

Actionable Patient Safety Solutions (APSS): **Surgical Site Infections (SSI)**

How to use this guide

This guide gives actions and resources for creating and sustaining safe practices for SSI. In it, you'll find:

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Executive Summary

The Problem

Nearly half of all adverse events in industrialized hospital settings are attributable to surgical procedures, with surgical site infections (SSIs) occurring in 5% of patients undergoing surgical procedures. SSIs specifically account for nearly 15% of all nosocomial infections ([World Alliance, 2008](#); [Reichman, 2009](#)). The cases of disability and death that are directly attributable to the 300,000 annual SSIs are entirely preventable through standardization and consistency of protocols that already exist in many hospitals. However, even in the most sophisticated settings, these protocols are fragmented and are not consistently followed ([World Alliance, 2008](#)).

The Cost

It is common for patients who acquire SSIs to spend an additional 7-10 days in the hospital. The typical attributable cost per patient is over \$25,000 with nearly 300,000 SSIs per year in the US alone ([Klebens et al., 2007](#)). Hospital leaders may not realize that the components necessary to mitigate these significant financial burdens likely already exist in the organization.

The Solution

Many healthcare organizations have successfully implemented and sustained improvements and reduced death from SSI. These organizations have focused on projects that included **implementation of a safe surgery bundle**.

This document provides a blueprint that outlines the actionable steps organizations should take to successfully improve surgical safety and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website. Hospitals who make a formal commitment to improve SSI and share their successes on the PSMF website have access to an additional level of consulting services.

Leadership Checklist

On a monthly basis, or more frequently if a problem exists, the executive team should review the outcomes of surgical patients. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

- Measure and report SSIs and compliance monthly (colon surgical site infections based on [CDC NHSN definitions](#)/total number of colon operative procedures based on [CDC NHSN definitions](#)). Note trends in areas with low compliance and high SSI incidence. Routinely reassess outcomes.
- If SSI rates indicate room for improvement, initiate a performance improvement (PI) project. If a problem is not indicated, routinely reassess to identify gaps, and ensure integrity of the data collected.
- Ensure frontline involvement in surgical safety improvement activities. Maintain their engagement and remove barriers to progress.
- If a PI plan is put in place, measure the associated process outcomes.
- Ensure that surgical safety protocols are embedded into [clinical workflows](#), whether electronic or paper.
- Ensure there are enough staff to effectively manage (necessary preventive care).
- Ensure adequate training and documentation of surgical safety competencies and skills.
- Eliminate barriers to making rapid changes to documentation templates and order sets.
- Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed.
- Hold staff accountable for providing the standard of care and reward success.
- Ensure that leaders have a simple process to oversee surgical safety improvement work while also considering how it aligns with other initiatives across the organization.

Clinical Workflow Infographic

CREATE AN ACTION PLAN

- Implement evaluation practices and metrics to measure patient outcomes and routinely review results.
- **Educate patients and families on surgical safety and integrate them as equals in the care team.** Use patient stories to help teach and inspire change in your staff.
 - [Alicia Cole](#) video

PRE-OPERATIVE MEASURES

(Bratzler et al., 2013; Berrios-Torres et al., 2017; Ban et al., 2017)

- **Devise a procedure plan and ensure all components are optimized.**
 - Consider minimally-invasive alternatives.
 - Plan surgical techniques, including [topical and local antibiotic administration](#).
 - **Administer antibiotics in a timely manner**
 - Administer within one hour prior to incision (two hours for vancomycin and fluoroquinolones).
 - Administer the appropriate parenteral prophylactic antimicrobial agents before skin incision in all cesarean section procedures.
 - Choose the appropriate agents on basis of:
 - ◊ Surgical procedure
 - ◊ Most common SSI pathogens for the planned procedure
 - ◊ Known allergies or drug reactions of each specific patient
 - Conduct mechanical bowel preparation in conjunction with oral antibiotics ([Rodriguez-Bigas, 2019](#)).
 - **Prepare surgical site.**
 - Don't remove hair at the operative site unless it will interfere with the surgical procedure.
 - Avoid razors. Instead, opt for a single-use hair clipper or a clipper with a removable head that can be disinfected.
 - Mark skin.
 - Use appropriate antiseptic agent and technique for skin preparation, preferably an alcohol-containing preparation.
 - ◊ Perform chlorhexidine shower/bath two hours before procedure.
 - ◊ Skin antiseptic agents must contain a non-irritating antimicrobial preparation, be broad spectrum, fast acting, and have a long-lasting effect.
 - ◊ See [Appendix A](#) for active ingredients in antiseptic skin preparation.
 - If appropriate, mechanically prepare patients for colorectal surgery by enema or cathartic agents.
 - **Understand patient information.**
 - Confirm patient identity.
 - Determine if patient has a difficult airway or is at risk for aspiration.
 - Introduce yourself and know who your team members are.
 - Conduct MRSA screening.
 - Check patient temperature.
 - Assess if risk for 500mL or greater blood loss and prepare central access and fluids if a possibility.
 - Implement perioperative glycemic control.
 - **Check equipment.**
 - Ensure functioning pulse oximeter on patient.
 - Ensure essential imaging is displayed, if applicable.

