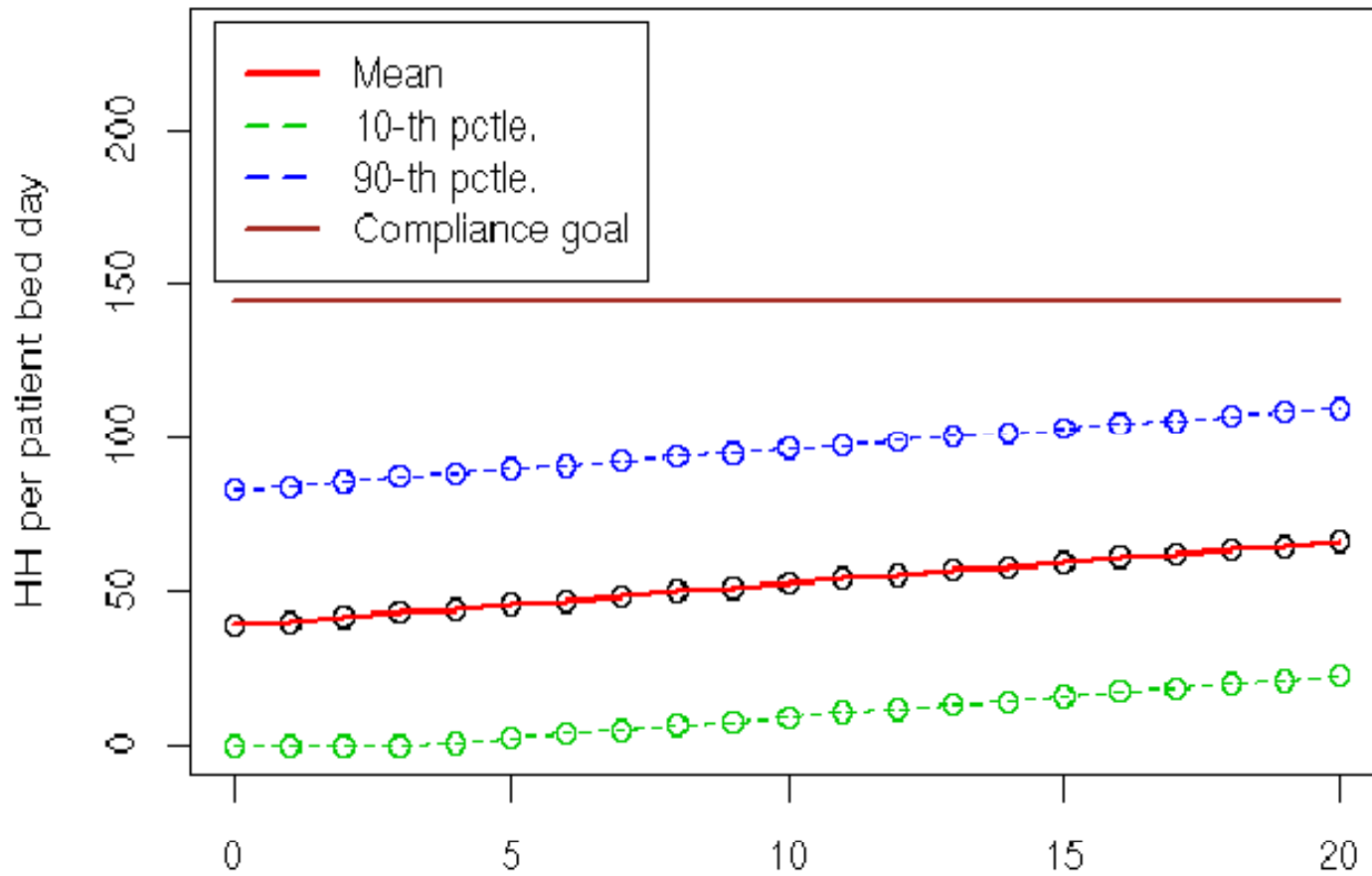


Examples of numerical goals appropriate for pilot teams

- Decrease by 50% the amount of time it takes to notify the infection preventionist of a positive MRSA culture
- Increase hand hygiene compliance by 50%
- Achieve a 40% reduction in the rate of transmission of MRSA from infected/colonized patients to non-infected patients

