

The Cost of Surgical Site Infections- A Look at the Financial and Medical Impact on Patients

and Hospitals

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Aim of the Project

The purpose of this project is to develop an evidence-based care surgical site infection prevention bundle for patients undergoing cardiac surgery. The measures would start prior to surgery, continue during hospitalization after surgery, and finally; would be included in the discharge instructions. Including all phases of care in the bundle emphasizes the importance each period of time has in the prevention of an Surgical Site Infection (SSI). The project will be conducted at Maine Medical Center (MMC), a 637- bed, non-profit, Level I Trauma hospital in the state of Maine. Cardiac surgery is one of the few surgical services at MMC that does not currently have a care bundle for infection prevention.

In 2019 MMC's Cardiac Surgery Program performed 1100 cases and had a surgical site infection rate of 1.19%. While this rate does not represent a problem, MMC believes one infection is too many and we can do better. According to The Society for Thoracic Surgery (STS), the national SSI rate is 0.3%. STS is a quality improvement database registry and is frequently regarded as the gold star of cardiac surgery reporting. (Duke University Medical Center, 2020)The cardiac division at MMC reports all of their data to STS.

In the United States, there are an estimated 15 million surgical procedures performed each year. Approximately 2-5% of these patients or 160,000-300,000 will develop a surgical site infection which is also categorized as a healthcare acquired infection (HAI). SSIs are the most common and most expensive health care associated infection in the U.S. and are said to cost about \$10 billion in direct and indirect cost each year. With the development of evidence based practices, it is estimated that 60% of these infections could potentially be prevented.(Health

Research &, 2018) The rate of surgical site infections has risen over the past decade because of an increase in reporting, a longer than average life span and the presence of antibiotic resistant bacteria (Urban, 2016).

The Centers for Disease Control and Prevention (CDC) defines a surgical site infection as” an infection related to an operative procedure that occurs at or near the surgical incision withing 30 days of the procedure, or within 90 days if prosthetic material is implanted.”(Agency for Healthcare Research & Quality, 2019, p. 1) There are three types of surgical site infections. A superficial incision infection occurs just in the area of the skin where the incision was made. Deep incision infection occurs just beneath the incision area in the muscle and tissues surrounding the muscles. The third type is an organ or space infection. This type of infection can be in any area of the body other than skin, muscle, and surrounding tissue that was involved in the surgery. This includes a body organ or a space between organs.(John Hopkins, 2020)

“Many SSIs are treatable with antibiotics yet they remain a significant cause of morbidity and mortality after surgery. Patients with an SSI are twice as likely to die, 60% more likely to be admitted to the intensive care unit, five times more likely to be readmitted to the hospital after discharge, and have an increased hospital stay of 7-10 days (Darouiche, 2017, p. 1).”

Signs and symptoms (S&S) of a surgical site infection include redness, delayed healing, warmth, fever drainage, and swelling. The S&S can vary depending on the type and severity of the infection. A deep incision infection may produce purulent drainage or cause the wound to re-open (dehiscence). With an organ space SSI there may be an abscess which is an enclosed area of purulent drainage. This can be seen via x-ray or if the wound is re-opened for an incision and drainage in the operating room. Quick diagnosis and treatment of an SSI can prevent it from developing into a more serious condition.(John Hopkins, 2020)

It is imperative that the patient understands the S&S of an SSI. Patients who undergo heart surgery are discharged from the hospital and instructed to make a follow-up appointment in two weeks. That period of time is enough for a minor superficial infection to turn into a major or organ space infection if it goes unnoticed. At MMC, all patients and their families are encouraged to attend a class before discharge. This class is taught by a nurse and reviews wound care, S&S of infection, importance of medication regime, blood glucose management, mobility/weight restrictions, and what to expect as you recover from cardiac surgery. This class is not only a great source of information but also alleviates anxiety the patient and family may be feeling as they transition to home.