INTRA-OPERATIVE MEASURES

(Mueller et al., 2015) (Berrios-Torres et al., 2017) (Ban et al., 2017)

- **Initiate time-out procedure.**
 - Confirm patient identity.
 - Confirm incision site.
 - Confirm procedure.
- **Monitor patient vital signs and adjust as needed.**
 - Re-dose prophylactic antibiotics based on agent half-life or for every 1,500 mL of blood loss.
- **Optimize the environment.**
 - Minimize the traffic in OR.
 - Keep the interior of the OR at 'positive pressure'.
 - Maintain room humidity of 50-55%.
 - Use laminar air flow.
- **Adhere to sterile precautions.**
 - Enforce strict hand scrub compliance (no jewelry).
 - Maintain appropriate PPE- not to be worn outside of the OR.
 - Ask staff to change their gloves before closure in colorectal cases.
- **Optimize prophylaxis.**
 - Minimize red blood cell transfusions.
 - Use antibiotic-impregnated implants.
 - Practice antimicrobial prophylaxis.
- **Maintain sterilization and protection of the site during operation.**
 - Use an impermeable plastic wound protector after open abdominal surgery, especially colorectal and biliary procedures.
 - Perform topical irrigation of the incision site, especially in colorectal surgery.
 - In clean and clean-contaminated procedures, don't administer additional prophylactic antimicrobial agent doses after the surgical incision is closed in the operating room, even in the presence of a drain.
 - Perform intraoperative skin preparation with an alcohol-based antiseptic agent unless contraindicated.
 - Do not withhold transfusion of necessary blood products from surgical patients as a means to prevent SSI.
 - Determine that a blood transfusion is absolutely necessary after alternatives have been ruled out. See [AFSS #5: Patient Blood Management](#).
- **Be mindful of other considerations.**
 - For patients with normal pulmonary function undergoing general anesthesia with endotracheal intubation, administer increased FIO2 during surgery.
 - For prosthetic joint arthroplasty patients in clean and clean-contaminated procedures, do not administer additional antimicrobial prophylaxis doses after the surgical incision is closed in the operating room, even in the presence of a drain.

POST-OPERATIVE MEASURES

(Berrios-Torres et al., 2017)

- Complete counts of sponges, instruments, and needles.
- **Communicate key concerns for patient recovery with the full care team, including the patient and family.**
- Check blood glucose level and temperature.
- Perform chlorhexidine shower two hours after procedure.
- Protect primary closure incisions with sterile dressing for 24-48 hours post-op.
- Document wound care.
- Stop using antibiotics within 24 hours after the surgery end time—48 hours for cardiac patients—unless signs of infection are present.
- Do not apply antimicrobial agents (i.e., ointments, solutions, or powders) to the surgical incision to prevent an SSI.
- Maintain infection vigilance throughout full hospital stay.
 - If an infection is identified at any point, the care team should also be actively engaged in sepsis prevention (See [AFSS #9](#)).

Performance Improvement Plan

Follow this checklist if the leadership team has determined that a performance improvement project is necessary:

- **Gather the right project team.** Be sure to involve the right people on the team. You'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

Complete this Lean Improvement Activity: Conduct a [SIPOC](#) analysis to understand current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.



