Objectives

After completion of this self-study activity, the learner will be able to:

1. Discuss the importance of *Staphylococcus aureus* and methicillin-resistant *Staphylococcus aureus* (MRSA) as they relate to surgical site infections (SSI) and post-procedure pneumonia (PPP).
2. Discuss the importance of oral and nasal bacteria as they relate to SSI and PPP.
3. Discuss four means of reducing the bacterial load on skin and mucous membranes prior to high risk procedures.
4. Describe the guidelines that support each indication.

Test Questions

1. Of the four leading types of healthcare-associated infections (HAIs), surgical site infections (SSI) have the highest rate of associated deaths.
   A. True    B. False

2. Cardiac open heart procedures are considered high risk because these patients often have many underlying risk factors which may include diabetes, obesity, nicotine use, and extremes of age.
   A. True    B. False

3. In a study, it was determined that high-level of nasal carriage with *S. aureus* was the most important and only significant independent risk factor for developing *S. aureus* related SSI following orthopedic surgery with prosthetic implants.
   A. True    B. False

4. Approximately 50 percent of the population carries *S. aureus* all the time in their nose and of those that carry *S. aureus*, 1 percent carry MRSA.
   A. True    B. False

5. Patients undergoing orthopedic total joint arthroplasty procedures are considered at higher risk of developing surgical site infections because the artificial joint implant becomes a medium for bacterial growth and the formation of biofilms.
   A. True    B. False

6. Chlorhexidine oral rinses are recommended for all ventilator patients by many organizations.
   A. True    B. False

7. Unlike other guidelines that address preoperative showers or prepping for central lines, no evidence-based guidelines state that a CHG patient prep is preferred over an iodine-based prep for the surgical application.
   A. True    B. False
8. The top ranking pathogen (January 2006 - October 2007) associated with both ventilator-associated pneumonia (VAP) and SSI is *S. aureus*.
   A. True    B. False

9. Because mupirocin is an antibiotic, there is not a concern that mupirocin resistance may emerge.
   A. True    B. False

10. Studies also show that 80 percent of *S. aureus* infections are caused by the patient’s own nasal flora.
    A. True    B. False

**Introduction**

The Centers for Disease Control and Prevention (CDC) established the National Healthcare Safety Network (NHSN) in 2005 as a standardized means of identifying and tracking healthcare-associated infections (HAI). This system replaces the old National Nosocomial Infections Surveillance (NNIS) System which was developed in the early 1970’s. The NHSN has two components, a patient safety component and a healthcare provider component. Under the Patient Safety component of the new NHSN, the CDC further categorizes infections (see Figure 1) based on whether they are device associated (central line, urinary catheter, ventilator or dialysis related), procedure associated (surgical site or post-procedure pneumonia) or medication associated infections. This article will focus on the use of antimicrobial agents to reduce the risk of procedure associated infection.

**Procedure Associated Infections**

Surgical procedures are becoming increasingly more complicated and the population of surgical patients has more underlying conditions. These factors increase the risk for developing surgical site infection (SSI) and post-procedure pneumonia (PPP). Therefore, new strategies are needed to keep surgical site infection and post-procedural pneumonia rates and their associated morbidity and mortality as low as possible.

**High Risk SSI Procedures**

Certain surgical procedures are considered high risk for SSI because when an infection develops, patients have high morbidity and mortality rates as well as a high impact on consumption of healthcare resources and attributable cost. High risk procedures include cardiac open heart procedures, orthopedic total joint procedures, neurological procedures, and bariatric surgery. See Figure 2 on page 72 for the CDC SSI classifications.

Cardiac open heart procedures are considered high risk because these patients often have many underlying risk factors which may include diabetes, obesity, nicotine use, and extremes of age. These patients are more susceptible to infections and, when these patients develop an infection, they have a more difficult time fighting off the infection than a young healthy person. Studies estimate that the attributed cost of sternal wound infections after open heart surgery is between $11,000 and $17,000.

Not only is the cardiac surgical patient at risk for developing an SSI, they are also at risk for developing a post procedure pneumonia (PPP) from being intubated during and after the procedure; catheter-related bloodstream infections (CR-BSI) from having central lines in place; and catheter-related urinary tract (CR-UTI) infections from having a urinary catheter.

