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**Surgical Resident and Staff
Engagement in Quality Improvement
Related to Surgical Site Infections:
The Effect of Real-Time Feedback**



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Surgical Resident and Staff Engagement in Quality Improvement Related to Surgical Site Infections: The Effect of Real-Time Feedback

Structured Abstract

Purpose: To reduce surgical site infection rates by surgical staff engagement through real time feedback in a high risk tertiary care hospital.

Scope: This project involved engagement of the surgical staff at multiple levels in a true partnership with multidisciplinary team members including Infection Preventionists, infectious diseases/infection control physician, operating room (OR) staff nurses, surgeons, anesthesiologists, residents and OR administration to embark on a two-year-long quality improvement project to develop a culturally appropriate approach to improving surgical site infection rates.

Methods: Phase I of this project developed real time surveillance for surgical site infections by infection control department. Phase II included feedback to the OR staff including surgeons, residents and nursing on infection rates, on-the-spot feedback on process measures through random audits, root cause analyses and correction of identified opportunities.

Results: During Phase I, duties and workflow of infection preventionists in the Department of Infection Control were reorganized to be able to perform real time surveillance as soon as an SSI has occurred and information related to SSI is available. During Phase II, we continued real time surveillance and paired it with real time feedback to the stakeholders along with feedback on process measures. Outcomes include: 50% reduction in surgical site infection rates in the post intervention period compared to the pre-intervention period. We estimate that we have impacted about 200 staff including OR staff and residents/surgeons with this project. Estimated total target population number impacted to date is 5500 patients.

Key Words: Surgical site infection, feedback, multidisciplinary, staff engagement

Purpose:

Project Aim: With this project, we created a multidisciplinary approach to decrease surgical site infection rates by at least 50% by focusing on real time feedback on infections and on-the-spot feedback on OR processes to OR staff including OR nursing staff, residents and surgeons. In order to achieve this, we:

Objective 1: Reorganized infection control department's workflow to perform surveillance for SSI as soon as the infection occurred and information related to infection is available.

-Infection preventionists started performing daily surveillance and sharing data with the stakeholders.

Objective 2: Utilized surveillance data to provide feedback to surgeons and surgical staff.

Objective 3: Infection preventionists performed random audits during procedures and provided on-site feedback on processes such as preoperative skin preparation to the surgical staff.

Scope

Background: Surgical site infections (SSIs) contribute to significant morbidity and at times mortality in patients. SSI reduction has been identified as a significant focus of quality improvement (QI) programs for several years. US Department of Health and Human Services (HHS) established a national prevention target to reduce SSI by 25% by December 31, 2013.¹ However, our current QI efforts have not reached desired goals (Figure 1). CDC's National Health Safety Network (NHSN) data shows a 10% reduction in SSI nationally at the end of the year 2010.¹

Incidence/Prevalence: The average SSI rate was 3.038 infections per 100 procedures for the baseline period (years 2009, 2010, 2011 and Quarter (Q)1 and Q2 2012).

Context: Efforts to engage surgical staff in SSI reduction efforts are lacking. Surgical curricula with a QI focus have been described in the literature, but those related to involvement of residents in SSI prevention strategies have not been specifically described.¹ Indeed, among all the outstanding educational activities for the residency and fellowship programs in the surgical departments, quality improvement education related to SSI prevention is lacking. It is our intent to focus on QI in SSIs, engaging surgical staff and surgical attending and resident staff through education in this process. We proposed that providing real-time SSI data and integrating infection prevention experts into these multidisciplinary teams, using this real-time data, would lead to reduction in SSI. Our ultimate goal was to reduce SSI by 50% in a 2-year time frame.

Setting: The project took place at a tertiary care hospital in the Department of Infection Control, the operating room, and the surgical departments, and focused on the key participants and stakeholders.