RECOMMENDED SURGICAL SAFETY IMPROVEMENT TEAM

- | | |
|---|---|
| <ul style="list-style-type: none">• Nurses and nurse leaders• Surgeons• Anesthesiologists• Nurse anesthetists• Operating room technicians | <ul style="list-style-type: none">• Clinical educators• Quality improvement leaders• Infection preventionists• Admitting and registration staff• Quality and safety specialists |
|---|---|

Table 1: Understanding the necessary disciplines for a surgical safety improvement team

- **Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources are needed to improve patient outcomes.

Create a [process map](#) once the workflows are well understood that illustrates each step and the best practice gaps the team has identified ([IHI, 2015](#)). Brainstorm with the advisory team to understand why the gaps exist, using whichever [root cause analysis tool](#) your organization is accustomed to ([IHI, 2019](#)). Review the map with the advisory team and invite the frontline to validate accuracy.



SSI PROCESSES TO CONSIDER ASSESSING

- | | |
|---|---|
| <ul style="list-style-type: none">• Documentation of wound care• Use of blood transfusions and assessment of alternative options.• Traffic in operating room• Documentation of blood glucose level | <ul style="list-style-type: none">• Documentation of patient temperature• Consideration of all surgical options, particularly non-invasive• Antimicrobial prophylaxis• Sterile technique adherence |
|---|---|

Table 2: Consider assessing these processes to understand where the barriers contributing to unsafe surgery may be in your organization

- **Prioritize the gaps to be addressed and develop an action plan.** Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are a priority for the organization to focus on. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

The action plan should include the following:



- Assess the ability of the culture to change and adopt appropriate strategies
- Revise policies and procedures
- Redesign forms and electronic record pages
- Clarify patient and family education sources and content
- Create a plan for changing documentation forms and systems
- Develop the communication plan
- Design the education plan
- Clarify how and when people will be held accountable

TYPICAL GAPS IDENTIFIED IN SURGICAL SAFETY

- Lack of accountability
- Differing attitudes based on specialty
- Awareness of best practices
- Lack of time allocated for team discussion and planning before the operation
- Lack of formal surveillance of compliance
- Lack of standardized processes for monitoring of patient temperature, glucose, etc.

Table 3: By identifying the gaps in surgical safety compliance, organizations can tailor their project improvement efforts more effectively

- **Evaluate outcomes, celebrate wins, and adjust the plan when necessary.** Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking. Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas ([IHI, 2006](#)).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don't move so quickly that you don't consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

Read this paper from the Institute for Healthcare Improvement to understand how small local steps can integrate into larger, system changes



SURGICAL SAFETY COMPARATIVE OUTCOMES

- Hand hygiene
- Sepsis cases
- PPE compliance
- Traffic in OR
- Post-operative LOS
- Adverse transfusion reactions

Table 4: Consider evaluating related metrics to better understand surgical safety presence and contributing factors

What We Know About Surgical Site Infections (SSI)

Surgical Site Infections (SSI) and Surgical Safety

Surgical safety and the prevention of SSIs require organizational commitment at the leadership level and proper execution of standards in every aspect of care. While unsafe surgery is not limited to SSIs, SSIs are the most common surgical adverse event and as such, should be an organizational priority.

SSIs can be defined as an infection that occurs after surgery in the part of the body where surgical procedure took place ([CDC, 2010](#)). Specifically, there are three distinct forms of SSI as defined by the CDC ([Reichman, 2009](#)):

- **Superficial Incisional SSI:** Involving only skin or subcutaneous tissue of the incision.
- **Deep Incisional SSI:** Related to the operation and infection involving deep soft body tissues specifically (e.g. muscle tissues and fascicles).
- **Organ/Space SSI:** Related to the operation and involves any part of the anatomy (e.g. organs or body other cavities not including the surgical incision).

Precautions for Surgery during Heightened Safety Measures: A COVID-19 Case Study

During COVID-19 (or in any catastrophic event) in which the risk of patient infection and fatality due to nosocomial infection is heightened, most hospitals have to cancel or reduce nonurgent outpatient visits as part of their containment strategy. Surgeons should prioritize urgent or emergency visits and procedures ([Liu et al., 2020](#)). Surgeons should schedule surgery procedures based on the severity of threat to the patient’s life and their health ([Liu et al., 2020](#)).