Surgical Site Infections are caused by germs. The most common germs or bacteria are Staphylococcus, Streptococcus, and Pseudomonas. (John Hopkins, 2020) There are multiple ways an infection can occur. Infection may occur during surgery from bacteria in the air, a member of the surgical team gets a hole in their sterile glove causing contamination, a surgical instrument that did not get sterilized properly, the patient is not prepped and draped using sterile technique, or the patient does not receive the recommended hair removal procedure prior to surgery.(John Hopkins, 2020) Examples of how an infection can occur after surgery while still hospitalized are; poor hand hygiene by care team, improper sterile technique during dressing changes, elevated blood glucose levels, and poor nutrition. Once discharged to home infection can occur from improper medication management, elevated blood glucose levels not properly treated, inability to care for self, improper wound care, not following weight (lifting) restrictions, not knowing the S&S of infection, and non-compliance with follow up appointments.

Surgical wounds are classified according to their risk for infection, this is called the wound classification. Each surgery has a wound classification assigned to it. Clean wounds are

not inflamed or contaminated and do not involve operating on an internal organ. Clean-contaminated wounds have no evidence of infection and do not involve operating on an internal organ. Contaminated wounds are on an internal organ with spilling of contents from the organ into the wound. Dirty wounds are known to be infected at the time of surgery. (John Hopkins, 2020)

Patient risk factors play a key role in the prevention of surgical site infections. According to Johns Hopkins Medical (2019) “the patient’s age, tobacco use, nutritional status, frailty, diabetes diagnosis, non-compliance with care, and obesity can all affect wound healing (pg.3).” There are factors such as location of surgery, if emergent surgery, length of surgery, and the degree of bacterial contamination of the surgical wound are procedure specific risk factors that the patient does not have control over.(Agency for Healthcare Research & Quality, 2019) In the case of emergency surgery there is little time to plan for infection prevention measures besides maintaining a sterile surgical field and administering antibiotics. However, in elective surgery there is time to put measures in place to prevent an SSI that can begin days before surgery. The strategy most often used is a bundle or a group of evidence based measures aimed at a specific outcome. The bundle is used by the team to include the patient and includes all phases of care.

“The cost to the healthcare system to treat a surgical site infection varies depending on the severity of the infection. Direct costs include hospital visits, re-admissions, and additional surgery. Indirect costs consist of post-care costs like lost wages, loss of functional capacity, and loss of mental health (Urban, 2016, p. 2).” A superficial infection may need oral antibiotics and more frequent dressing changes which are relatively inexpensive. If you have a deep organ space infection, you will need additional surgeries to remove dead tissue and clean the areas, inpatient IV antibiotics, and eventual re-construction by plastic surgery.(Mancini & Mueller,

2020) This type of infection is costly to treat, not just in dollars but the long lasting affect it has on the patient.

In 2002, Hospital Compare was created in a combined effort with the Center for Medicare Services, and the Hospital Quality Alliance (HQA). It was established to promote reporting on hospital quality of care. (Centers for Medicare & Medicaid Services, 2016) Hospital Compare is a consumer based website that provides information on how a hospital is performing in a certain area, for example, surgical site infections. The information is displayed on the website in such a way to compare similar hospitals and care provided. The website allows the consumer the ability to compare up to three hospitals at one time. It was created to create transparency and accountability of healthcare providers and to allow the patient to make an informed decision. Another aim of this effort was to improve quality in both public and population health. (Centers for Medicare & Medicaid Services, 2016)

It was a volunteer effort in the early years and then became a mandatory requirement by 2011. The pay for performance-era was then introduced and hospitals were benchmarked for performance in certain areas. For example, The CDC assigns a Standardized Infection Ratio or SIR to all hospitals. “The SIR is a statistic used to track healthcare associated infections over time at a national, state, or facility level. If the SIR is less than 1 then the facility’s performance is labeled better than expected (Centers for Disease Control and Prevention, 2019, p. 5).” The lower the SIR the better the rate of infection is at that hospital. Based on the public reporting of the hospital’s SSI rate, the hospital either meets the assigned rate or exceeds it and thus will be penalized by a reduction of reimbursement rates. The information is not only used by potential patients/consumers but also their insurance companies, regulatory bodies such as the Centers for Medicare & Medicaid Services (CMS), and hospitals to gauge their performance against the

competition. (Centers for Disease Control and Prevention, 2019) In 2008, the Centers for Medicare and Medicaid stopped reimbursement for additional charges associated with serious hospital acquired conditions, including SSIs. (Wong, Weng, Finnegan, & Schaffer, 2017)