Participants: Each Objective of this project involved different participants who were engaged at various levels. Objective 1 participants included the infection preventionists and Infection Control Medical Director. These were existing members of the infection control department and were engaged in this QI project. Objective 2 and 3 included infection preventionists along with OR staff, surgeons and residents. Feedback on processes and infections were provided by the infection preventionists to the rest of the participants.

Methods

Study Design

Phase 1: Objective I: Reorganizing the infection control department's workflow to perform surveillance for SSI as soon as the infection occurred and information related to infection was available was the first, and most important step in achieving our goal of reducing SSI rates. Infection preventionists started performing daily surveillance and sharing data with the stakeholders. Infection preventionists used Center for Disease Control and Prevention/National Health Safety Network definitions for surgical site event surveillance (Appendix A).²

Phase 2:

Objective II: Emails and one-on-one and group meetings were utilized to disperse data. Meetings were called by the Infection Control Department as needed to discuss the infection rates and opportunities. Cases were brainstormed to identify opportunities.

Objective III: Infection preventionists performed random audits in the OR. They randomly selected operative cases from the OR schedule. Once they selected the case, they approached the surgeon and the OR manager to inform their intent to observe. They then stood in one corner and watched all aspects of the procedure including surgical hand scrub, handling and storage of instruments, OR etiquette, OR traffic and skin preparation. They immediately provided feedback on any opportunities identified. Findings were also shared with OR leadership who then educated staff in monthly staff meetings. Infection rates were also shared at some surgical departmental meetings and morbidity & mortality conferences.

Data sources/collection:

The source of all data collected for SSI surveillance was our electronic medical record and infection control database. The Institutional Review Board at our institution has deemed this project a quality improvement project. All data was collected as part of the routine surveillance of the Department of Infection Control.

Interventions

The following interventions were implemented as described and a statistically significant decline in SSI was achieved. Among the implemented interventions as described in the project proposal were:

1. Real time data feedback to the OR staff, surgical attendings and residents when an SSI occurred.
2. Daily surveillance for SSI by infection preventionists.
3. Root cause analysis was performed by the multidisciplinary team including infection preventionist, medical director of infection control, OR staff and surgical departments.
4. Correction of issues identified through the root cause analysis by the multidisciplinary team.
5. OR observations by the infection preventionist and immediate feedback and follow up feedback to the OR staff, surgeons and resident staff.
6. Presentation of data at some surgical M&Ms on a quarterly basis.

Measures

Surgical procedures included in the study include Colectomies, Hysterectomies, Coronary artery bypass grafting, Hip and knee arthroplasties, laminectomies and fusion and Cesarean sections.

Surgical site infection rate/100 surgical procedures was measured using the following formula:

Number of surgical site infections/Number of surgical procedures*100

Statistical significance was tested by statistical control charts using QI Macros®.

SSI rates during baseline period (CY 2009, 2010, 2011 and Q1 and Q2 2012) and Intervention period (Q3 and Q4 2012, CY 2013 and CY 2014 and Q1 2015).

Limitations:

Analysis of secondary outcome measures is pending. Measurement of increase in surgical resident knowledge about SSI prevention is pending - we plan to continue our quality improvement efforts beyond this final report and plan to work with surgical departments to accomplish this.

Results:

Principal findings and outcomes:

As a result of the real time feedback to and engagement of surgical staff including OR nursing, surgical attendings and residents, we have achieved 50% reduction in surgical site infection rates in the post intervention period compared to the pre-intervention period. The graph below represents the SSI rates. The statistical control chart has shown the decline to be statistically significant. The average SSI rate was 3.038 infections per 100 procedures for the baseline period (years FY 2009, 2010, 2011 and 2012) and has decreased to 1.463 infections per 100 procedures during the intervention period (FY 2013, 2014 and Q1 and Q2 2015).



Figure 1: SSI rates during baseline period (FY 2009, 2010, 2011 and 2012) and Intervention period (FY 2013, 2014 and Q1 and Q2 2015). Q = Quarter which equals a 3-month period.