SYMPTOMS	EPIDEMIOLOGY	DIAGNOSIS	RISK FACTORS
Symptoms of an SSI include: <ul style="list-style-type: none"> • Redness and pain around the surgical site area • Drainage of cloudy fluid from the surgical wound • Fever 	SSIs can be caused by: <ul style="list-style-type: none"> • Endogenous factors, such as from the patient’s flora or seeding from a distant site of infection • Exogenous factors, such as from surgical staff, physical environment and ventilation, tools, equipment, and materials in the operating room 	Criteria for diagnosis of superficial incisional SSI, deep incisional SSI, and organ SSI are displayed in Table 1 of UpTo Date’s “ Surgical Site Infection Definitions ”.	Any patient undergoing a surgical procedure is at risk for SSI. However, patient-specific risk factors include (Cheadle, 2006): <ul style="list-style-type: none"> • Pre-existing infection • Low serum albumin concentration • Old age • Obesity/diabetes • Smoking • Ischemia • Trauma • Blood transfusions • Hypothermia • Hypoxia • Hyperglycemia • Abdominal surgery

Clinical Implications

While unsafe surgery has implications beyond that of an infection, including patient misidentification, lack of person-centeredness, and/or lack of an equipment reconciliation protocol, SSIs are the most common and visible indication of unsafe surgical care.

There are about 300,000 SSIs each year and SSIs account for 17% of all HAIs.

- SSIs happen in 2%-5% of patients receiving inpatient surgery ([Anderson et al., 2020](#)).
- The SSI mortality rate is 3%, with a 2-11 times higher chance of death when compared to other types of infections.
- SSI can cause long-lasting disabilities.

Financial Implications

SSIs can sometimes result in patients spending an additional 7-10 days in the hospital. Healthcare costs can rise up to \$3,000-\$29,000 for each SSI, depending upon the procedure and pathogen. On a national level, direct and indirect healthcare costs combined can reach up to \$10 billion annually ([Quicho, 2016](#)). These estimated costs don’t account for the additional costs of:

- Rehospitalization
- Post-discharge outpatient expenses
- The costs of care for long-lasting disabilities

Current Barriers to Safe Surgery and SSI Prevention

AHRQ introduced the Barrier Identification and Mitigation (BIM) tool to identify and prioritize barriers based on hospital context and to aid in the development of an action plan to overcome these challenges ([Agency for Healthcare Research and Quality, 2017](#)). Some common organizational barriers to safe surgery and SSI prevention include:

- **Awareness:** Current research suggests that up to 50% of nurses and healthcare staff are unaware of the evidence-based recommendations to prevent SSIs ([Lin et al., 2019](#)).
- **Attitudes:** It has been suggested that clinicians may not agree on the standardized protocols or may not feel

confident in their abilities to execute these standards effectively. Providers may not agree that the presented evidence is applicable to their patient's situation. Hospital leaders should evaluate the number of steps in SSI prevention standards to better understand the operational barriers that even the most well-intended clinicians may face ([Implementing your Surgical, 2017](#)). Understanding these operational barriers can shed light on how to better incorporate safety measures into the existing clinical workflows.

- **Detection:** Detecting SSIs is becoming increasingly challenging due to the lack of standardized methods for post-discharge and outpatient surveillance. This is in part due to an increased number of outpatient surgeries and shorter postoperative inpatient stays.

Creating evidence-based protocols, establishing universal preoperative, intraoperative, and postoperative care standards, and engaging staff, patients, and family members can greatly improve surgical safety in hospitals.

Preoperative Care

Proper preoperative care is crucial for ensuring a safe start to the surgical procedure and for ensuring safety during surgery ([Jacques et al., 2008](#)).

A comprehensive and universal preoperative care plan will allow for optimal performance of the surgery and lower rate of surgical issues/errors. ([Zambouri, 2007](#)). Characteristics of a thorough preoperative care plan may include the following checkpoints ([Zambouri, 2007](#)):

- Document the conditions for which surgery is needed.
- Assess the patient's overall health status.
- Determine perioperative risk.

Understand the patient's medical condition in order to reduce the patient's surgical and anesthetic perioperative morbidity or mortality.

- Develop an appropriate perioperative care plan.
- Educate the patient about surgery, anesthesia, intraoperative care and postoperative pain treatments in the hope of reducing anxiety and facilitating recovery.

Intraoperative Care

Proper intraoperative care includes all standards that should be applied during the surgical procedure ([Hurley et al., 2006](#)). Characteristics of thorough intraoperative care may include the following checkpoints ([Hurley et al., 2006](#)):

- Ensure time out procedures just before operation.
- Limit traffic through the OR.
- Monitor the vital signs of the patient.
- Assess the patient's blood-oxygen levels.
- Adherence to sterile precautions.
- Sterilize and protecting site during operation.
- Ensure frequent fluid assessment.
- Consider each patient on a case by case basis.