Framework

The framework used for this project involves the development of a cardiac surgery care bundle that will be incorporated into the electronic health record (EHR). The bundle will be a combination of the World Health Organization and Centers for Disease Control and Prevention guidelines for the prevention of surgical site infections. (Singhal, 2019) (Berrios-Torres, Umscheid, & Bratzler, 2017) The bundle will be in the form of a flow sheet in the EHR and introduced at the office visit prior to cardiac surgery. Once admitted to the hospital, the Pre-Anesthesia Care Unit (ASU) nurse will prepare the patient for surgery. There are specific measures this phase of care is responsible for including maintaining normo-thermia, glucose monitoring, hair removal, and a chlorhexidine gluconate bath with wipes. The patient will make their way into surgery and have a new set of measure the team will use. These will include maintaining sterility, proper preparation with a cleansing solution to the area(s) of the incision(s), antibiotic administration, and glucose monitoring. The peri-operative nurse will be able to access the worksheet and see the measures the ASU provided. The care bundle ends in the operating room but the measures continue with physician orders written for post-operative care. The measures include continued glucose monitoring, and incision care. These orders carry over to the cardiac step-down unit and to the home health agency upon discharge. The patient is taught how to care for their surgical incision, the S&S of infection, and the importance of compliance with medications and follow-up appointments. Moreover, I will also outline a case study of a patient that had cardiac surgery and was subsequently diagnosed with mediastinitis, a deep

sternal wound infection. I will outline the hospital course, the financial impact on the institution, and the aftermath for the patient.

Organizational Level

The project is important at an organizational level because MMC prides itself with providing excellent patient care. Cardiac surgery is one of the few specialties that do not have a surgery bundle currently. Care bundles have been shown to decrease surgical site infections when adopted into practice. (Dunivan & Krantz, 2018) Surgical site infections have a large economic impact on the institution. The costs of SSIs vary widely based on the type and severity of infection. The estimated average cost of an SSI can be more than \$25,000, increasing to more than \$90,000 if the infection involves a prosthetic implant. (Eloquest, 2018) Financial implications related to the case (See Table 1), demonstrate how it affects MMC's bottom line. Competitively, MMC aims to be the hospital consumers seek out for surgery therefore, it is important we keep our infections at or below a SIR of 1. A surgical site infection can be considered medical malpractice in some situations, which may result in large monetary settlements. (Clark & Mitchell, 2020) The long term consequences for patients are disfigurement, continued follow up care, lost wages, pain and suffering, and a decreased quality of life. (Clark & Mitchell, 2020)

Ethical Issues

The significance of ethics with this project is that as healthcare providers, we should do everything within our power to prevent surgical site infections. First, do no harm. It is unethical to do anything less than that. SSI rates are not reviewed by the Ethics Committee at MMC, they are reviewed at the Surgical Site Prevention Committee meetings quarterly. The committee is multi-disciplinary and includes surgeons, nurses from all phases of care, physician assistants,

medical students, and residents. The Infection Prevention Department sends out a report each time a surgical site infection is identified to members of the committee for review. Each quarter all of the infections are presented by the surgeon who performed the surgery. They will address the length of surgery, the approach used, if there was an implant used, and any difficulties experienced during the operation. The team will weigh in by asking questions and the surgeons may discuss alternate ways the surgery could've have been performed. It is an open forum to discuss ways in which we can improve on our infection prevention measures.