Patients undergoing orthopedic total joint arthroplasty procedures are considered at higher risk of developing surgical site infections because the artificial joint implant becomes a medium for bacterial growth and the formation of biofilms. Quantitatively, it has been shown that if a surgical site is contaminated with >10^5 (100,000) microorganisms per gram of tissue, the risk of SSI is markedly increased. However, the dose of contaminating microorganisms required to produce infection may be much lower when foreign material (e.g., implants or sutures) is present at the site (e.g., 10^2 or 100 microorganisms per gram of tissue).

According to the American Academy of Orthopedic Surgeons, approximately 1 million total joint arthroplasties are performed annually in...
the United States. The estimated cost of treating an infection at the site of a total hip or knee can exceed $50,000.

Figure 2. Centers for Disease Control SSI Classification

Post-procedural Pneumonia (PPP)

As with hospital-associated bacterial pneumonia, the primary risk factor for the developing PPP is mechanical ventilation which requires endotracheal intubation. For patients undergoing cardiac open heart procedures and other major surgeries, endotracheal intubation with mechanical ventilation, is required for the procedure. (See “Glossary of Terms.”)

Prevalence of HAIs

In 2002, under the old NNIS system, it was estimated that the number of HAIs in U.S. hospitals, adjusted to include federal facilities, was approximately 1.7 million. The estimated number of deaths associated with HAIs in U.S. hospitals was 98,987: of these, 35,967 were for pneumonia (HAP), 30,665 for bloodstream infections (CRBSI), 13,088 for urinary tract infections (UTI), 8,205 for surgical site infections (SSI), and 11,062 for infections of other sites (see Figure 3).

NOTE: In the past, post procedure pneumonia was included in hospital-acquired pneumonia or ventilator associated pneumonia statistics, so no data are available specific to PPP at this time.
Etiology

Surgical site infections and VAP may be caused by a wide spectrum of bacterial pathogens (see Table 1), however *S. aureus* is the leading cause of infection for both SSI and VAP. As with all HAIs, antibiotic resistant organisms are also of great concern. Of the *S. aureus* causing VAP or SSI, 49 percent and 56 percent are MRSA, respectively. Only 40 PPP were reported, but 5,291 SSIs were reported mostly following cardiac (29 percent), abdominal (26 percent), and orthopedic (18 percent) procedures. Viral and fungal pathogens are rare in these infections.

Table 1. Distribution of top ranking pathogens (January 2006 - October 2007)³

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>VAP (%)</th>
<th>SSI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>24.43%</td>
<td>30.01%</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>16.31%</td>
<td>5.55%</td>
</tr>
<tr>
<td><em>Coagulase Negative Staph (CNS)</em></td>
<td>1.33%</td>
<td>13.74%</td>
</tr>
<tr>
<td><em>Enterococcus spp.</em></td>
<td>1.29%</td>
<td>11.21%</td>
</tr>
<tr>
<td><em>Eschericia coli</em></td>
<td>4.55%</td>
<td>9.55%</td>
</tr>
<tr>
<td><em>Acinetobacter baumannii</em></td>
<td>8.36%</td>
<td>0.06%</td>
</tr>
<tr>
<td><em>Enterobacter spp.</em></td>
<td>8.36%</td>
<td>4.17%</td>
</tr>
<tr>
<td><em>Candida spp.</em></td>
<td>2.69%</td>
<td>2.07%</td>
</tr>
</tbody>
</table>

FACTS ABOUT MRSA

The cost associated with MRSA infections is staggering. Compared to non-MRSA infections, MRSA infections:³

- Have longer hospital days (15.5 days vs. 11 days).
- More antibiotic use (10 days vs. 7 days).
- Death rate has been estimated to be more than 2.5 times higher.
- Higher cost ($17,000-$35,000 compared to $12,000-$14,000).

Centers for Medicare and Medicaid Services (CMS)

As of October 1, 2008, the Centers for Medicare and Medicaid Services (CMS) will no longer reimburse hospitals for additional costs related to certain healthcare-acquired conditions (HAC) including the following infections acquired during a hospital stay.⁹

- Catheter-associated blood stream infections, and
- Surgical site infection following:
  - cardiac open heart surgery—mediastinitis;
  - certain orthopedic procedures (total joint) including procedures that are often elective and that involve the repair, replacement, or fusion of various joints including the shoulder, elbow, and spine;
  - bariatric surgery.

Where Bacteria are Found on the Human Body

According to the 1999 CDC Guideline for Prevention of Surgical Site Infections, for most SSIs, the source of pathogens is the endogenous flora of the patient’s skin, mucous membranes or hollow visera (gastro-intestinal tract).⁴

SKIN

Bacteria can be found on all areas of the body, but are found in significantly higher numbers in those moist areas that include the axilla, skin folds, webs of the feet, perineal area, and peri-anal area.