Postoperative Care

The type of postoperative care that a patient receives is dependent on the type of surgery that was performed as well as the health history and needs specific to the patient ([D'Amico, 2014](#)). Characteristics of thorough postoperative care may include the following checkpoints ([D'Amico, 2014](#))

- Monitor the patient's pain symptoms after the surgical procedure,
- Monitor the body temperature,
- Ensure proper blood circulation and sensation at the site of the surgery, especially for vascular or orthopedic surgery.
- Monitor patient nausea or vomiting.
- Check patency rate of intravenous tubing.
- Check patency of drainage tubes and catheters.
- Check patency of patient's airway, if necessary.
- Administer of pain medication.
- Sterilize patient environment and performing frequent wound care.
- Assess dressings for excess fluid, discharge, or infection.
- Incorporate patient and family members into routine care discussions. See "[Education for Patients and Family Members](#)" section.

All of the above checkpoints encompassing preoperative, intraoperative, and postoperative care standards can contribute to reduction of costs, shortening of hospital stay, reduction of cancellations, and increase of overall patient health and satisfaction ([Zambouri, 2007](#)).

Resources



- [AHRQ: Implementing your Surgical Site Infection Prevention Bundle](#)
- [Effectiveness of Wound Surveillance Program](#)
- [APSIC: Guidelines for Prevention of Surgical Site Infections](#)
- [WHO: Surgical Safety Checklist](#)
- [Five Steps to Safer Surgery](#)
- [IHI: Preventing Infection after Hip and Knee Replacement](#)
- [IHI: A New Emergency Checklist for Office-based Surgery](#)

Resources for patients and family members:

- [Kaiser Northern California, San Rafael: Your Guide to Surgery](#)
- [How-to Guide: Prevent Surgical Site Infections](#)

For hospital project improvement teams for general improvement:

- [CMS: Hospital Improvement Innovation Networks](#)
- [IHI: A Framework for the Spread of Innovation](#)
- [The Joint Commission: Leaders Facilitating Change Workshop](#)
- [IHI: Quality Improvement Essentials Toolkit](#)
- [SIPOC Example and Template for Download](#)
- [SIPOC Description and Example](#)

Education for Patients and Family Members

The outline below illustrates all of the information that should be conveyed to the patient and family members by someone on the care team in a consistent and understandable manner.

Explain why surgery is needed. A member of the healthcare team should elaborate on the need for surgery and should provide a basic overview of the methods of surgical preparation and management.

Indicate what to watch out for. Family members can serve as an extra pair of eyes and ears and can alert medical staff if something might be wrong. Family members should have an understanding of what to look for that may indicate deterioration, such as abnormal vital signs or a change in patient alertness. In order to adequately welcome patients and family members into the care team, it is not enough to explain “what” patients and family members should look for or “what” is going to happen in their care. The “what” must always be followed with a “why” to aid in genuine understanding.

Additionally, family members should know exactly when to call for help, where to go for help, and with whom they should speak. It is essential that patients and family members understand that they should not be ashamed to ask any of their questions and that many patients in similar situations often have similar questions.

Instead of employing a directive conversation style, an active, engaging conversation should take place, leaving capacity for questions and repeat-back strategies. When patients and family members understand the signs and symptoms that could be indicative of a problem, they are able to serve as an extra set of eyes in order to elevate this concern as early as possible.

Describe what can be anticipated. In addition to explaining when to call for help in the case of a potential emergency, healthcare providers should also thoroughly explain the typical treatment that can be expected before, during, and after surgery. Additionally, it is important to discuss potential post-surgery complications and what to look out for. Clinicians should provide a high-level overview of the processes in place at their organization to ensure safe surgery before the surgical operation. This demonstrates competence of the organization, will likely bolster patient and family comfort, and will provide the patient and family members with information for which to reference if they may be suspicious of a problem post-operation.

By engaging in these conversations before a problem arises, family members can be prepared in the circumstance of necessary treatment and will have an understanding of where to go to find out more information about their loved one’s condition.