Financial Implications

There are very minimal financial implications with this project. The only costs arise with the team of nurses from the Electronic Health Record department (EHR). The nurses in this department are specially trained in EHRs. They are skilled at designing, building, and implementing programs for the EPIC system. A build such as a flowsheet for the bundle requires about five meetings with different members of the team. Their goal is to be certain everything we want from the program can be achieved. The worksheet needs to be built into the EHR and tested to be sure it does what we have requested. Since they are the experts, special attention is made to ensure the programs or in this case the flowsheet is user friendly. This involves being able to run monthly reports on outcomes of the care bundle. These reports will help us determine where we need to focus our attention.

Literature Review

The literature reviewed was related to the statistics, signs and symptoms, financial impact, types of, bundle use, risk factors, and current guidelines all related to the prevention of surgical site infections. I reviewed multiple journal articles, the CDC and WHO guidelines, and the patient's chart.

While reviewing all of the information it became clear very quickly that how a hospital publicly reports their infections varies from institution to institution. According to a systematic review by Iskander et al “there are 41 different definitions for SSI addressed in the literature among which very few were standardized (Iskandar, Sartelli, Ansaloni, Baiocchi, & Catena, 2019, p. 5).”

Using a surgical infection care bundle has been shown to be a cost-effective way to prevent SSIs. (Phelan, Dilworth, & Bhangu, 2019) There are bundle design guidelines to help create a short list of interventions that are accepted by national guidelines and appropriate for the population of focus. (Resar, Haraden, & Nolan, 2012) The goal of a bundle is to implement interventions that are already recommended and are generally accepted by the multi-disciplinary group. By keeping the list of evidence-based interventions short, there is a better chance of achieving 95% compliance.

The financial implications to both the institution and patient vary widely since the location and severity of infection determine the overall cost. These costs are not only measured monetarily, but in quality of life as well.

Surgical site infections are potentially preventable up to 60% of the time. (Health Research &, 2018) When a patient develops an SSI their mortality and morbidity increases. Using a care bundle approach is proven to not only reduce SSIs but it is also cost-effective. Communication and a team approach is necessary for a bundle to be successful. When a patient enters the hospital they are not thinking about leaving worse off than when they entered. It is the entire care team’s responsibility to do everything possible to prevent them from developing an infection.

Methods

The methods selected for this project are a cardiac surgery care bundle, a policy regarding this tool, and a case study analysis of a patient at MMC. According to Resar, The Institute for Healthcare Improvement developed the bundle concept in 2001 with the goal of improving care processes. (Resar et al., 2012). The use of peri-operative bundles reduce readmission rates and morbidity for surgery. Implementation of care bundles is greatly facilitated with the use of checklists. Enforcing checklists can assist in ensuring vital factors such as performing antibiotic re-dosing administration in the appropriate timeframe as well as monitoring compliance.(Resar et al., 2012)

(Dunivan & Krantz, 2018) The bundle measures that will be included come from the World Health Organization. Teamwork, consistency, and communication are all necessary for the successful implementation of a care bundle. (The care bundle tool will be included in the appendix).

Deliverables

As the primary investigator for this project and Director of Cardio-Vascular Surgical Programs, I will lead the planning, implementation, and monitoring of the care bundle. This will be a new set of interventions and measures created to fill an existing gap in cardiac surgery. The development of these interventions will involve the EHR team of nurses to develop and build the flowsheet in EPIC, and the cardiac surgeons for their approval. Once approval is received, the EHR team will be notified that we are ready to go live. I will be educating the nurses in the Pre-Anesthesia Care Unit, Operating Room, units, and surgery office. A monthly compliance report will be generated and sent out to members of the Surgical Site Infection Prevention Committee.

The report will consist of data from the bundle flowsheets entered in to the EHR.

Case Study

In order to demonstrate the devastating impact one surgical site infection can have on a patient and hospital, I decided to present a case. I met with the Chief of Cardiac Surgery, explained my capstone project, and asked if I could use one of his cases that developed an infection. The patient he gave me to present is a worst case scenario for infection after cardiac surgery. Not only does it leave a lasting impact on the patient but the hospital also encountered a significant loss of revenue.