The groin and perineal areas are known to harbor higher microbial counts than areas such as the chest or back. In fact, we humans often carry 5 to 6 logs per centimeter square in the groin region (moist skin area) compared with 3 to 4 logs per centimeter square on our dry sites such as the abdomen.

MUCOUS MEMBRANES

Mucous membranes are the parts of the body that line various body cavities which are exposed to the external environment and internal organs. They are often continuous with skin: at the nostrils, the lips/mouth, the genital area, and the anus. These areas also harbor large numbers of bacteria.

In fact, two areas that aren’t usually considered when we think about reducing the risk of procedure associated infections for high risk patients or procedures, including surgical site infections or post-procedure pneumonias are the nasal cavity and the oral cavity.

NASAL CAVITY

Humans carry a significant amount of bacteria in our noses. Of particular interest is *S. aureus*. Approximately 30 percent of the population carries *S. aureus* in their nose, and of those who carry *S. aureus*, 1 percent carries MRSA.⁴,¹⁰

In addition, nasal carriage of *S. aureus* has been identified as a major risk factor for wound infections after both orthopedic total joint and cardiac surgery. A study published in 2004 by Wertheim, et al demonstrated that genotyping revealed that 80 percent of *S. aureus* bacteremia infections were caused by the patient’s own clonal nasal flora.¹¹ Another study by Kluymans, et al demonstrated that 10 out of 10 pairs of pre-op nasal isolates and post-op cardiac wound isolates were identical.¹² In a third
study done in 2002 by Kalmeijer, et al, it was determined that high-level nasal carriage of \textit{S. aureus} was the most important and only significant independent risk factor for developing SSI with \textit{S. aureus} following orthopedic surgery with prosthetic implants.\textsuperscript{13}

**ORAL CA VITY**

The mouth has its own ecosystem of bacteria that when an individual is healthy and has good oral hygiene is kept in check by a variety of the body’s own defense mechanisms. Dental plaque is bacterial biofilm that builds up on the teeth. If not removed regularly, it can lead to dental cavities and gingivitis, an inflammation of the gums around the teeth. Thus, the mouth can become a reservoir for bacteria that cause pneumonia.

When a person becomes ill and is intubated and on a respirator, the body’s natural defense mechanisms change. There is an increase in oropharyngeal colonization by gram negative bacteria in patients with pulmonary disease, coma, or an endotracheal or nasogastric tube in place. Another contributing factor is that due to changes in secretions during many disease states, bacteria are better able to adhere to tissue.\textsuperscript{22}

The physical presence of the endotracheal tube is another contributing factor to developing pneumonia. Patients with endotracheal tubes are unable to swallow, so the oropharyngeal space becomes a warm moist environment where bacteria can grow and replicate. If the endotracheal tube cuff is not kept at the correct pressure, oropharyngeal secretions can leak around the cuff carrying bacteria into the lower respiratory tract.

**Reducing the Patient’s Bacterial Load Before Surgery**

A number of practices are used to reduce the bacterial load on the patient prior to surgery with the use of topical antimicrobial agents. In the past, this included primarily decreasing microbial counts on the skin prior to surgery. While this continues to be a very important step for all surgical procedures, for certain high risk procedures, experts now are expanding this to include decontaminating the nares and the oral cavity prior to surgery.

For each area, we will focus on the different guidelines and recommendations and on current and emerging practices.

**Decreasing Microbial Counts on the Skin**

**PREOPERATIVE SHOWERS OR BATHS**

The practice of having patients shower or bathe before surgery has been around for a long time. Showers, baths, and wipes cleanse the skin by removing dirt and debris. In addition, products that include an antimicrobial agent will also decrease microbial counts on the skin. Figure 4 discusses the guidelines and recommended practices for preoperative showers or baths to reduce the microbial counts on the skin.