Explain what is expected of them during their care. By giving patients and family members a “job” while they are in the hospital, they can be immersed fully in the routine care, can hold other team members accountable, can feel more confident voicing their concerns or opinions, and can serve as an extra set of informed and vigilant eyes to optimize surgical safety. This team involvement can also reduce their anxiety by transforming concern into proactive action. Patients and family members can:

- Engage in conversations around current health conditions, allergies, and medications.
- Ask for clarification of surgical safety standards.
- Make sure skin is marked.

- Monitor temperature and speak up if there are any abnormalities.
- Encourage the patient to stop smoking.
- Discourage the patient from shaving the surgical area.
 - Shaving with a razor prior to surgery can cause skin irritation, thereby making the patient more susceptible to infection ([What you should know, 2020](#)). Instead, opt for a single-use hair clipper or a clipper with a removable head that can be disinfected.
- Monitor for hand hygiene in all healthcare providers and visitors.
- Ensure that people do not touch the wound if unnecessary. If necessary, ensure that they have performed proper hand hygiene.
- Watch for any signs of an infection, including redness, coreness, pain at the surgery site, or fever, and elevate to care team.

Explore next steps. Planning for life after the hospital, whether in assisted living, returning home, or another option, should begin as early as possible between the healthcare providers and the patient and family.

- If the patient is a smoker, the healthcare team should encourage smoking cessation and provide additional resources for further information, groups, or strategies for smoking cessation.
 - Try to understand what specific barriers that patient as an individual faces in cessation.
- Describe the organization’s surgical safety standards that were followed.
 - If any of the protocols changed due to this specific patient’s circumstance, articulate that to the patient and family members.
- Have a discussion with the patient and family around end of life care and advanced directives.
 - Make an attempt to thoroughly understand the religious or cultural nuances in any of the patient’s or family members’ decisions or questions.
- Ensure thorough explanation of necessary post-discharge appointments, therapies, medications, and potential complications.
 - Assess for patient preference in time and location of follow-up appointments, if possible.
- Provide patients and family members resources, including direct contact phone numbers, to the hospital for post-discharge questions.
 - Make sure the resources are in their own language.
- Provide thorough instructions to the patient and family members in the days leading up to discharge regarding wound care and recovery after discharge ([What you should know, 2020](#)).
 - If wound care is required after discharge, set aside time with the patient and family members **more than once** to ensure their understanding and confidence.

Each conversation with a patient and family member should be inclusive and void of bias. Additionally, these conversations should leave ample time for discussion and the facilitator should encourage questions from the patient and family members.



Patients and family members should understand that, although all clinicians in the hospital do their best, no one is ultimately coordinating their care. Patients and family members should understand that they are the managers of their care and as such, should demand to be an active part of the care team by participating in conversations and decisions.

Measuring Outcomes

Topic 1

Colon Surgical Site Infection Rate (Colo SSI):

Rate of patients with a Colon Surgical Site Infection per 100 NHSN colon operative procedures

Outcome Measure Formula:

Numerator: Colon surgical site infections based on CDC NHSN definitions (CDC, 2019)

Denominator: Total number of colon operative procedures based on CDC NHSN definitions

* Rate is typically displayed as SSI/100 Operative Procedures

Metric recommendations

Indirect Impact:

All patients requiring a colon operative procedure

Direct Impact:

All patients requiring a National Healthcare Safety Network (NHSN) colon operative procedure

Lives Spared Harm:

$$\text{Lives Spared Harm} = (\text{SSI Rate}_{\text{baseline}} - \text{SSI Rate}_{\text{measurement}}) \times \text{Operative Procedures}_{\text{baseline}}$$

Lives Saved:

$$\text{Lives Saved} = \text{Spared Harm} \times \text{Mortality Rate}$$

Notes:

To meet the NHSN definitions, infections must be validated using the hospital acquired infection (HAI) standards.

Data Collection

All NHSN colon operative procedures require infection surveillance for 30 days following the procedure date. Operative procedures are defined by ICD and CPT codes.

Colon SSIs can be displayed as a Standardized Infection Ratios (SIR) using the following formula:

$$\text{SIR} = \text{Observed SSI} / \text{Expected SSI}$$

Expected infections are calculated by NHSN and available by location (unit type) from the baseline period.