The patient is a 67 year old male with diabetes, coronary artery disease, hypertension, obstructive sleep apnea, and rheumatoid arthritis, he was an elective case. This means that he walked in to the hospital on the day of surgery. His insurance is Medicare.

Sequence of Events

Nov. 4th 2019- The patient was an elective surgical admission scheduled for a Coronary Artery Bypass Graft x 4.

Nov. 9th- Discharged to home on day 5. Hospital stay uneventful.

Nov. 26th- The patient has a follow up office visit appointment and his wounds are “healing well.”

Dec. 2nd- The patient called the office to report a new open area with serosanguineous drainage at the distal area of the incision. An office visit for the patient is scheduled.

Dec. 3rd- The patient comes in for an office visit. There is a small open area at the distal end of the incision and has a small amount of yellow drainage. The incision area is slightly warm to touch with mild redness. A suture knot is removed, fibrinous exudate cleansed with hydrogen peroxide and packed with 2x2 gauze. Diagnosed with a superficial surgical site infection . An

antibiotic is ordered for 7 days and dressing changes twice daily . The patient is to follow up in one week and call sooner if he has any problems.

Dec. 10th-The patient is in for a one week follow up office visit. He states the drainage is decreasing and he believes the wound is improving. A small open area at the distal end of the incision remains. No tunneling or tracking noted, has mild erythema, and good granulating tissue. The wound measures 1 cm. length x .7 width x .5 depth. To continue dressing changes twice daily and follow up in two weeks.

Dec. 20th-The patient calls regarding a new open area at the incision site. Scheduled to come in to office today. Patient arrives he is cool, clammy, light headed, pulse irregular, blood pressure 86/60, respiratory rate 16-20, afebrile, oxygen saturation 95%, purulent drainage noted from incision.

The patient was directly admitted to Maine Medical Center with a sternal wound infection. Antibiotics, pharmacy consult, wound and blood cultures ordered. The patient is brought to surgery for a sternal wound wash out with debridement and removal of eight sternal wires. Two points of the incision had purulent drainage, areas cultured, wound opened, moderate amount of purulent material was present down to and surrounding the bone. Underlying mediastinal structures were densely adherent to under surface of sternum. Pulse lavage used and the sternum was irrigated with saline and antibiotics. A vacuum sponge was applied to the open chest and put to suction.

Shortly after arrival to the cardiac step down unit the patient has a ventricular tachycardia arrest. He is shocked x 2 and CPR is delivered for a total of 3 minutes. He is urgently brought to the Cath Lab and found to have an occluded posterior left ventricular artery. This artery supplies the inferior portion of the heart. He has also suffered an inferior wall myocardial infarction. He

undergoes a stent placement complicated by low blood pressure at the end of the case. The culture results are back and show a staph aureus infection, pharmacy consults and starts the patient on Vancomycin.

Dec 23rd -The patient has his vacuum sponge dressing changed and it looks as though he will need an additional debridement in the O.R. Plastic Surgery consults and determines the patient will need full reconstruction once all the dead tissue is removed. Infectious Disease consults and orders for the patient to continue on the same course of antibiotics.

Dec. 24th-The patient's blood sugar is elevated requiring insulin.

Dec. 25th- The vacuum dressing is changed.

Dec. 27th- The patient has a peripherally inserted central catheter placed due to the need for long term intravenous antibiotics.

Dec. 29th- The patient goes to the operating room for a debridement and closure with bilateral muscle flaps. Skin, bone and subcutaneous tissue are debrided. There are three surgeons present, two plastic surgeons and one cardiac surgeon. Infectious disease consults and orders an antibiotic three times daily for six weeks, diagnosed with sternal osteomyelitis. Will have a follow up appointment in ten days after discharge.

Jan. 1st 2020-Plastic surgery examines patient. Drains will remain in place for three weeks, shower with Hibiclens, non- weight bearing upper extremities except light activities of daily living, no arm abduction, no pushing, pulling, or lifting for six weeks, follow up office visit one week from discharge.