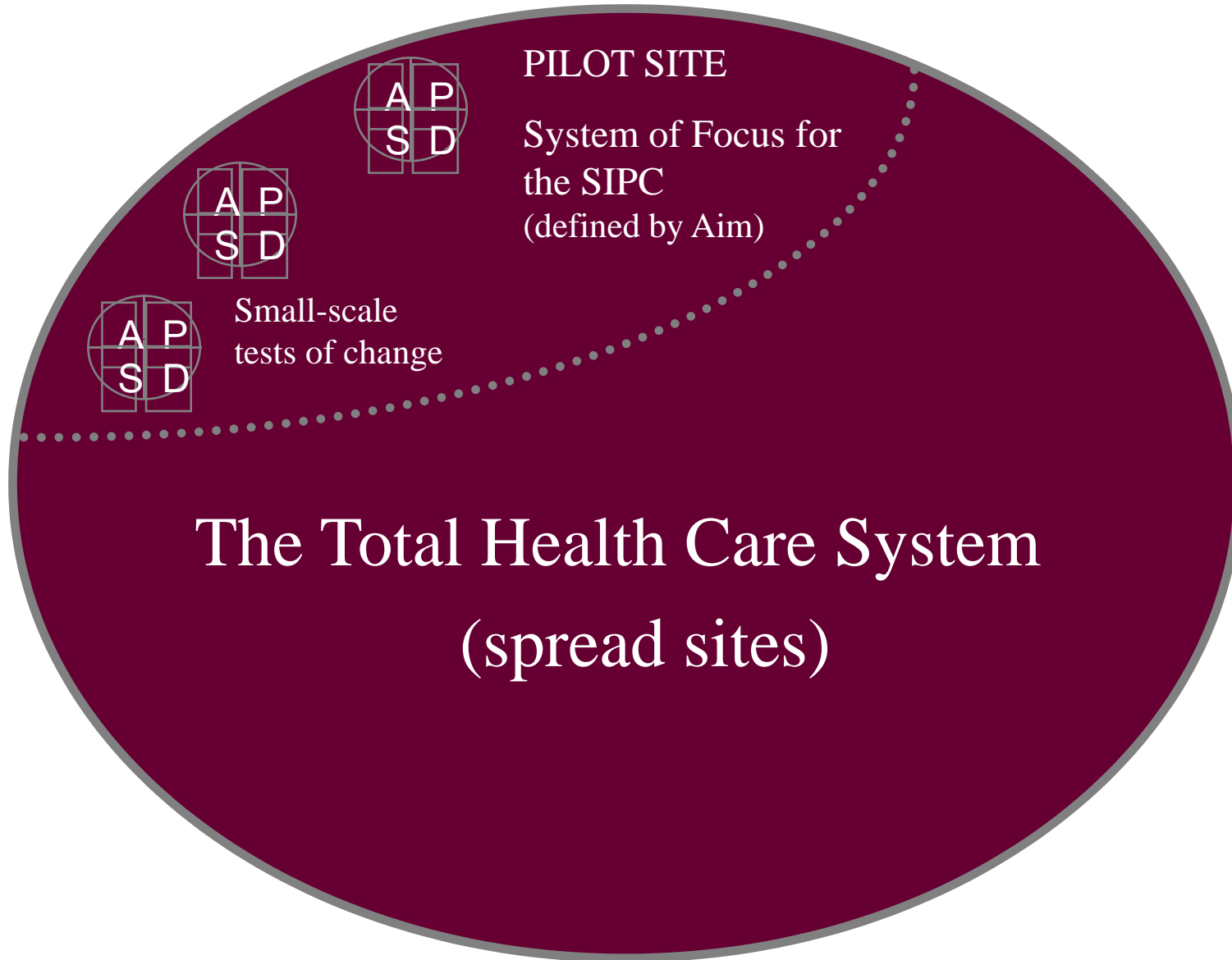


Soap and Sanitizer Combined: (ICU)





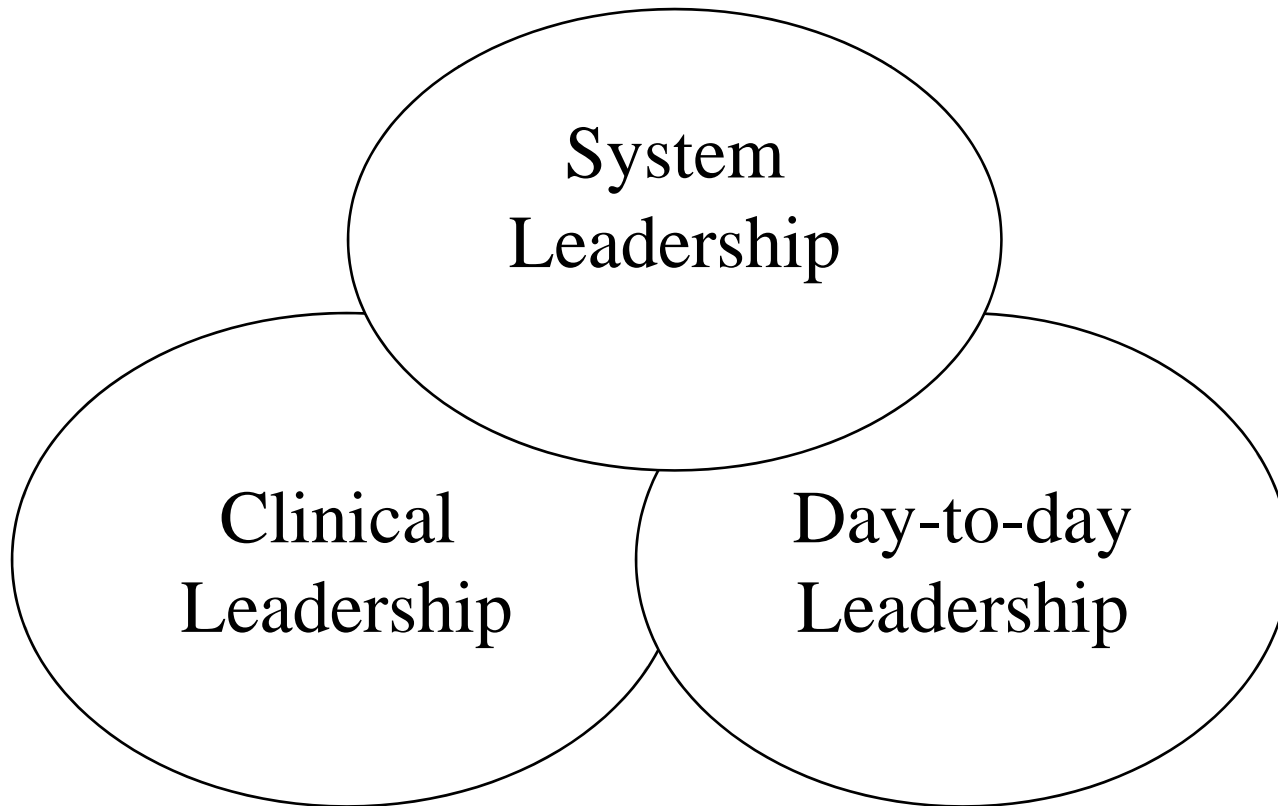
Different Populations





Ingredients for an Effective SIPC Team

Senior Leadership



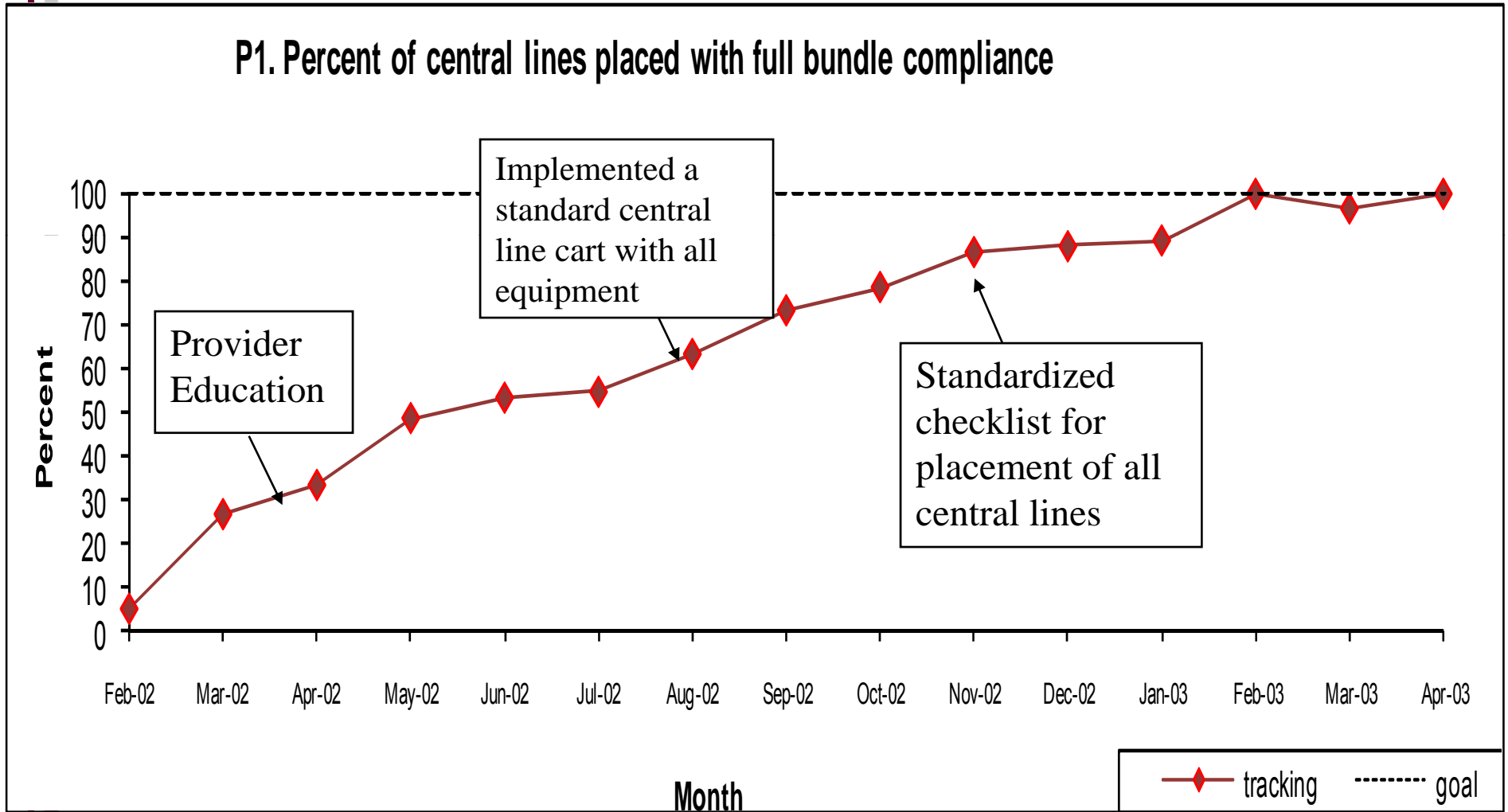


For Each of the Key Measures

- Define each of the measures for your pilot population (numerator and denominator)
- Begin reporting your measures immediately
- Use the current administrative data whenever possible
- Develop run charts to display your measures each month



