



Clinical Safety & Effectiveness

Cohort # 15

Team 14

**Implementing a Program to  
Decrease Surgical Site Infections**



Educating for Quality Improvement & Patient Safety

# Project Contributors

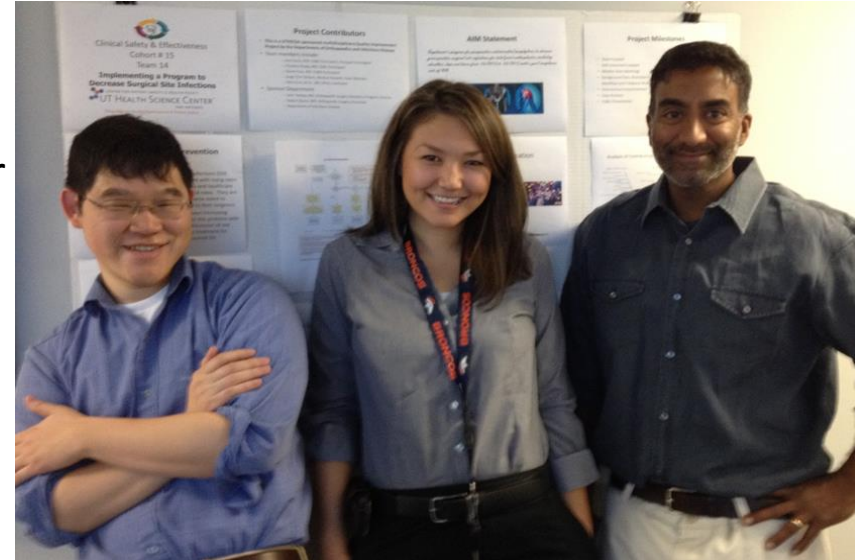
**This is a UTHSCSA-sponsored multidisciplinary Quality Improvement Project by the Departments of Orthopaedics and Infectious Disease**

Team members include:

- Anil Dutta, MD: CS&E Participant, Principal Investigator
- Christina Brady, MD: CS&E Participant
- David Chee, MD: CS&E Participant
- Jorge Clint Deleon, Medical Student, Team Member
- Edna Cruz, M.Sc., RN, CPHQ, Facilitator

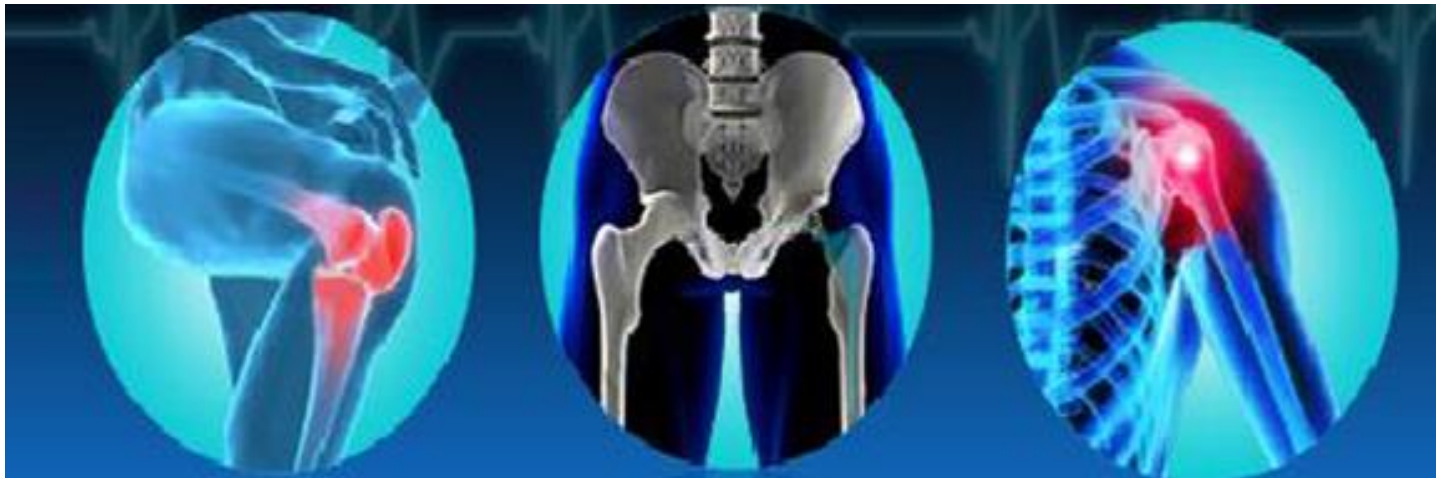
Sponsor Department:

- John Toohey, MD: Orthopaedic Surgery Residency Program Director
- Robert Quinn, MD: Orthopaedic Surgery Chairman
- Department of Infectious Disease and Infection Control
- Claudia Thames Ortho Clinic Manager



# AIM Statement

Implement a program for preoperative antimicrobial prophylaxis to decrease gram-positive surgical site infections for total joint arthroplasties including shoulders, hips and knees from 09/2013 to 12/2013 with a goal compliance rate of 80%.