**Figure 4. Recommended practices for preoperative showers or baths**

<table>
<thead>
<tr>
<th><strong>CDC</strong> – Guideline for Prevention of Surgical Site Infections, 1999\textsuperscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Require patients to shower or bathe with an antiseptic agent at least the night before the operative day (Category IB)</td>
</tr>
<tr>
<td>“Chlorhexidine gluconate-containing products require several applications to attain maximum antimicrobial benefit, so repeated antiseptic showers are usually indicated. Even though preoperative showers reduce the skin’s microbial colony counts, they have not definitively been shown to reduce SSI rates.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>AORN</strong> – Perioperative Standards and Recommended Practices, 2009\textsuperscript{13}</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Unless contraindicated, patients should be instructed or assisted to perform two preoperative baths or showers with CHG before surgery to reduce the number of microorganisms on the skin and reduce the risk of subsequent contamination of the surgical wound.</td>
</tr>
<tr>
<td>“Although there is sufficient evidence of the effectiveness of two CHG showers to reduce microbial counts, there is insufficient research to definitively link this decrease in microbial count to a reduction in surgical site infection rates.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SHEA/IDSA</strong> – Strategies to Prevent Surgical Site Infections, 2008\textsuperscript{14}</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Preoperative bathing with chlorhexidine-containing products (Unresolved issue)</td>
</tr>
<tr>
<td>“Preoperative showering with agents such as chlorhexidine has been shown to reduce bacterial colonization of the skin. Several studies have examined the utility of preoperative showers, but none has definitively proven that they decrease SSI risk. A recent Cochrane review evaluated the evidence for preoperative bathing or showering with antiseptics for SSI prevention. Six randomized, controlled trials evaluating the use of 4% chlorhexidine gluconate were included in the analysis, with no clear evidence of benefit noted. To gain the maximum antiseptic effect of chlorhexidine, it must be allowed to dry completely and not be washed off.”</td>
</tr>
</tbody>
</table>

\textsuperscript{*} CDC- Centers for Disease Control and Prevention  
AORN – Association of periOperative Registered Nurses  
SHEA – Society for Healthcare Epidemiology of America  
IDSA – Infectious Disease Society of America
Current practice

While these three organizations agree that using CHG preoperatively for showers or baths has not been shown definitively to reduce surgical site infection, this practice theoretically makes sense in the fight to reduce bacteria on the body that cause surgical site infections. Current practice includes using either 2% or 4% CHG antiseptic to showers/baths or using 2% CHG impregnated wipes to cleanse the surgical site and surrounding body.

PREOPERATIVE SHOWERS/BATHS

- Pre-op shower/baths/wipes reduce bacterial counts on the skin.
- CDC recommends that patients shower or bath with an antiseptic agent at least the night before the operative day.
- CHG has cumulative activity with multiple uses.
- CHG is recommended by AORN for pre-op shower/bath application.
- Therefore, theoretically, this may be associated with reduced risk for SSI.

SURGICAL PREOPERATIVE PATIENT PREP

There are also multiple guidelines and recommended practices that address the use of surgical preoperative patient prep. Unlike guidelines that address preoperative showers or prepping for central lines, none of these evidence-based guidelines state that a CHG prep is preferred over an iodine-based prep for the surgical application.

Figure 5. Recommended practices for surgical preoperative patient prep

<table>
<thead>
<tr>
<th>CDC* – Guideline for Prevention of Surgical Site Infections, 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Thoroughly wash and clean at and around the incision site to remove gross contamination before performing antiseptic skin preparation.</td>
</tr>
<tr>
<td>- Use an appropriate antiseptic agent for skin preparation.</td>
</tr>
<tr>
<td>- Apply preoperative antiseptic skin preparation in concentric circles moving toward the periphery. The prepared area must be large enough to extend the incision or create new incisions or drain sites, if necessary.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AORN* – Perioperative Standards and Recommended Practices, 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The preoperative skin antiseptic agent should: significantly reduce microorganisms on intact skin, contain a nonirritating antimicrobial preparation, be broad spectrum, be fast acting, and have a persistent effect.</td>
</tr>
<tr>
<td>- Application of the skin antiseptic should progress from the incision site to the periphery of the surgical site.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHEA/IDSA* – Strategies to Prevent Surgical Site Infections, 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Wash and clean skin around incision site.</td>
</tr>
<tr>
<td>- Use an appropriate antiseptic agent.</td>
</tr>
</tbody>
</table>

* CDC- Centers for Disease Control and Prevention
AORN – Association of periOperative Registered Nurses
SHEA – Society for Healthcare Epidemiology of America
IDSA – Infectious Disease Society of America

Current practice

Preoperative patient skin antiseptics can include iodine/iodophors, chlorhexidine gluconate or alcohol in combination with iodine/iodophor, CHG or iodine povacrylex. Each has advantages and disadvantages and choosing the right antimicrobial for the right application is critical. The surgical environment is very different from vascular access procedures and the prep must be able to withstand the challenges of surgery. This includes being effective after exposure to both blood and saline as well as helping to provide effective drape adhesion. Preps with a water-insoluble polymer immobilize bacteria remaining on the skin, potentially reducing the risk of microbial migration into the surgical incision.
The importance of preoperative skin preps

- The skin carries significant amounts of bacteria, particularly in moist areas.
- Bacteria on the skin continue to grow and repopulate the skin.
- The skin cannot be sterilized.
- The surgical environment is very different from that of having a central line inserted (larger incision, blood and saline challenges, tissue manipulation, need for drape adhesion).
- Pre-op skin preps need to be fast acting and have persistent activity throughout the procedure.
- Preps need to resist removal by both blood and saline.
- Preps need to be effective after exposure to both blood and saline.
- Preps with a water-insoluble polymer immobilize bacteria remaining on the skin, potentially reducing the risk of microbial migration into the surgical incision.

Preoperative reduction of *S. aureus* in the nares

The guidelines and recommendations around reducing *S. aureus* in the nares prior to surgery are not so clear cut. The guidelines agree that there is a link between nasal carriage of *S. aureus* and development of surgical site infections, but differ in their recommendations to use an anti-staphylococcal agent in the preoperative setting. This is due in part to the concern over antibiotic resistance.

Figure 6. Recommended practices for preoperative reduction of *S. aureus* in the nares

**CDC** – Guideline for Prevention of Surgical Site Infections, 1999

- No recommendation to preoperatively apply mupirocin to nares to prevent SSI. *Unresolved issue*

Discussion: “It has been known for years that the development of SSI involving *S. aureus* is definitely associated with preoperative nares carriage of the organism in surgical patients. A recent multivariate analysis demonstrated that such carriage was the most powerful independent risk factor for SSI following cardiothoracic operations … The effect of mupirocin on reducing SSI risk is yet to be determined. Additionally, there is concern that mupirocin resistance may emerge, although this seems unlikely when treatment courses are brief.”

Current practice

Mupirocin nasal 2% is indicated for the eradication of nasal colonization with MRSA in adult patients and healthcare providers as part of a comprehensive infection control program to reduce the risk of infection among patients at high risk of MRSA infection during institutional outbreaks of infections with this pathogen. According to the prescribing information: There are insufficient data at this time to establish that this product is safe and effective as part of an intervention program to prevent autoinfection of high-risk patients from their own nasal colonization with *S. aureus* or to recommend its use for general prophylaxis of any infection in any patient population.

While the product dosing is twice daily for 5 days (10 doses), there is no standard protocol for pre-surgical application. While some facilities do prescribe the full 5 day regimen, because of the logistics, many facilities are giving 1 to 3 doses before the surgical procedure and may or may not give the rest following the procedure.
WHY REDUCE S. AUREUS COLONIZATION IN THE NAres?

- Healthcare Associated Infections (HAIs) are one of the top 10 leading causes of death in the U.S.
- SSIs are the second leading cause of HAIs.2
- Roughly 30 percent of surgical patients are colonized with S. aureus in the nares.3
- S. aureus is the leading cause of SSIs.4
- 80 percent of S. aureus infections are caused by the patient’s own nasal flora.5
- Nasal carriage of S. aureus has been identified as a risk factor for both cardiac open heart procedures and orthopedic total joint procedures.
- Therefore, theoretically reducing S. aureus in the nares will reduce the risk of SSIs.

One of the concerns with the use of mupirocin ointment, because it is an antibiotic, is development of resistance. Surveillance studies have reported mupirocin resistant MRSA strains in up to 13 percent of patients in institutions that do not practice routine use of mupirocin and in up to 65 percent of patients in areas with widespread mupirocin use.6 Rotger, et al, in their 2005 article, “Phenotypic and genotypic mupirocin resistance among staphylococci causing prosthetic joint infection,” found that 27 percent of MRSA isolates causing hip and knee PJI [prosthetic joint infections] were resistant to mupirocin versus 0 percent for methicillin sensitive S. aureus isolates.7

One emerging option is the use of a 5% povidone iodine antiseptic which is specially formulated to work in the unique physiology of the nares. It is applied 1 hour before surgery and provides a 99.5 percent reduction of S. aureus in the nares at 1 hour and maintains that log reduction for at least 12 hours. Because it’s an antiseptic and not an antibiotic, there is not the concern of resistance that there is with mupirocin.

So, while the guidelines and recommendations remain mixed on this practice, because of the link between nasal carriage of S. aureus and surgical site infections, it makes theoretical sense that reducing S. aureus in the nose may help reduce the risk of surgical site infections. In addition, there is a need for a preoperative product that reduces colonization of S. aureus in the nose, is easy to apply, fits into hospital protocols, is cost effective, and will not lead to resistance.

**Decreasing Microbial Counts in the Mouth**

According to the American Dental Association, researchers have found that periodontitis (the advanced form of gum disease that can cause tooth loss) is associated with other health problems such as cardiovascular disease, stroke and bacterial pneumonia. This is why more and more emphasis is being put on oral care within the hospital setting. This extends to the preoperative area as well as indicated by the following guidelines and recommendations shown in Figure 7.

**Figure 7. Recommended practices for preoperative oral hygiene**

- **CDC** - Guidelines for Preventing Health-Care-Associated Pneumonia, 200315
  - Develop and implement a comprehensive oral-hygiene program (that might include the use of an antiseptic agent) for patients in acute-care settings or residents in long-term care facilities who are at high risk of developing health-care-associated pneumonia. CATEGORY II
  - Use an oral chlorhexidine gluconate (0.12%) rinse during the perioperative period on adult patients who undergo cardiac surgery. CATEGORY II

  “Recently, the antiseptic chlorhexidine gluconate (0.12%) was used successfully as a perioperative oral rinse to decrease the overall incidence of nosocomial respiratory tract infections in patients who underwent cardiac surgery.”

- **ATS** - Guideline for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia, 200516
  - Modulation of oropharyngeal colonization by the use of oral chlorhexidine has prevented ICU-acquired HAP in selected patient populations such as those undergoing coronary artery bypass grafting, but its routine use is not recommended until more data becomes available.

- **AAOS** - Information Statement, 199717
  - Patients who are about to have a total joint arthroplasty should be in good dental health prior to surgery and should be encouraged to seek professional dental care if necessary.
  - Patients who already have had a total joint arthroplasty should perform effective daily oral hygiene procedures to remove plaque.

- **AACN** - Practice Alert: Oral Care in the Critically Ill, 200718
  - Use an oral chlorhexidine gluconate (0.12%) rinse twice a day during the perioperative period for adult patients who undergo cardiac surgery. Routine use in other populations is not recommended at this time.

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* CDC – Centers for Disease and Prevention  
ATLS – American Thoracic Society  
AAOS – American Academy of Orthopaedic Surgeons  
AACN – American Association of Critical Care Nurses
Current practice

In the intensive care unit, it has been known for some time that good oral hygiene and the removal of plaque helps reduce the risk of ventilator-associated pneumonia. The practice of good oral hygiene is now being extended to the preoperative arena prior to intubation in the operating room. Chlorhexidine oral rinses have long been used by dentist in the treatment of gingivitis and provide antimicrobial activity during oral rinsing. At present there are no CHG oral rinses approved by FDA for the prevention of VAP.

WHY PREOPERATIVE ORAL HYGIENE?

- The mouth has its own ecosystem of bacteria.
- Over time, bacterial biofilms build up in the mouth which can lead to plaque and gingivitis.
- 63 percent of people in the U.S. have gingivitis.27
- Good oral hygiene and the removal of plaque helps reduce the risk of ventilator associated pneumonia (VAP).
- Oral hygiene is now being extended to the preoperative arena prior to intubation in the operating room.
- CHG oral rinses have long been used by dentist in the treatment of gingivitis and provide antimicrobial activity during oral rinsing.

Summary

*Staphylococcus aureus* and MRSA are leading causes of both surgical site infections and pneumonia. In addition, the source of these pathogens is often the endogenous flora of the patient’s skin and mucous membranes. Changes to CMS payments are challenging hospitals to reevaluate their infection prevention practices and examine new practices to further reduce both surgical site infections and post-procedure pneumonias.

Part of the strategy is to look at practices for reducing bacteria on the patient’s skin and in the oral and nasal cavities, particularly prior to high risk procedures like cardic, neurosurgical and orthopedic total joint procedures. When developing these strategies, it is important to understand the guidelines and recommended practices, but also to consider emerging products and practices that may be to new to be included in the guidelines and recommended practices that may be several years old. By combining best practice and choosing the right antimicrobial for the right application, healthcare facilities can reduce the risk of post-procedure infections, thus achieving positive patient outcomes.

References

20. 3M Skin and Nasal Antiseptic: 9110811 12 hour study.indd 2.
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Address ______________________________________
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