

Surgical safety program greatly reduces surgical site infections for heart operations

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A common postoperative complication after open heart operations—infection at the surgical site—has been reduced by 77 percent at a Canadian hospital through its participation in the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP), according to a new case study presented at the 2014 ACS NSQIP National Conference.

Vancouver General Hospital in Vancouver, British Columbia, reportedly reduced its rate of cardiac surgical site infections (SSIs) using a "best practices bundle," or combination of scientifically proven, up-to-date methods for reducing these potentially serious infections. The hospital's new surgical patient safety program, which aligned with NSQIP best practices, quickly resulted in "a dramatic reduction" of SSIs, said Rael Klein, MD, FRCP, a study coauthor and an anesthesiologist at the University of British Columbia, Vancouver.

SSIs affect 2 to 20 percent of coronary artery bypass graft (CABG) procedures.¹ CABG is the most common type of open heart procedure performed in the United States, with nearly 159,000 CABG procedures performed in 2013,² according to the Society of Thoracic Surgeons Adult Cardiac Surgery Database. An infection can develop in the surgical wound of either the patient's sternum (chest) or leg if a vein was harvested from the leg for the bypass.

"Sternal infections can be devastating for the patient because it is close to vital structures such as the heart," Dr. Klein said. "Reducing the SSI

rate means fewer postoperative complications and a reduced length of stay in the hospital."

Dr. Klein and other members of Vancouver General's multidisciplinary [cardiac surgery](#) quality improvement team led the SSI reduction effort after finding that their average cardiac NSQIP SSI rate was 7 percent, about twice that of other comparable hospitals that participate in ACS NSQIP. The NSQIP database is the leading nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care in hospitals.

The project's goal was to reduce the cardiac NSQIP SSI rate to 2 percent, according to lead author Barbara A. Drake, RN, clinical quality and safety coordinator for Vancouver General Hospital. The team succeeded in lowering the infection rate to a NSQIP average of 1.6 percent in the nine months after fully instituting the surgical best practices bundle in July 2013, she reported.

Ms. Drake attributed their success to involving all health care disciplines that care for cardiac surgical patients. The quality improvement team included surgeons, anesthesiologists, nurse practitioner, infection control specialist, quality coordinators, pharmacists, educators, nurse leaders, and staff nurses who championed the changes with their peers. After querying frontline providers and searching published best practices, the team identified several areas needing improvement.

Specifically, the group improved guidelines for prophylactic antibiotic use so that providers routinely administered the proper, weight-based intravenous dose of antibiotic at the best time and gave the patient a second dose if needed during long surgical procedures. In addition, patients received new types of wound dressings designed to reduce the chance of infection. The nurse practitioner led the team in standardizing the postoperative wound care of the surgical sites.

Another change involved active warming of patients to normal body temperature once they were taken off the cardiac surgery bypass machine. Patients are deliberately cooled when on the cardiac bypass machine, but warming the patients as soon as possible can help reduce the chance of infection. Cold constricts blood vessels, hindering oxygen needed for healing, Ms. Drake explained.

She said many of the new improvements came from information obtained from Safer Health Care Now, a program of the Canadian Patient Safety Institute in collaboration with other organizations.

The team called the SSI reduction program CLEAN, an acronym that stood for the collected best practices, both existing and new:

- **C:** Clean hands before touching the dressing, chlorhexidine wipes applied to the body before surgery, clippers used for hair removal instead of shaving, and nasal decolonization (disinfecting the nostrils with ultraviolet light) performed
- **L:** Leave the dressing on for 72 hours postoperatively, and leave the pink chlorhexidine disinfectant on the skin for 6 hours after the operation
- **E:** Engage patients and staff on best practices for SSI prevention
- **A:** Appropriately use antibiotics
- **N:** Normothermia (normal body temperature), normal blood glucose (sugar), nutritious meals, and no smoking for patients

Using the ACS NSQIP data sampling of 12 to 16 cardiac surgery cases a month, which is 20 percent of the surgical volume, the number of SSIs was tracked. From January 2012 to June 2013 the NSQIP SSI rate was 7 percent. Once the CLEAN protocol was fully implemented in July 2013, the SSI rate fell to 1.6 percent by the end of March 2014.

Our infection control practitioner monitors all cardiac inpatients who

receive cardiac bypass and/or valve surgery for 90 days. An average of one sternal infection a month was reported. Since July 2013, only two sternal infections have been recorded. No sternal infection was observed for eight consecutive months from July 2013.

At an approximate cost of \$30,000 to treat a sternal infection, she estimated that the hospital saved \$300,000 in the past year. The new dressings cost \$35,000 per year.

"This project," Dr. Klein said, "shows it is possible to really improve patient outcomes and obtain excellent compliance from physicians in changing clinical practice."

More information: ¹ Swenne CL, et al. "Surgical-site infections within 60 days of coronary artery by-pass graft surgery." *J Hosp Infect* 2004;57(1):14-24.

² Society of Thoracic Surgeons. Adult Cardiac Surgery Database Executive Summary. Available at: www.sts.org/sites/default/files/ExecutiveSummary.pdf. Accessed July 27, 2014.

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