# Project Milestones

- Team Created 9/2014
- AIM statement created 9/2014
- Weekly Team Meetings 9/2014-1/2015
- Background Data, Brainstorm Sessions,  
Workflow and Fishbone Analyses 9/2014
- Interventions Implemented 9/2014-1/2015
- Data Analysis 12/2014
- CS&E Presentation 1/23/15

# Why Implement A SSI Prevention Program?



- Surgical Site Infections (SSI) are a serious adverse event to patients and to their surgeons.
- Over the last decade, MRSA rates in the community and in healthcare settings have risen.
- There is continuing discussion to use legislative pressure for not reimbursing costs for hospital acquired infections, which would include surgical site infections

# University Hospital Surgical Site Infections

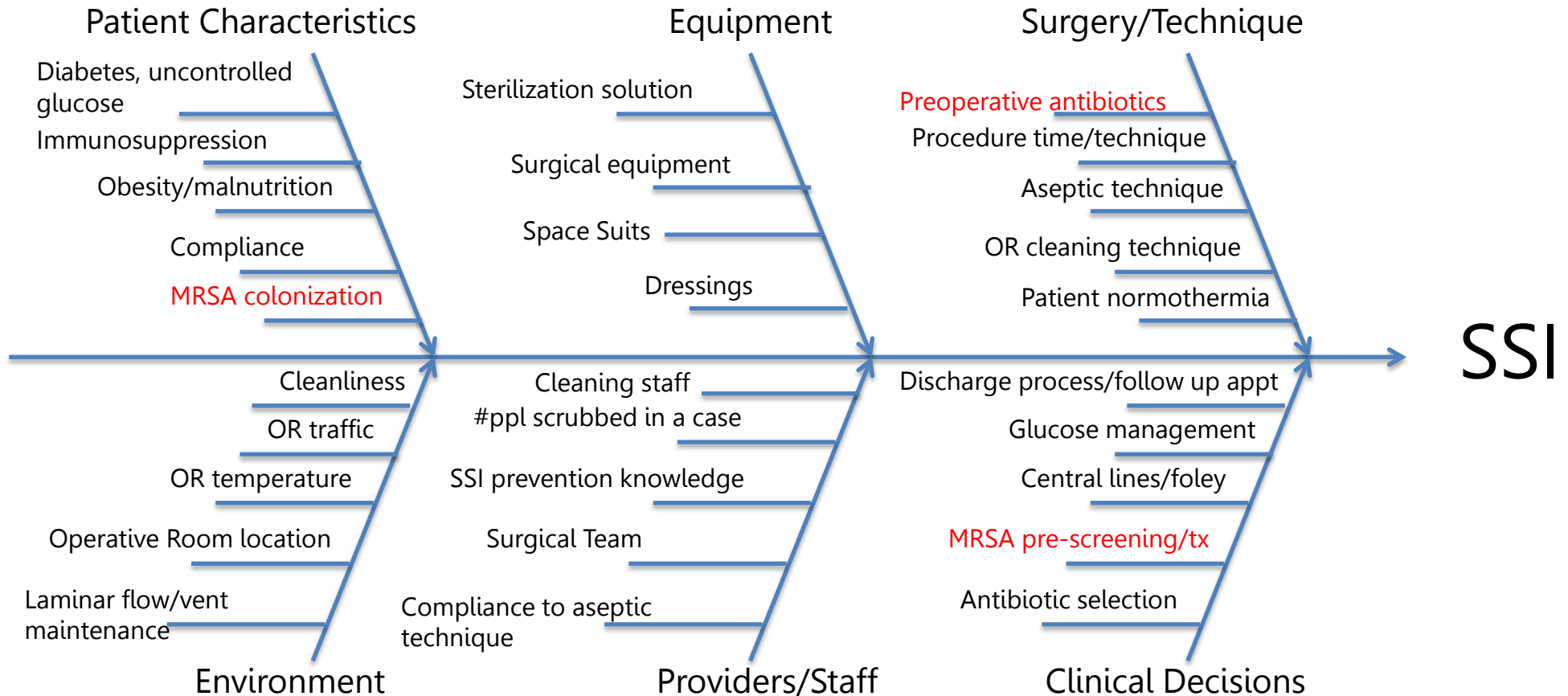
- The National Healthcare Safety Network is a hospital acquired infection tracking network by the Centers for Disease Control
- In 2012-14, the rate of infections for hip and knee prostheses for University Hospital ranged from 2.3-3.8% (National rates 1-1.4%, other studies up to 5%)
- Of those infections, 62% were from *Staphylococcus aureus* and of those 38% were MRSA

# Bundled Interventions

- Bundled interventions have been shown to be effective for reducing hospital acquired infections for Ventilator Associated Pneumonias and Central Line Associated Blood Stream Infections
- Similarly, bundled interventions for skin and nasal decolonization and antimicrobial prophylaxis for Staph aureus have demonstrated a decrease in SSI.
- Estimated a number needed to screen of 250 to prevent 1 surgical site infection .



