Infection control

Mediastinitis: Targeting zero infections

A new push is on to reduce hospital-acquired infections—the target is zero. As of Oct 1, 2008, Medicare will not pay hospitals for additional costs associated with 3 types of infections deemed preventable:

- catheter-associated urinary tract infections
- central line catheter-associated bloodstream infections
- mediastinitis—a deep sternal incisional infection following coronary artery bypass graft (CABG) surgery.

The Association for Professionals in Infection Control and Epidemiology (APIC) has launched the Targeting Zero initiative to eradicate these 3 types of infections plus those associated with Clostridium difficile. The aim is to create a culture of zero tolerance for noncompliance with measures proven to prevent hospital-acquired infections.

Of the targeted infections, mediastinitis has a direct link to surgery and is one of the most devastating (sidebar).

Perioperative leaders and staff can make a difference in eradicating these infections. They need to be aware of the risk factors so they can plan prevention strategies for before, during, and after surgery.

Preoperative risks and prevention

Two risk factors OR teams can help to reduce are:

- blood glucose level at least 200 mg/dL
- chest hair harboring bacteria.

OR teams can also make sure preoperative antibiotics are given on time, which has already received a major push from the Surgical Care Improvement Project (SCIP).

“Communicating the research and guidelines on glycemic control, hair removal, and timely administration of antibiotics to physicians will take on new importance in the coming months,” says Carrie N. Keib, RN, PhD, assistant professor, department of nursing, Cedarville University, Cedarville, Ohio.

Glucose control

High blood glucose levels are a major independent risk factor for mediastinitis, as documented by Trick and colleagues in their 2000 article, notes Jodi C. McDaniel, RN, PhD, assistant professor in the College of Nursing, Ohio State University, Columbus, who coauthored a mediastinitis article with Keib in the Journal of Cardiovascular Nursing.

Close monitoring of a patient’s glucose level and communicating this information preoperatively, intraoperatively, and postoperatively has been shown to lower this risk in diabetic patients, according to articles by Furnary and colleagues and Zerr and colleagues. McDaniel says clinicians are beginning to use algorithms to tightly control glucose levels.

The American College of Cardiology (ACC) and American Heart Association (AHA) guideline on CABG surgery published in 2004 strongly recommends continuous insulin infusion to prevent perioperative glucose levels from exceeding 150 to 180 mg/dL. The evidence and resulting practice guideline support tight control of glucose levels in patients having CABG surgery to help decrease the incidence of sternal wound infections, McDaniel notes.
Preoperative skin preparation

Research has shown that male chest hair harbors bacteria. But shaving hair preoperatively causes skin irritation and abrasions that can host bacterial growth.

The Centers for Disease Control and Prevention (CDC) in its 1999 Guideline for Prevention of Surgical Site Infection recommends:

• not removing hair preoperatively unless it will interfere with the operation
• removing hair immediately before surgery with electric clippers, if hair has to be removed
• having patients shower or bathe with an antiseptic agent at least the night before surgery
• washing the incision site to remove gross contamination before performing antiseptic skin preparation
• preparing skin with an antiseptic agent, such as povidone-iodine, alcohol-containing products, and chlorhexidine gluconate
• applying the antiseptic agent in concentric circles moving toward the periphery.

Despite the research and guidelines, McDaniel says some continue to shave incision sites, and antiseptic preoperative showers or baths aren’t always ordered.

Antibiotic administration

The ACC/AHA guideline recommends administering the prophylactic antibiotic with a cephalosporin within 30 to 40 minutes of the surgical incision.

“The nurse can make sure antibiotics are administered within that 30- to 40-minute window and can be an advocate in bringing that to a surgeon’s attention if it didn’t happen,” notes McDaniel.

She and Keib suggest having discussions with anesthesiologists, surgeons, and staff about these measures and developing tools, such as checklists, to alert the staff to a patient’s infection risks.

“OR managers also need to emphasize that for those who won’t take appropriate measures, there will be economic consequences in the fall,” Keib says.

Intraop risks and prevention

Intraoperative risks for mediastinitis are often related to surgical technique and decisions during the case, notes Keib. These include:

• bilateral harvest of internal mammary artery
• number of bypass grafts
• excessive use of electrocautery and/or bone wax
• length of cardiopulmonary bypass and/or total OR time.

Other risks OR personnel can affect are:

• infractions in sterile technique
• organization of the OR
• traffic in the OR.

Keib suggests evaluating traffic flow in ORs to see if there are ways to decrease traffic. The staff can also assist in keeping traffic down during a procedure. Nurses should review their routines and evaluate the roles and responsibilities of staff members to see if there are patterns that may create potential for infractions in sterile technique.

Postop risks and prevention

Mediastinitis typically occurs in the first 7 to 10 days after surgery, and often patients have already been discharged when the infection is noticed. Nurses should educate patients and families about symptoms of infection before discharge. Stress that patients should report any symptoms as soon as they are noticed.

The CDC guidelines on postoperative incision care to prevent surgical site infections recommend education and reporting of infections as well as:

• protecting the incision for 24 to 48 hours after surgery with a sterile dressing
• using sterile technique to change incision dressings
• washing hands before and after dressing changes and contact with the incision site.
Sterile technique and handwashing need to be emphasized when changing dressings, McDaniel says. These recommendations are often overlooked, and dressings are taken off with bare unwashed hands, she notes.

“The time has come for OR managers, physicians, and OR staff to be purposefully diligent during the surgery in recognizing a patient’s risk for mediastinitis,” says McDaniel.

“If they ignore evidence-based recommendations by the CDC and the push by organizations such as CMS and APIC to eradicate these infections, the patient, the physician, and the hospital will now suffer consequences.”

— Judith M. Mathias, RN, MA

More information on APIC’s Targeting Zero initiative is at www.apic.org.

References


Fast facts on mediastinitis

- Mediastinitis occurs after 0.25% to 4% of cardiac surgeries.
- The mortality rate is 10% to 47% with costs of $40,000 to $50,000 per case.
- Coagulase-negative *Staphylococcus* species account for half of cases. *Staphylococcus aureus* has been isolated in 25% to 35% of cases.
- Mediastinitis is especially complicated when there are multiple antibiotic-resistant pathogens such as methicillin-resistant *S aureus*.

Prevention for mediastinitis

**Preoperative**
- Surgical site preparation
- Antimicrobial administration

**Intraoperative**
- Hyperglycemia management
- Antimicrobial administration
- Decrease operating room traffic
- Minimal use of electrocautery
- Minimal or no use of bone wax
- Double-glove barrier technique
- No infractions in sterile technique

**Postoperative**
- Postoperative incision care
- Antimicrobial administration
- Hyperglycemia management
- Surgical treatment modalities