DISCUSSION:

Impact of the project: Real time data surveillance and feedback has been received with great enthusiasm. We have started providing infection data to the surgical disciplines as soon as the infection occurred. Education to surgeons and residents was provided on an ongoing basis in the OR. SSI data was provided to OR staff who were involved in that particular patient's care to encourage continuity of patient care related to OR staff who may have otherwise not been aware of the long term outcome of their patient. OR staff/managing staff conducted case investigation and shared findings with all OR staff. Findings, if any SSI occurred and the infection rates were shared with all OR staff on a monthly basis at staff meetings. We saw a significant decline in surgical site infections as evidenced by the statistical control charts submitted.

Target healthcare population was about 150 including OR staff and residents/surgeons. We estimate that we have impacted 200 staff with this project. Total target population for this project was 3000 patients. Estimated number impacted to date is 5500 patients. We are working on having a uniform process for review of surgical site infection data at morbidity & mortality conferences in different surgical departments. The efforts are ongoing and we expect to have this in place in a few months.

Significance and Implications

We have however already seen significant decrease in our infection rates by otherwise carrying out the project as described. We received several positive comments about the power of real time data surveillance and feedback, monthly education to the staff and multidisciplinary nature of the work. Our SCIP measures have stayed at a high compliance percentage and were stable through the pre- and post-intervention periods.

Public sharing of methods and outcomes: Part of the project and results were shared as an oral presentation at the Association of Perioperative Nurses (AORN) meeting in April 2014. AORN is a national organization that establishes perioperative standards and recommends best practices towards providing superior perioperative care for surgical patients.

REFERENCES

1. O'Connor ES, Mahvi DM, Foley EF, Lund D, McDonald R. Developing a practice-based learning and improvement curriculum for an academic general surgery residency. J Am Coll Surg. 2010 Apr;210(4):411-7
2. CDC/NHSN. SSI event: Procedure Associated module. January 2015.

Appendix A: Center for Disease Control/National Health Safety Network Definition of Surgical Site Infection

Criterion	Surgical Site Infection (SSI)
	Superficial incisional SSI Must meet the following criteria:
	Infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date), including those coded as 'OTH'* AND involves only skin and subcutaneous tissue of the incision AND patient has at least <u>one</u> of the following: - purulent drainage from the superficial incision. - organisms isolated from an aseptically-obtained culture from the superficial incision or subcutaneous tissue. - superficial incision that is deliberately opened by a surgeon, attending physician** or other designee and is culture positive or not cultured AND patient has at least <u>one</u> of the following signs or symptoms: pain or tenderness; localized swelling; erythema; or heat. A culture negative finding does not meet this criterion. - diagnosis of a superficial incisional SSI by the surgeon or attending physician** or other designee. *http://www.cdc.gov/nhsn/XLS/ICD-9-cmCODEScurrent.xlsx ** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).
Comments	There are two specific types of superficial incisional SSIs: - Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB) - Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CBGB)

	Deep incisional SSI Must meet the following criteria:
	Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 3 AND involves deep soft tissues of the incision (e.g., fascial and muscle layers) AND patient has at least <u>one</u> of the following: a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, attending physician** or other designee and is culture positive or not cultured AND patient has at least <u>one</u> of the following signs or symptoms: fever ($>38^{\circ}\text{C}$); localized pain or tenderness. A culture negative finding does not meet this criterion. c. an abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam, or imaging test. ** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).

	Organ/Space SSI Must meet the following criteria:
	Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 3 AND infection involves any part of the body deeper than the fascial/muscle layers, that is opened or manipulated during the operative procedure AND patient has at least <u>one</u> of the following: a. purulent drainage from a drain that is placed into the organ/space (e.g., closed suction drainage system, open drain, T-tube drain, CT guided drainage) b. organisms isolated from an aseptically-obtained culture of fluid or tissue in the organ/space c. an abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test AND meets at least <u>one</u> criterion for a specific organ/space infection site listed in Table 4. These criteria are in the Surveillance Definitions for Specific Types of Infections chapter.