Mortality (will be calculated by the Patient Safety Movement Foundation):

The PSMF, when available, will use the mortality rates associated with Hospital Acquired Conditions targeted in the Partnership for Patient’s grant funded Hospital Engagement Networks (HEN). The program targeted 10 hospital acquired conditions to reduce medical harm and costs of care. “At the outset of the PFP initiative, HHS agencies contributed their expertise to developing a measurement strategy by which to track national progress in patient safety—both in general and specifically related to the preventable HACs being addressed by the Pfp. In conjunction with CMS’s overall leadership of the Pfp, AHRQ has helped coordinate development and use of the national measurement strategy. The results using this national measurement strategy have been referred to as the “AHRQ National Scorecard,” which provides summary data on the national HAC rate (AHRQ, 2015). *Based on these data, the estimated additional inpatient mortality for Colo SSI is 0.026 (26 per 1000 events).*

Topic 2

Abdominal Hysterectomy Surgical Site Infection Rate (Hyst SSI)

Rate of patients with an abdominal hysterectomy surgical site infection per 100 NHSN abdominal hysterectomy operative procedures.

Outcome Measure Formula:

Numerator: Abdominal hysterectomy surgical site infections based on CDC NHSN definitions

Denominator: Total number of abdominal hysterectomy operative procedures based on CDC NHSN definitions

* Rate is typically displayed as SSI/100 Operative Procedures

Metric recommendations

Direct Impact:

All patients requiring a NHSN abdominal hysterectomy operative procedure

Lives Spared Harm:

$$\text{Lives} = (\text{SSI Rate}_{\text{baseline}} - \text{SSI Rate}_{\text{measurement}}) \times \text{Operative Procedures}_{\text{baseline}}$$

Lives Saved:

$$\text{Lives Saved} = \text{Spared Harm} \times \text{Mortality Rate}$$

Notes:

To meet the NHSN definitions, infections must be validated using the hospital acquired infection (HAI) standards (CDC, 2017).

Data Collection

All NHSN abdominal hysterectomy operative procedures require infection surveillance for 30 days following the procedure date. Operative procedures are defined by ICD and CPT codes.

Colon SSIs can be displayed as a Standardized Infection Ratios (SIR) using the following formula:

$$\text{SIR} = \text{Observed SSI} / \text{Expected SSI}$$

Expected infections are calculated by NHSN and available by location (unit type) from the baseline period.

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Endnotes

Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

Workgroup

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Appendices

Appendix A

Active Ingredients in Antiseptic Skin Preparations ([Jackson, 2018](#))

Table 3 lists the health care antiseptic active ingredients that have been considered under this rulemaking and show whether each ingredient is eligible or ineligible for evaluation under the OTC Drug Review for use in health care antiseptics for each of the five specified uses: Patient antiseptic skin preparation, health care personnel hand wash, health care personnel hand rub, surgical hand scrub, and surgical hand rub.

ACTIVE INGREDIENT	PATIENT ANTISEPTIC SKIN PREPARATION	HEALTH CARE PERSONNEL HAND WASH	HEALTH CARE PERSONNEL HAND RUB	SURGICAL HAND SCRUB	SURGICAL HAND RUB
Alcohol 60 to 95 percent	Y ²	N ³	Y	N	Y
Benzalkonium chloride	Y	Y	Y	Y	N
Benzethonium chloride	Y	Y	N	Y	N
Chlorhexidine gluconate	Y	N	N	Y	N
Chloroxylenol	Y	Y	N	Y	N
Cloflucarban	Y	Y	N	Y	N
Fluorcsalan	Y	Y	N	Y	N
Hexylresorcinol	Y	Y	N	Y	N
Iodine complex (ammonium ether sulfate and polyoxyethylene sorbitan monolaurate)	N	Y	N	N	N
Iodine complex (phosphate ester of alkylaryloxy polyethylene glycol)	Y	Y	N	N	N
Iodine tincture United States Pharmacopeia (USP)	Y	N	N	Y	N
Iodine topical solution USP	Y	N	N	Y	N
Nonylpheboxypoly (ethyleneoxy) ethanolic iodine	Y	Y	N	Y	N
Poloxamer-iodine complex	Y	Y	N	Y	N
Povidone-iodine 5 to 10 percent	Y	Y	N	Y	N
Undecoylium chloride iodine complex	Y	Y	N	Y	N
Isopropyl alcohol 70-91.3 percent	Y	N	Y	N	N
Mercufenol chloride	Y	N	N	N	N