Jan. 3rd- The patient is discharged home with visiting nurse services.

Jan. 6th- The patient has a follow up office visit with plastic surgery. The wounds are healing well. The stitches and drains will be kept in for one more week. Will follow up in one week.

Jan.10th- The patient follows up with Infectious Disease. His blood sugars have been in the 140 range. He has no signs or symptoms of recurrent bacteremia or endocarditis, will continue on IV antibiotics.

Jan. 14th- The patient calls the Infectious Disease office, he has developed a rash on thighs, small, flat, red bumps. His antibiotic is changed.

Jan. 27th - The patient has a follow up visit with ID. He feels well, the rash is resolved, antibiotics continue, 2 drains were removed two weeks ago, one drain remains, blood sugars in the 140s, the PICC line is clean, dry and intact.

Feb. 7th- ID follow up visit. Day forty of forty two for antibiotic treatment. No signs or symptoms of infection.

Feb. 11th- The PICC line is removed, will take an oral antibiotic for one month.

Mar. 25th- Follow up with ID, normalization of inflammatory markers. The patient has now completed twelve weeks of antibiotics and can discontinue.

Apr. 1st- Pt confused at home, wife calls 9-1-1. His blood sugar is 300, altered mental status, short of breath, headache, body aches for one week. CAT scan of the head is ordered and the patient is diagnosed with a right subdural hematoma.

Apr. 2nd- Patient goes to the operating room - craniotomy for evacuation of the hematoma.

COVID- 19 test is negative.

Apr. 14th- The patient is home and calls 9-1-1, has had a headache for one week since discharge home. Difficulty word finding, CAT scan ordered and is normal. He is discharged to home.

Apr. 15th- Patient's wife calls 9-1-1, the patient is confused, decreased movement in left arm, and unclear speech. CAT scan is normal but patient only able to answer "yes" to questions and has left sided neglect. He is admitted and awaiting an MRI of the brain.

Apr. 16th- MRI done and is negative. The patient is discharged to home with services.

Table 1

Financial Implication of a Surgical Site Infection

Date of CABG	11/04/19						
Readmission	12/20/19						
	Total	Net	Direct	Contribution	Indirect	Total	Net Income
	Charges	Revenue	Costs	Margin	Costs	Cost	
Cardiac	111,154.66	31,895.89	24,010.74	7,885.14	12,977.90	36,988.64	-5092.75
Surgery							
Readmission	157,659.85		32,436.36		22,930.77	55,367.14	- 157,659.85

After analyzing the case study it is possible that a surgical site infection prevention care bundle may have either prevented or lessened the patient’s course. The patient had a re-admission of fourteen days, two additional surgeries, a cardiac arrest and subsequent stent, twelve weeks of antibiotics, a central line inserted that was transitioned to a peripherally inserted central catheter, and abnormal blood sugars all related to the surgical site infection. His course was further complicated by a subdural hematoma, stroke like symptoms, and multiple emergency department visits via ambulance. Although these events are not directly related to the SSI, I question; had he not developed an SSI would his condition have deteriorated in this manner?

The financial implications are severe as displayed in Table 1. The hospital does not get reimbursed for infections and instead are responsible for the cost of all care related to the infection. The final loss to Maine Medical Center for this case study was approximately

\$160,000, this SSI is considered preventable and thus not reimbursed by CMS. As mentioned prior, the Cardiac Surgery Department at MMC has a 1.19% rate of infection. This case study was a great example of the devastating consequences that just one infection can have.

Reviewing the financial impact this infection had on the hospital requires the attention of all care team members to implement improvement measures. More importantly the patient was left with a decreased quality of life, and a chest disfigurement, both of which are tremendous losses.

Looking at the 1.19% infection rate without context one would conclude that is a low rate. I would say one infection is too many and Maine Medical Center can and will do better.