# Analysis of Contributing Factors to Surgical Site Infections

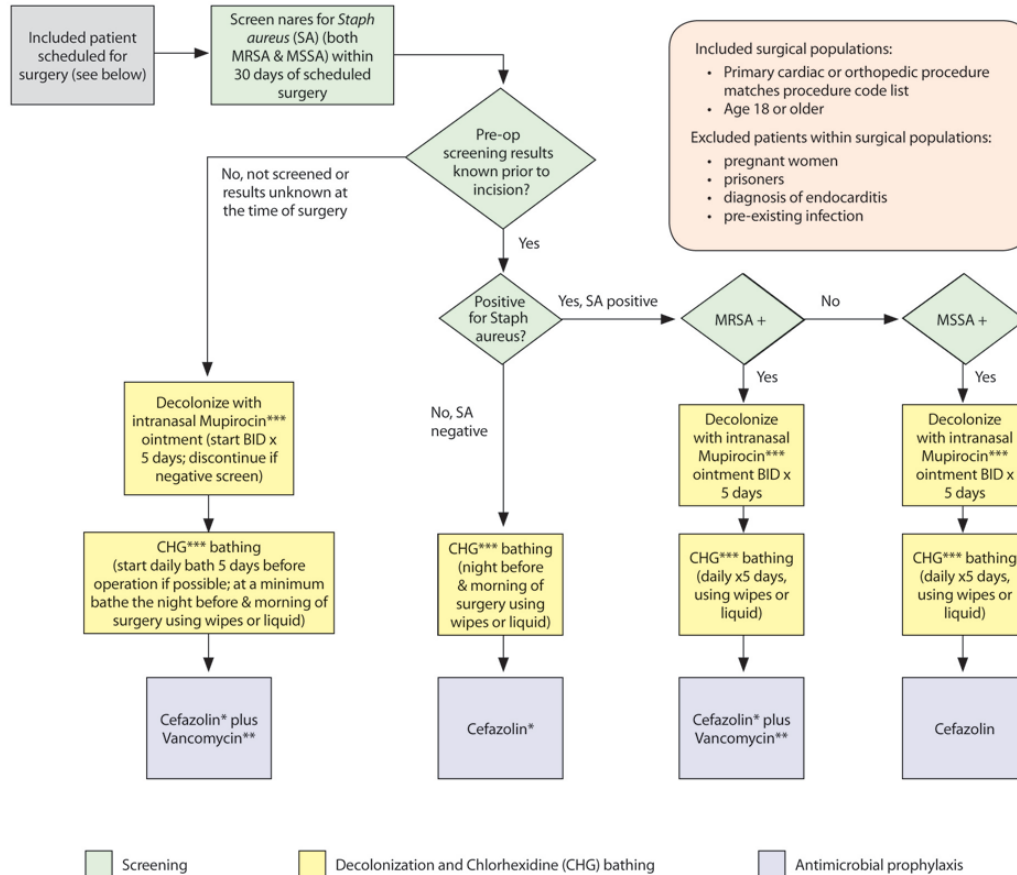




# PLAN: Intervention

- All the Orthopedic Staff performing total joint arthroplasties of the shoulder, hip or knee will be asked to participate
- The STOP SSIs Algorithm, an evidence-based algorithm supported by the Agency for Healthcare Research and Quality, was implemented
- During the preoperative visit a MRSA nasal screening will be taken and the patient will be sent home with a chlorohexadine pre-surgical scrub
- A medical assistant will follow up with the results of the study, and will contact the positively screened patients. A prescription for intranasal Mupirocin (Bactroban) will be provided. All patients will be asked to use the scrub the night before the surgery
- Data will be analyzed for efficacy of the program. Pending that analysis, we will decide if it should be continued

## The STOP SSIs Algorithm



\*May substitute cefuroxime for cefazolin; unconfirmed beta-lactam allergy does not preclude the use of cefazolin. For a confirmed beta-lactam allergy, use vancomycin 15mg/kg (<120 minutes before the operation) in place of cefazolin and add either gentamicin 5mg/kg, or aztreonam 2 Gm <60 minutes before the operation/incision.

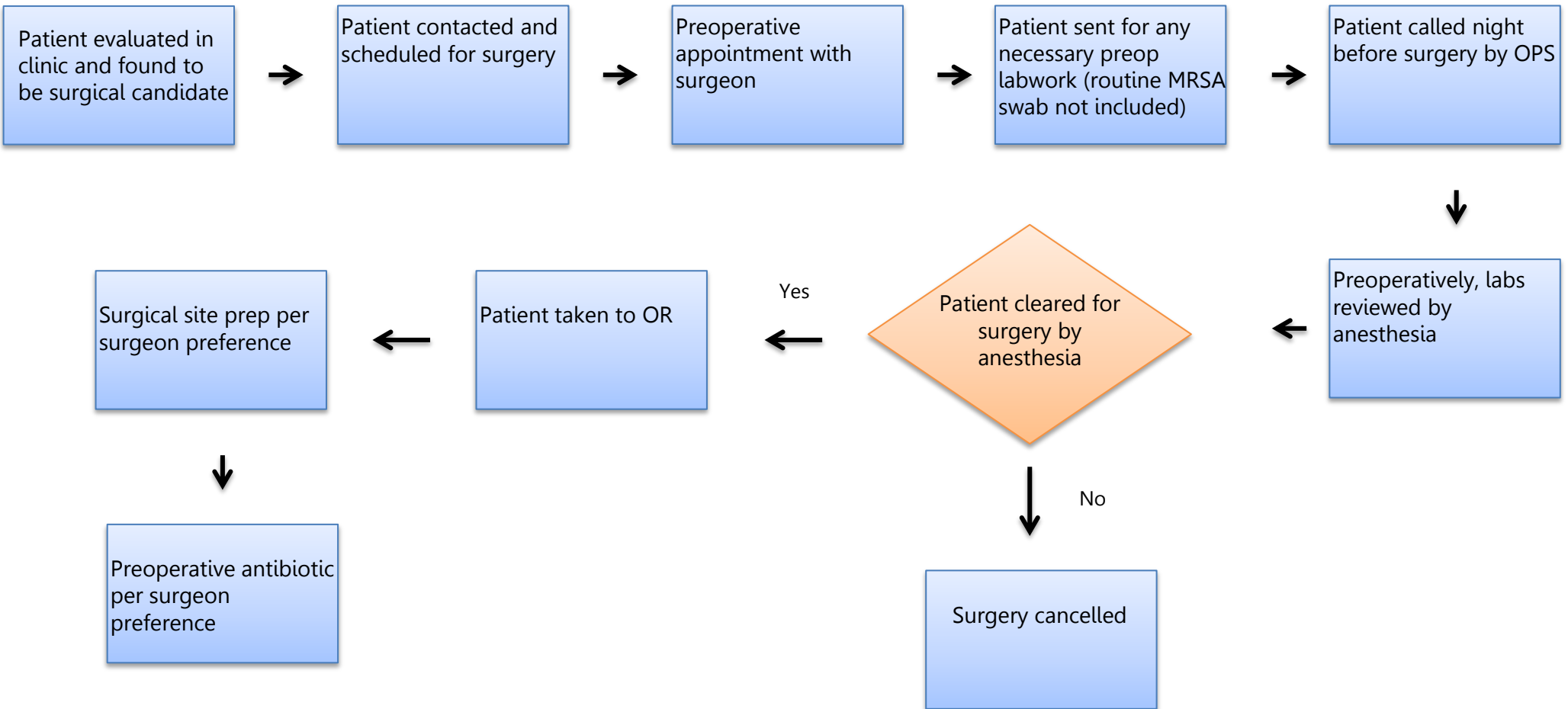
\*\*For vancomycin allergy, may use daptomycin (4mg/kg) in combination with cefazolin (if not beta-lactam allergic) for preoperative prophylaxis <60 minutes before the operation/incision. If also beta-lactam allergic, use gentamicin 5mg/kg, or aztreonam 2 Gm <60 minutes before the operation/incision in combination with the daptomycin. Vancomycin, daptomycin or gentamicin prophylaxis should not be continued after the operation. Cefazolin and aztreonam should be discontinued within 24-hrs. of the operation.

\*\*\* Discontinue if patient experiences any side effects or allergic reaction to mupirocin or chlorhexidine gluconate. For the purposes of this algorithm, CHG bathing does not need to continue post-operatively.

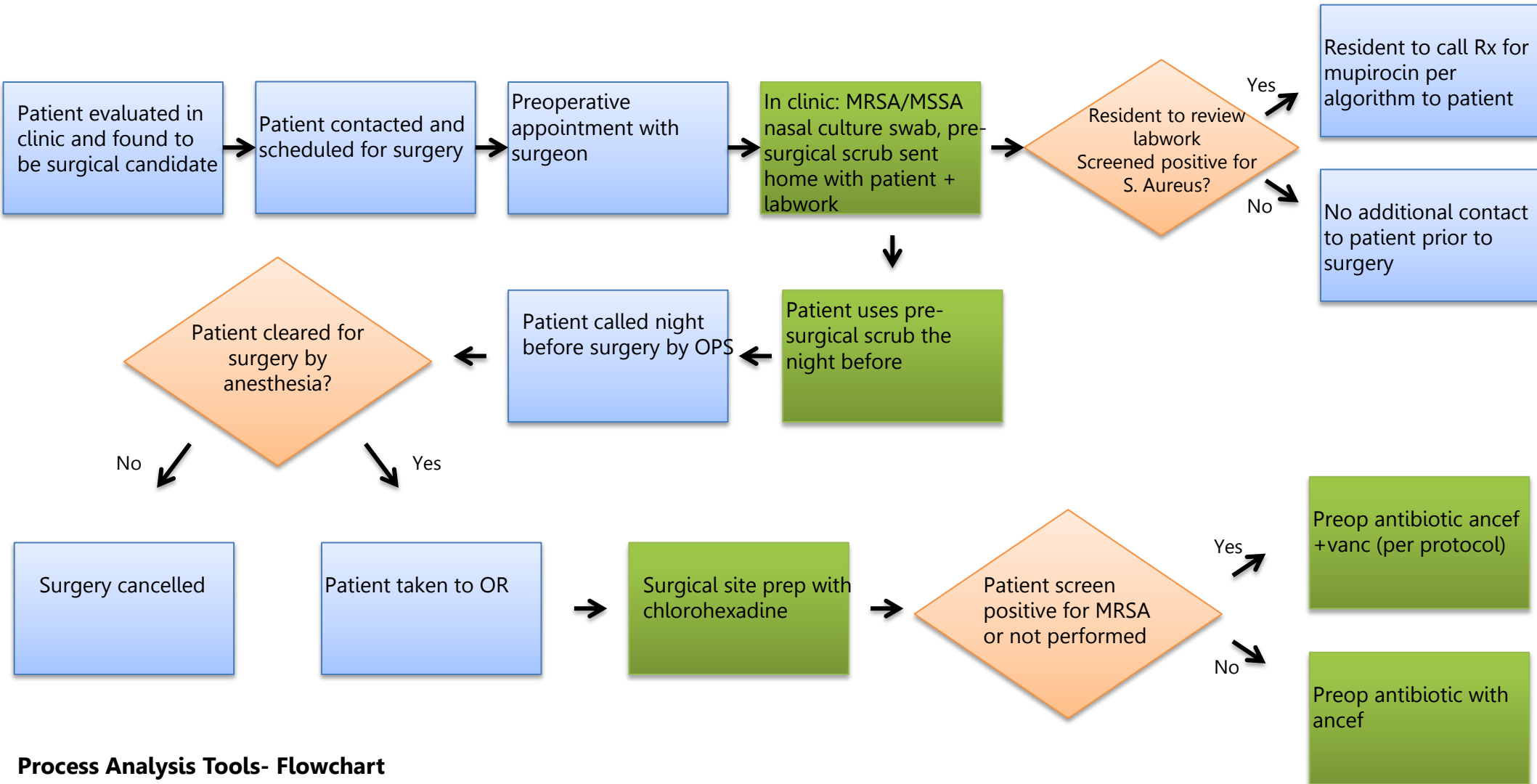
Please contact authors for a supplemental document for additional important information on dosing guidance and mupirocin and chlorhexidine use.

Figure 1. Overview of Study to Optimally Prevent (STOP) SSIs Algorithm

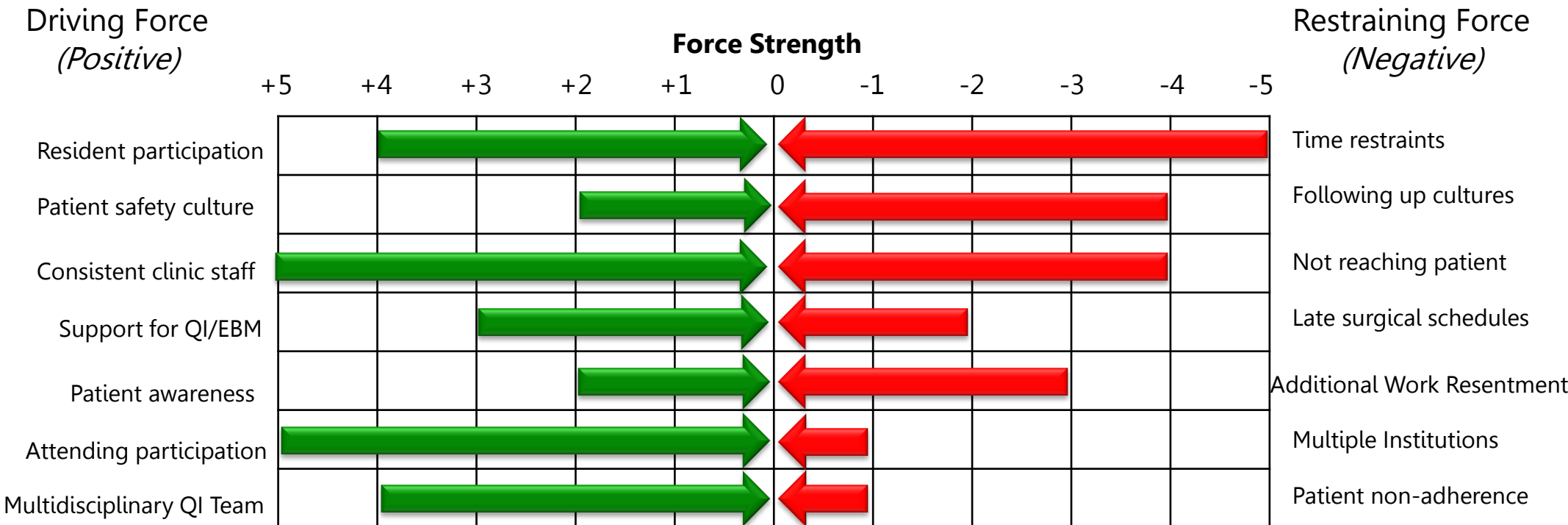
# Current SSI prevention flowchart



# Implementing a bundled SSI Prevention System



# Forces to Implementing a SSI Prevention Program

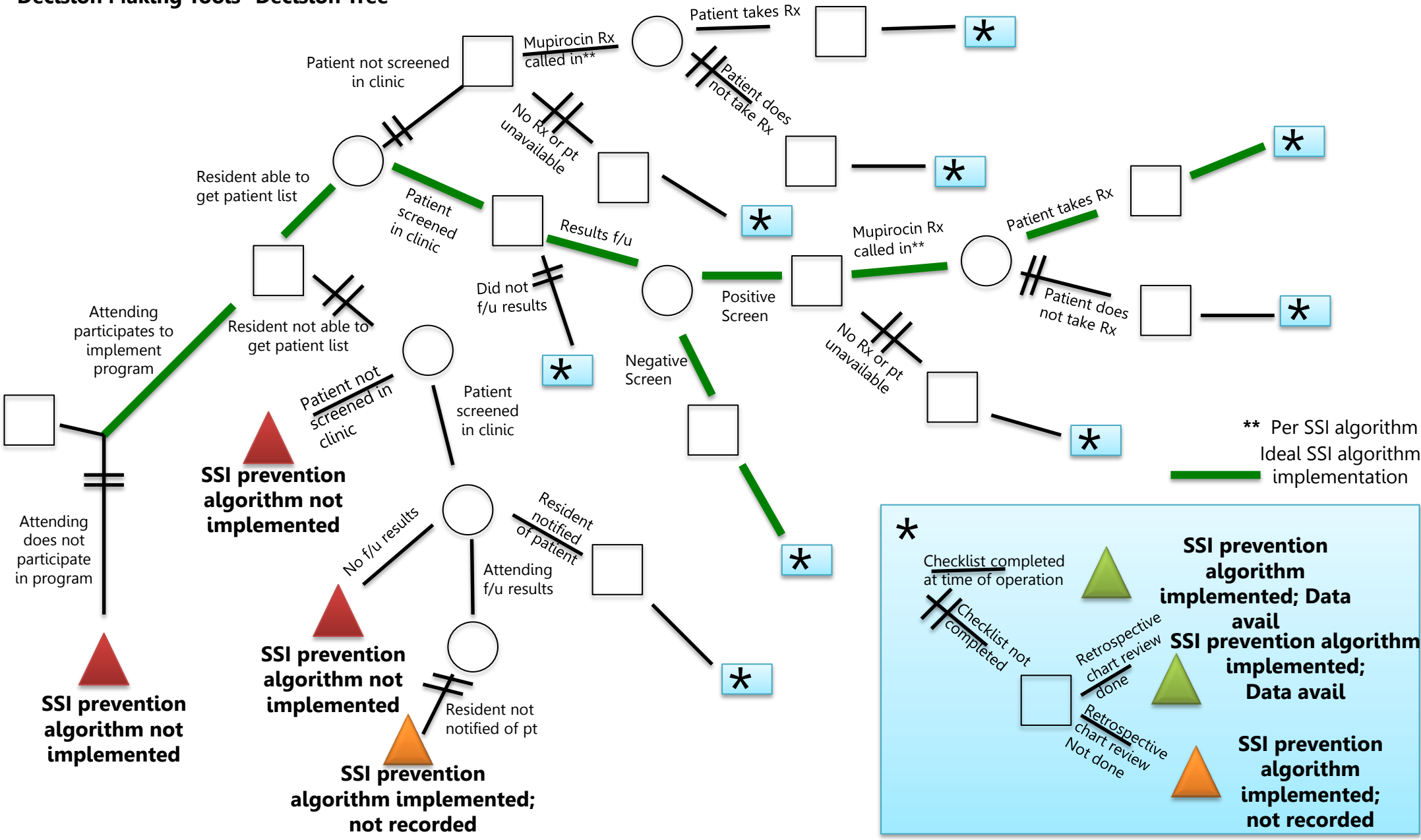


**+25**

**-20**

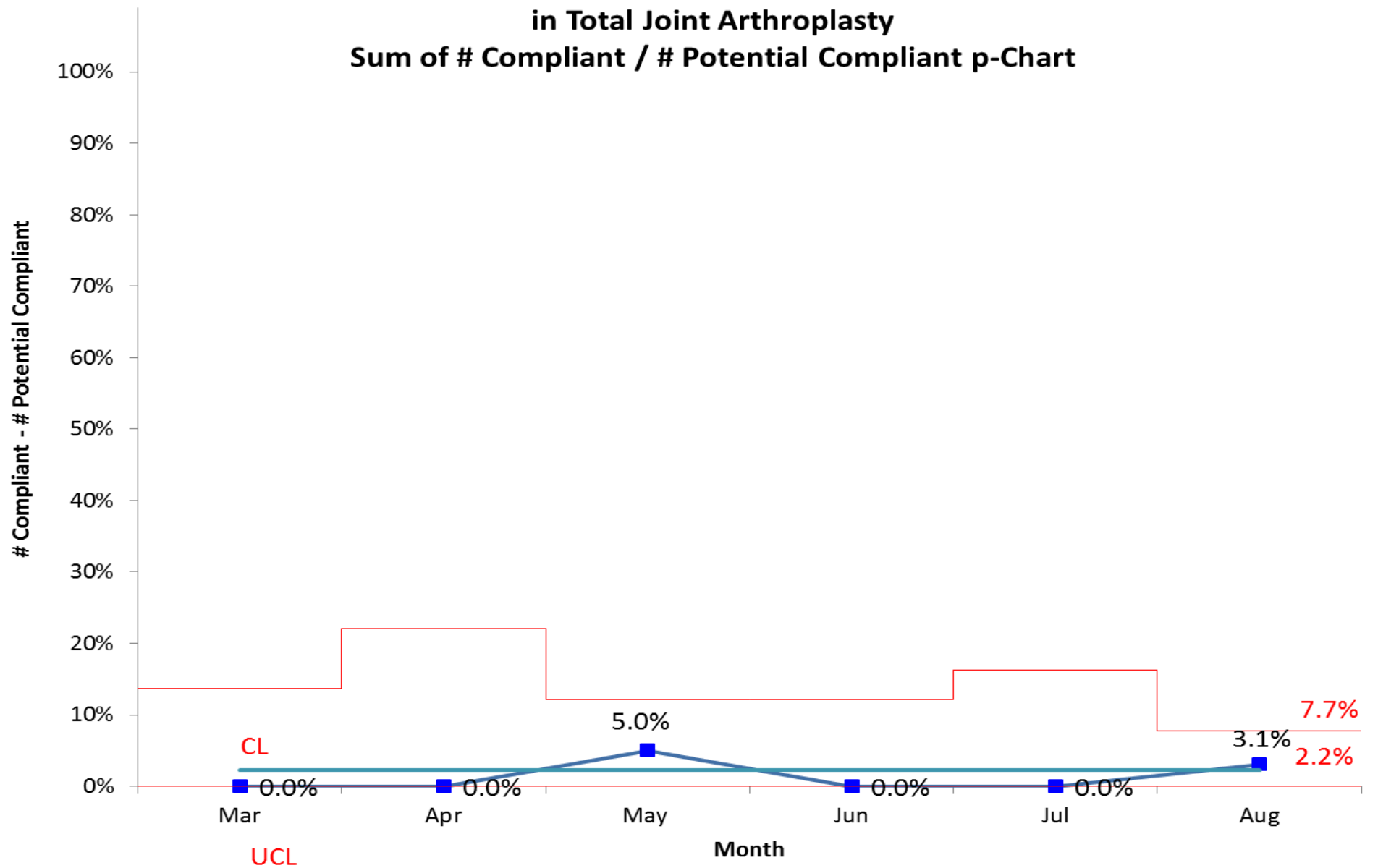
# Implementing SSI Prevention Program

## Decision Making Tools- Decision Tree



# Implementing a Program to Decrease Surgical Site Infections in Total Joint Arthroplasty

## Sum of # Compliant / # Potential Compliant p-Chart



# Tools used for measurement

- List of all cases provided by the MARC
- Retrospective chart review of all patients to evaluate
  - MRSA prescreen
  - Rxs documented
  - Antibiotics given per anesthesia report at UH
- Weakness of tools
  - Only a portion of cases were done at UH
  - Can not document if chlorohexadine provided
  - Outside records not available



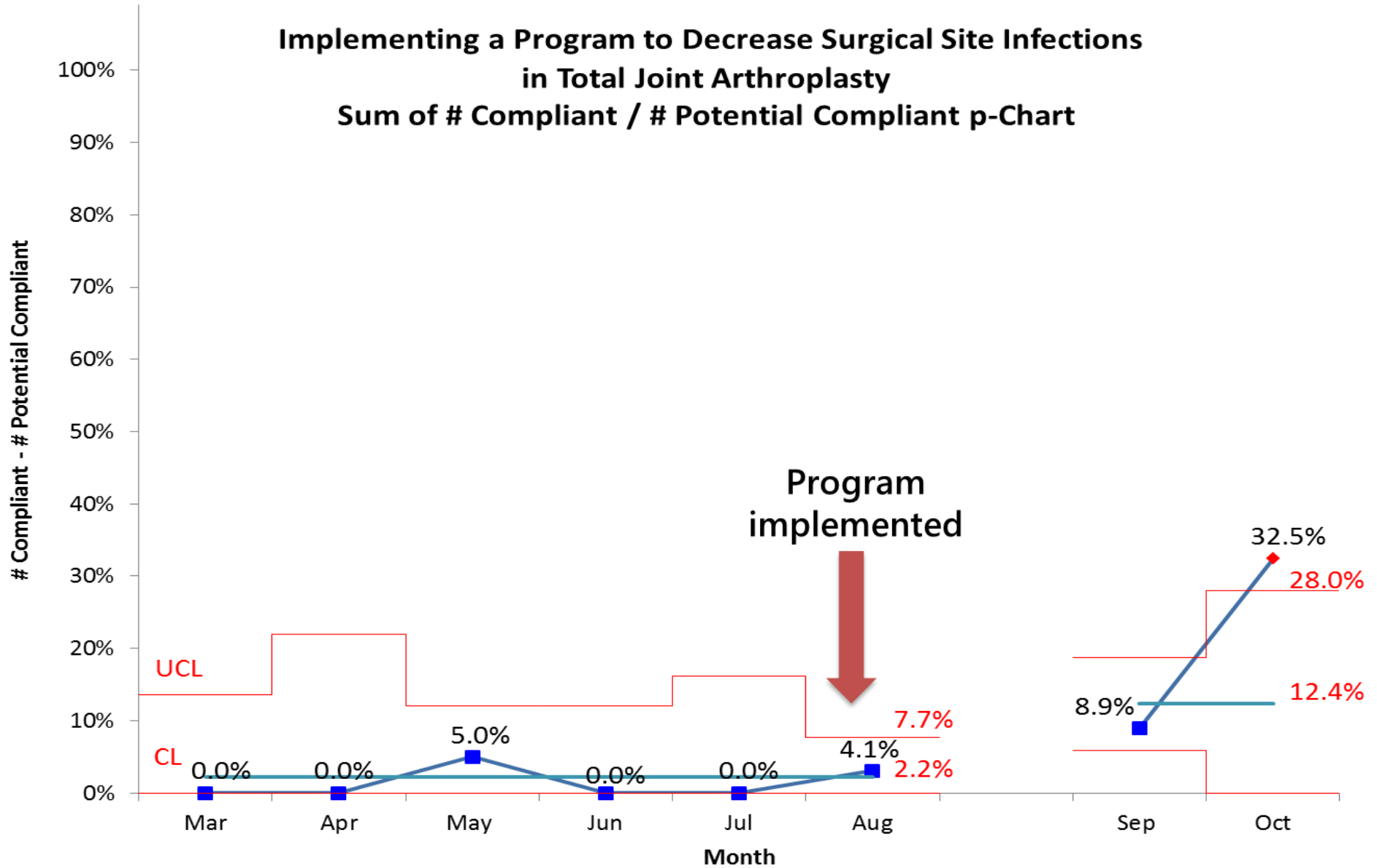
# DO: Implementing the Change

9/2014: Orthopedic staff were asked to participate, Patient handouts were provided and medical assistant staff were taught how to do the MRSA nasal swab and to provide the scrub

Problems encountered:

- Staff not wanting to participate
- Lack of follow-up of studies or screening not being completed

# Implementing a Program to Decrease Surgical Site Infections in Total Joint Arthroplasty Sum of # Compliant / # Potential Compliant p-Chart



# Pre and Post Intervention SSI Rates

- 2.2% infection rate pre intervention in 2014
- Months without surgical site infections =  $4 \pm 1$
- Post intervention 0% infection rate since September 2014, but sample size is small

# Return on Investment- Costs to Consider

- Cost nasal mupirocin  
~\$116.99
  - UH MRSA Nasal Screen  
Culture \$110.00
  - Vancomycin \$4.12/dose,  
Ancef \$3.00/dose
  - Hibiclens soap \$5.00/bottle
  - Number needed to screen  
250 to prevent 1 SSI (2)
  - Documented Average cost of  
single SSI \$10,000.00-  
\$26,000.00 (1)
  - Can only estimate due to  
patient variability
    - In house days ~\$5,000.00
    - Imaging ~\$150.00
    - Cost additional surgery ~\$5,000.00
    - Antibiotic management ~\$3,000.00
    - Additional followup visit ~\$2,000.00
- Preliminary cost estimate: ~\$15,150.00**

(1) Scott, R.D. The Direct Medical Costs of Healthcare-Associated Infections in US Hospitals and the Benefits of Prevention. CDC. 3/2009.

(2) Lonneke, GM. Et al. Preventing Surgical-Site Infections in Nasal Carriers of Staphylococcus aureus. NEJM. 2010; 361;1

# Return on Investment

To prevent one surgical site infection- Based on number needed to screen 250 to prevent 1 SSI:

Savings to hospital: ~\$15,000.00

Additional revenue to hospital: ~\$27,500.00  
(includes screening cost)

Cost to hospital: ~\$2,250.00  
(includes hibiclens soap, antibiotic, if not reimbursed)

$ROI = ((\text{Saving} + \text{New revenue}) - \text{cost}) / \text{cost}$

$ROI = (15,000 + 27,500 - 2250) / 2250$

**= +17.89**

# ACT: Sustaining the Results

- Continue with implementation until data can be analyzed to see if there is a decrease in surgical site infections (~6months)
- Our team will continue to meet monthly and send updates to staff
- If a concomitant decrease in surgical site infections is noted, will discuss changing policy to require implementing this program

# Conclusion/What's Next

- Implementing a program for preoperative antimicrobial prophylaxis to decrease gram-positive surgical site infections for total joint arthroplasties does improve compliance
- QI projects do not always save money
- Change in culture is very difficult
- Further data needs to be collected to complete an in depth cost-benefit analysis of this program

**Thank you!**



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