Annotated Run Chart

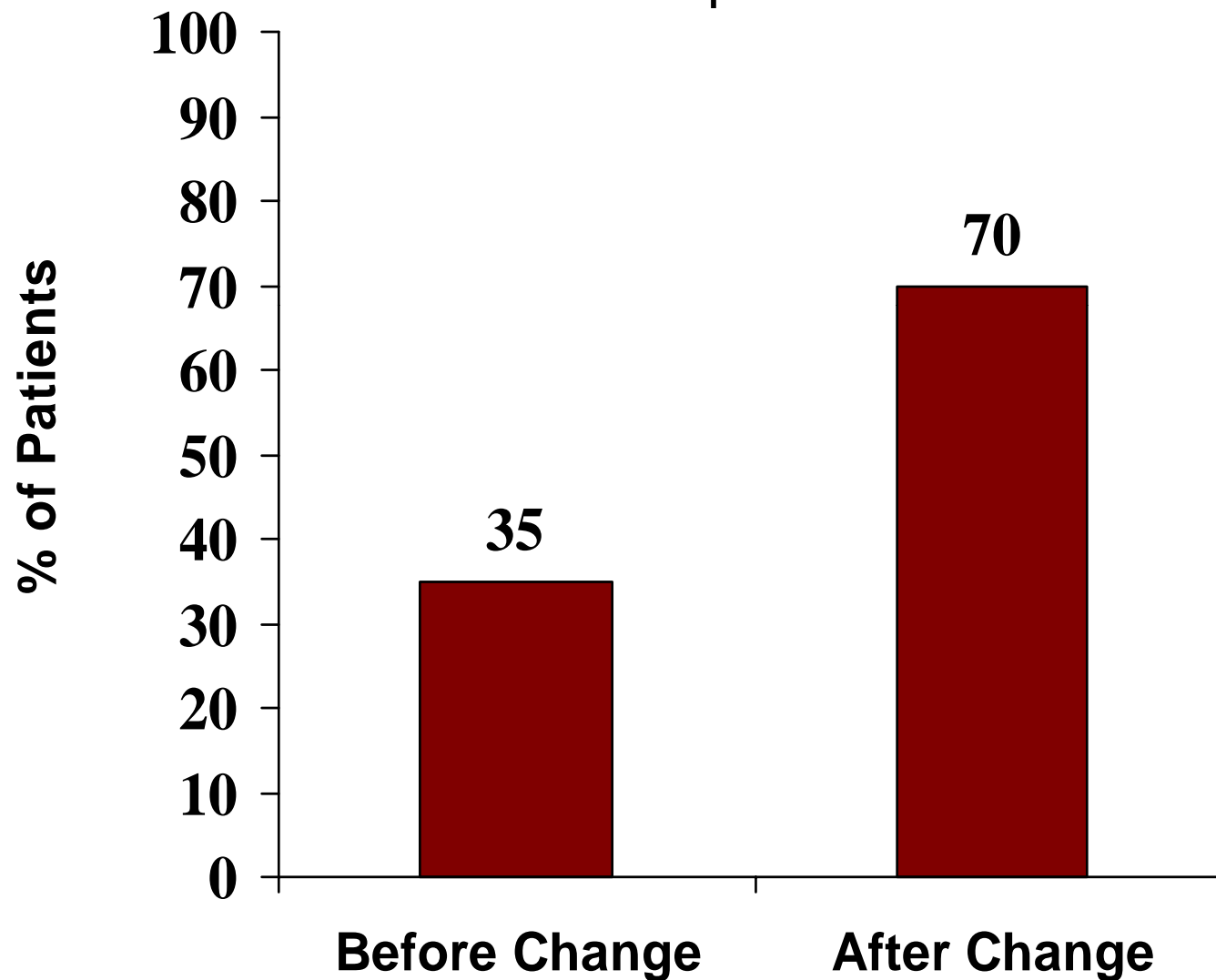




MRSA Risk Assessment

% of Patients with completed risk assessment

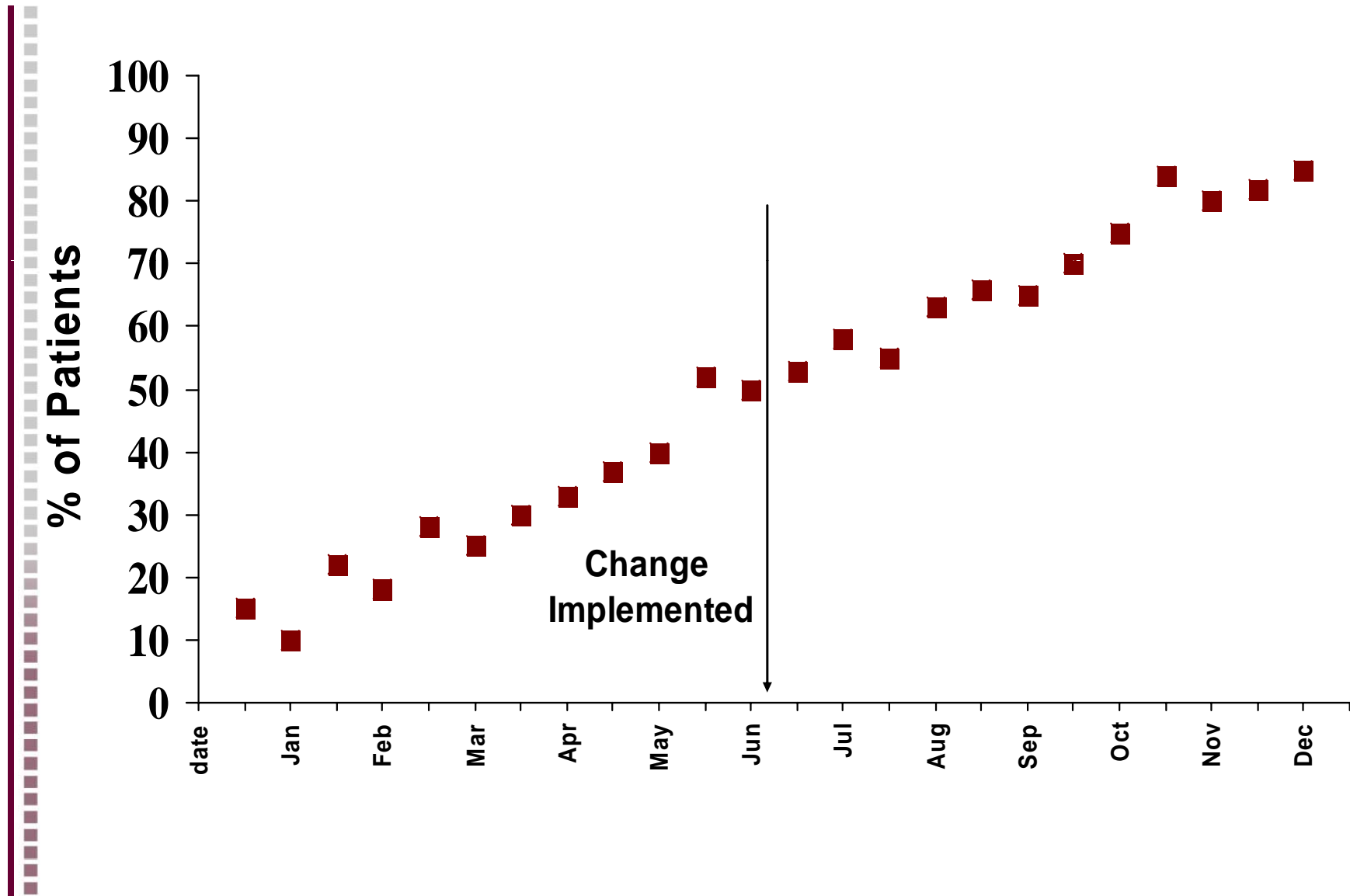
Hospital A





MRSA Risk Assessment

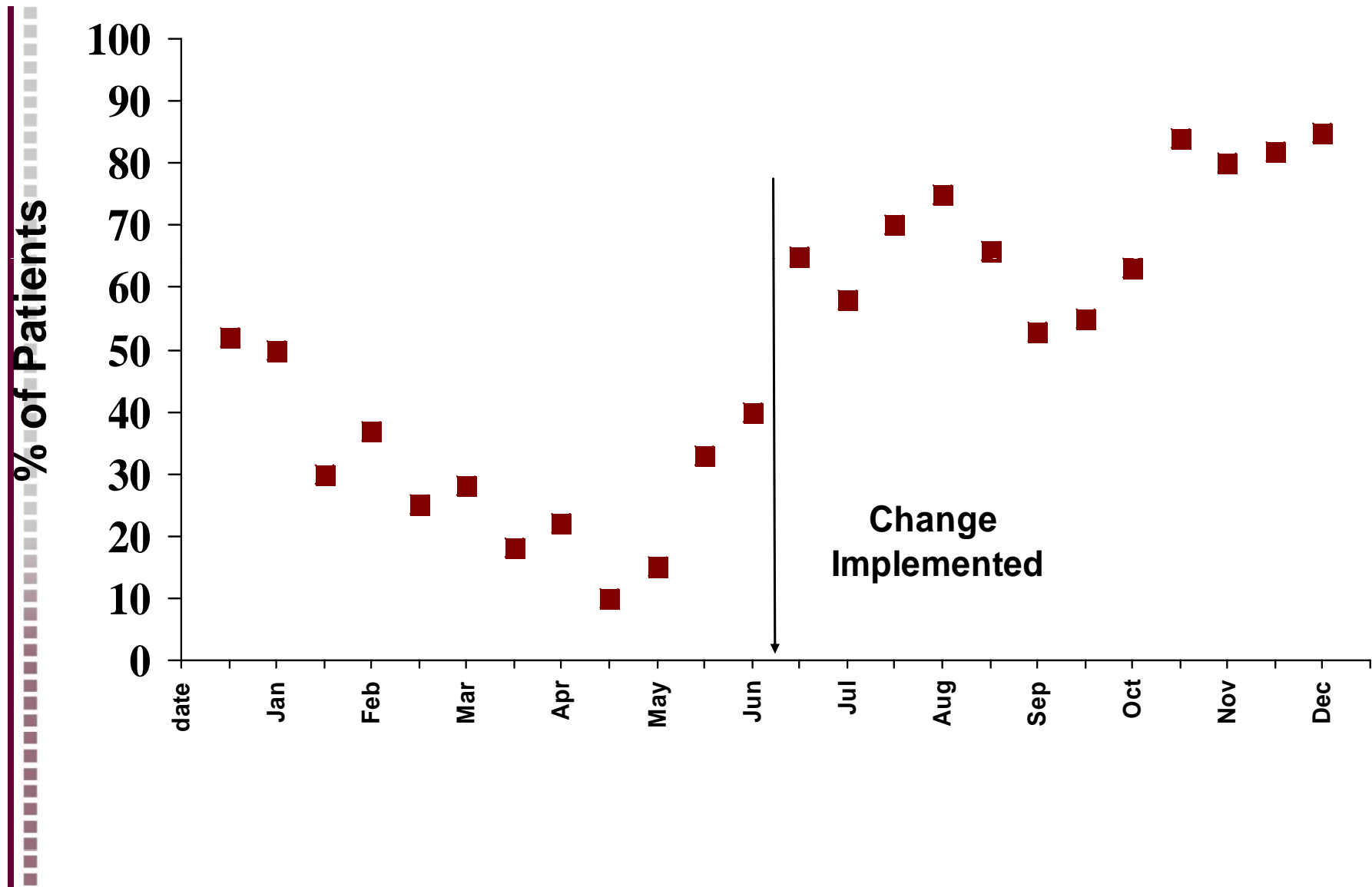
% of Patients with completed risk assessment





MRSA Risk Assessment

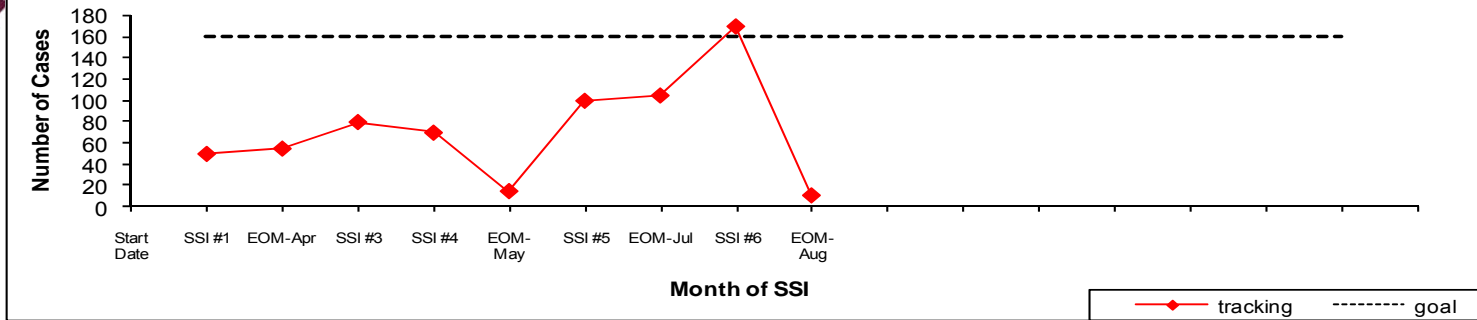
% of patients with completed risk assessment



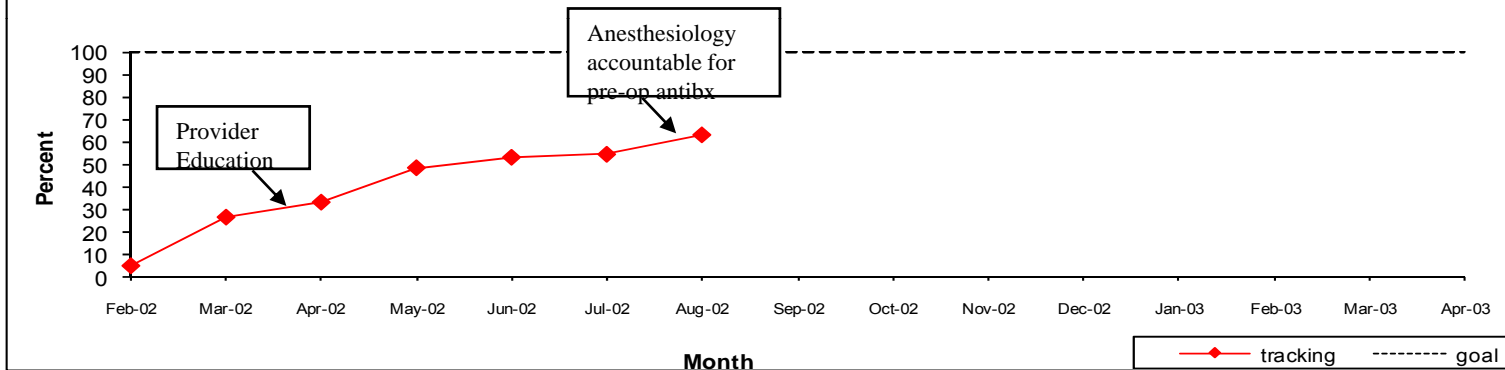


Family of Measures

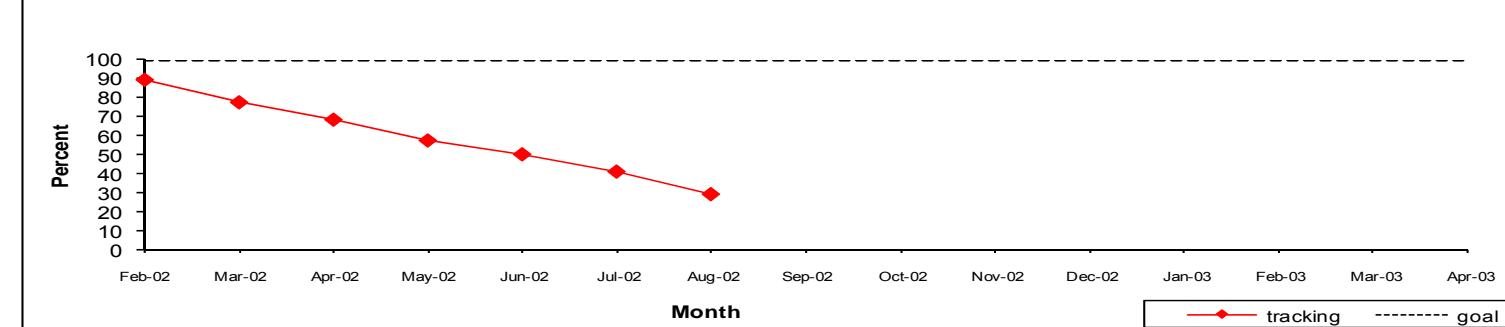
O1-1. Number of cases of MRSA transmission



P1. Percent of cases with central line bundle compliance



B1. Percent of cases without a completed MRSA risk assessment



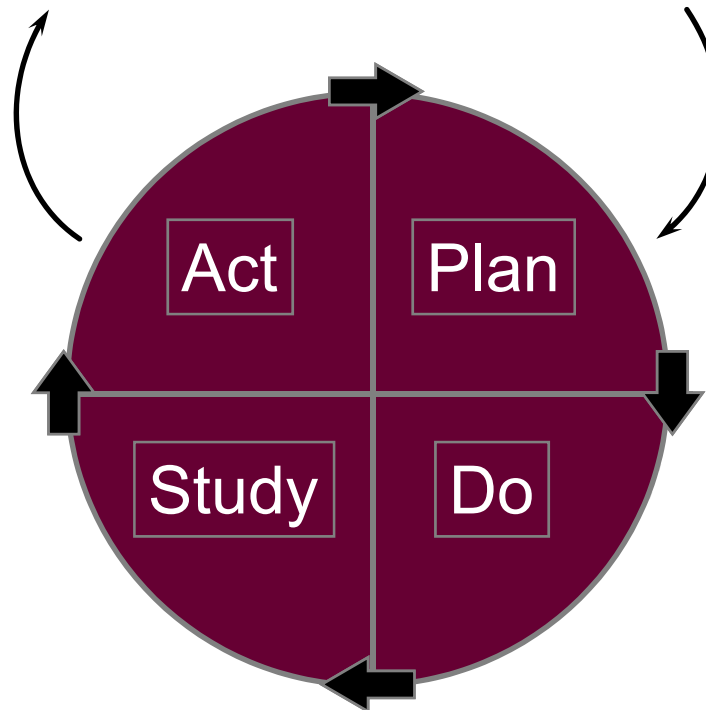


Model for Improvement


What are we trying to accomplish?

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 **Getting Started Kit:**
Reduce Methicillin-Resistant
Staphylococcus aureus (MRSA)
Infection
How-to Guide

www.ihi.org



Barriers

- **Lack of support by leadership**
 - Solution: Use opinion leaders (physicians) and data, if possible; a business case for the project may help to win leadership support.



Barriers

- **Uneven physician acceptance of new practices**
 - Solution: Use physician opinion leaders, review the medical literature, and feed back data on a physician-specific level. Remember that physicians may fall anywhere on the “Adoption of Innovations” curve; work first with your early adopters and use their stories to convince the majority.



Barriers

- **Lack of clear ownership for care practices**
 - Solution: Work with physician leaders to develop standard approaches to infection prevention, including clear designation of the physician owner.



Prevention of MRSA

- **Adherence to evidenced-based prevention practices**
 - Hand washing and contact precautions
 - CR-BSI bundle
 - VAP bundle
 - SSI bundle
 - CHG bathing in ICU
- **Antimicrobial stewardship**
- **Decontamination of environment and equipment**
- **Second tier of interventions based on local epidemiology**



Preventing MRSA

- **Engagement**
- **Education**
- **Execution**
- **Evaluation**



US Approach to Strategies in the Battle against HAI, 2006

- No single intervention prevents any HAI; rather a “bundle” approach, using a package of multiple interventions based on evidence provided by the infection control community and implemented by a multidisciplinary team is the model for successful HAI prevention
- Benchmarking is inadequate and a culture of zero tolerance is required
- A culture of accountability and administrative support is required



New Belief → New Response

- Change focus from infection *control* to infection *prevention*
- Abandon 33% preventable target

Am J Epidemiol 1985; 121:182

- Aim to eliminate all HAIs
- Requires culture change

While you may not eliminate every HAI, carefully evaluate those that occur to identify additional opportunities for improvement.



Essential Elements for Change

- Demand adherence to evidenced-based infection prevention practices
- Measurement and feedback of information
- Continuous learning and reflection
- Collaboration and teamwork between all levels of the organization (generate light not heat)
- Leadership support
- Everyone held accountable for compliance
- Empower all members of health care team (include patients and families) to ensure compliance



Good ideas are not adopted
automatically.

They must be driven into practice
with courageous patience.

Admiral Hyman Richover



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Oklahoma Foundation for Medical Quality

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