Project Results

Project Findings

My findings revealed that surgical site infections are preventable up to 60% of the time. A patient with a surgical site infection is twice as likely to die, more likely to be admitted to the intensive care unit, five times more likely to be re-admitted to the hospital after discharge, and have an increased hospital stay of 7-10 days.(Darouiche, 2017)

The case study analysis I performed found that the patient was re-admitted which lasted 14 days, suffered a cardiac arrest and subsequent stent placement, required surgery to clean out the infection, received a total of two and a half months of intravenous antibiotics, had two invasive lines placed for the IV therapy, needed reconstructive chest surgery that was performed by plastic surgery, once discharged from the second admission, he suffered a subdural hematoma requiring surgery, and lastly had multiple visits to the Emergency Room for stroke like symptoms. The second admission cost nearly \$160,000, all of which is solely the hospital's responsibility.

If further proved that although a surgery division's SSI rate may be 1.19% which is considered low; that percentage can have a devastating affect on the patient and hospital. One surgical site infection is too many.

Implications

The implications of my findings are that it is vital for all surgical divisions to have an evidenced-based infection prevention care bundle. SSIs have many layers and require the full attention of the whole care team including the patient to prevent them. Patient education regarding the signs and symptoms of infection can be the difference between a superficial and a deep space wound infection. There are many variables present during surgery, some can be prevented while others cannot. A care bundle ensures that every measure possible is put in place for the prevention of infection. Bundles are an effective means of prevention when they are followed. Effective communication is essential between the care team and patient to execute the bundle as designed. The sad reality is that patients will still develop SSIs. With a bundle in place, the goal is for the percentage to be even lower than 1.19%, and that the infection does not progress to the worst stage.

Challenges and Accomplishments

One challenge I envisioned was asking a surgeon to allow me to present one of his cases that developed a surgical site infection. It turned out that the surgeon was more than gracious and gave me a patient that was worst case scenario. He trusted that I would present the information in a professional manner, and that we could improve patient care with this example.

One accomplishment was creating an evidence-based infection prevention care bundle and working with the EHR team to have it built in EPIC. I reviewed the bundle with the Chief of Cardiac Surgery, he approved it, and was very excited. I will be presenting the bundle to all of

the cardiac surgeons at an upcoming meeting. Another accomplishment was being able to outline just how expensive one SSI can be and sharing that with colleagues.

Recommendations

To further the aim of this project I would recommend that the cardiac surgery office implement a tele-health visit with the patient on the third day after discharge. This would allow a nurse to visualize the incision and answer any questions the patient may have. The visit on day three may lead to identification of early signs of infection that should be treated prior to the patient's scheduled two -week follow -up appointment.

I would also like to see a standardization of the definition of an SSI. As mentioned prior, there are 41 definitions in use currently. A hospital reports infections with a pre-determined definition set forth by their reporting agency. Therefore, when looking at a site such as Hospital Compare or Leap Frog the playing field would be even. All centers reporting infections would be following the same guidelines or definitions.

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Appendix

PATIENT LABEL



DATE: _____

Cardiac Surgery Infection Prevention Bundle

Inpatients

Unit- _____

- ___ Pt. received Mupirocin nasal ointment twice daily before surgery.
- ___ Pt. had Hibiclens shower evening prior to surgery and a.m. of surgery.
- ___ Sage Wipes (nose to toes) day of surgery (within 6 hrs. of surgery).
- ___ 3M nasal antiseptic to both nares a.m. of surgery

ASU- Elective patients

- ___ Pt. pre-warmed ASAP with warming gown.
- ___ Blood glucose _____ => 200 notify surgeon.
- Did pt. use Mupirocin x 5 days **YES NO**
- Pt. took Hibiclens shower last evening & this a.m.? **YES NO**
- ___ Sage Wipes from nose to toes.
- ___ 3M nasal antiseptic to both nares.

O.R.

- ___ Green blanket on the bed for all bypasses.
- ___ Team double gloves & or changes gown & gloves after prep & drape.
- ___ Alcohol wash-off followed by Chloraprep.
- ___ Gloves changed every 3 hrs. If case less than 3 hrs. change prior to closing.
- ___ Re-operation for bleeding checklist completed.

Comments:
