Evidence appraisal of Owens PL, Barrett ML, Raetzman S, Gibbons MM, Steiner CA. **Surgical site infections following ambulatory surgery procedures.**

JAMA. 2014;311(7):709-716.

Evidence Appraisal Score: III B

Editor's note: *Reading research and incorporating valid research results into practice is a vital part of ensuring that perioperative nursing practice is evidence based. The AORN Research Evidence Appraisal Tool, which was adapted with permission from the Johns Hopkins Evidence-Based Practice Model and Guidelines, can help perioperative nurses evaluate research. This tool is used to evaluate the evidence upon which AORN's guidelines are based. The tool can be used to appraise the level of evidence and quality of evidence for a single research study or a summary of multiple research studies. An abbreviated tool using only the sections of the tool relevant to the study appraised is included in this article. Each section of the tool is discussed to help readers understand why the study received a particular appraisal score and what that rating means to perioperative nursing practice. Clinical judgment should be used to determine whether the findings of an individual study are of value and relevance in a particular setting or patient care situation. Individuals intending to put this study's findings into practice are encouraged to review the original article to determine its applicability to their setting.*

Surgical site infections (SSIs) are one of the most prevalent health care–associated infections (HAIs), accounting for a reported 20% to 31% of the HAIs in hospitalized patients. In addition, HAIs are reportedly associated with increased morbidity, a mortality rate of 3%, hospital stays extended by 7 to 10 days, and costs ranging from $20,000 to $27,600 per admission. According to the US Department of Health and Human Services (HHS), reducing the rate of SSIs is a national priority. The HHS has an action plan to address this

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issue, which initially focused on SSIs that occur in high-priority areas within acute care hospitals, but then expanded to include the ambulatory setting because serious breaches of infection prevention practices were found to be common during inspections at ambulatory surgery centers (ASCs). Although ambulatory surgery represents a substantial portion of surgical health care, there is a paucity of information on adverse events, including the rate of occurrence of SSIs following surgical procedures performed in the ambulatory setting. This retrospective study was conducted to better understand the spectrum of clinically significant surgical site infections (CS-SSIs) that occur after low- to moderate-risk ambulatory surgical procedures performed on adult patients with low surgical risks.

LEVEL OF EVIDENCE: STUDY

Because this is a retrospective nonexperimental study, the Level of Evidence: Study portion of the AORN Research Evidence Appraisal Tool was used to appraise this study (Figure 1).

Setting. Encounter data abstracted from the 2010 Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) State Ambulatory Surgical Databases and State Inpatient Databases for eight states (ie, California, Florida, Georgia, Hawaii, Missouri, Nebraska, New York, Tennessee), thereby accounting for one-third of the US population

Sample size and composition. The researchers reviewed records to identify low- to moderate-risk surgical procedures performed in hospital-owned ASCs in 2010. A variety of surgical specialties were selected, including general surgery, orthopedics, neurosurgery, gynecology, and urology. Selected procedures were elective, were of short duration, and did not require an overnight inpatient stay. These included

- laparoscopic cholecystectomy,
- six types of hernia repair (ie, open and laparoscopic for inguinal or femoral; umbilical; incisional or abdominal),
- spinal laminectomy,
- spinal discectomy,
- anterior cruciate ligament repair,
- vaginal hysterectomy,
- abdominal hysterectomy, and
- transurethral prostatectomy.

Patients were excluded if they

- were admitted in January or December,
- underwent more than one surgical procedure on the same day,
- were between the ages of one and 17 years,
- were undergoing a hysterectomy for the treatment of cancer,
- were undergoing transurethral prostatectomy for the treatment of cancer,
- experienced a hospital event (ie, inpatient or ambulatory surgery setting) in the 30 days before surgery,
- had a length of stay that was two or more days,
- were not discharged home after surgery, or
- had an infection coded on the day of surgery.

After applying inclusion and exclusion criteria to the selection index of ambulatory surgical procedures, a total of 284,098 records were obtained, which represented 282,086 patients.

This retrospective study did not require approval from an institutional review board because use of HCUP administrative data is not considered human subjects research.

Interventions. No interventions were used.

Control. No controls were used.

Random assignment. There was no random assignment.

Level of evidence. When using the AORN Research Evidence Appraisal Tool, this study was classified as III for level of evidence because it was a retrospective nonexperimental study.

QUALITY OF EVIDENCE: STUDY

Because this is the report of a nonexperimental retrospective study, the Quality of Evidence: Study portion of the AORN Research Evidence Appraisal Tool was used to appraise this study.

Existing information. The researchers described existing information, which revealed that ambulatory surgeries (eg, 18.7 million procedures performed in the United States in 2010) represent a substantial proportion of surgical health care (eg, 63% of all surgical procedures in 2010); however, there is a paucity of research on the rates of adverse events, including HAIs, after surgery performed in the ambulatory setting. Additionally, during inspections of Medicare-certified ASCs, serious breaches of infection control practices have been reported.

Purpose of the study. The purpose of the study was clearly stated—to determine the incidence of CS-SSIs after low- to moderate-risk ambulatory surgical procedures performed on adult patients with low surgical risk.

Literature review. The literature review was extensive but not current. Of the 38 works cited, only 15 (39%) were published within the past five years.

Sample sufficiency. The sample size was adequate for the study design.

Control group. There was no control group in this study.

AORN RESEARCH EVIDENCE APPRAISAL TOOL

DATE	March 2015
REVIEWER	George Allen
APPRAISAL SCORE	III B

RW# | CITATION Owens PL, et al. Surgical site infections following ambulatory surgery procedures. JAMA. 2014;311(7):709-716.

Does this evidence address the perioperative practice question? ☑ Yes ☐ No – Do not proceed with evidence appraisal.

LEVEL OF EVIDENCE: STUDY

Report of a single research study? ☑ Yes ☐ No (If No, go to Summary)

SETTING Encounter data from 8 hospital-owned ambulatory surgery centers in the United States

SAMPLE SIZE 284,098 ASC procedures | COMPOSITION Records from selected low- to moderate-risk surgical procedures in 2010

INTERVENTION(S) ☐ Yes ☑ No | CONTROL ☐ Yes ☑ No | RANDOM ASSIGNMENT ☐ Yes ☑ No

YES to Intervention, Control and Random Assignment	☐	LEVEL I Randomized Controlled Trial (RCT) or Experimental Study
YES to Intervention and either Control or Random Assignment	☐	LEVEL II Quasi-Experimental (no manipulation of independent variable; may have Random Assignment or Control)
YES to Intervention only or NO to Intervention, Control and Random Assignment	☑	LEVEL III Non-Experimental (no manipulation of independent variable; includes descriptive, comparative, and correlational studies; uses secondary data)
	☐	LEVEL III Qualitative (exploratory [eg, interviews, focus groups]) starting point for studies where little research exists; small samples sizes; results used to design empirical studies)

QUALITY OF EVIDENCE: STUDY

Does the researcher identify what is known and not known about the problem and how the study will address any gaps in knowledge?	☑ Yes	☐ No	
Was the purpose of the study clearly presented?	☑ Yes	☐ No	
Was the literature review current (most sources within last 5 years or classic)?	☐ Yes	☑ No	
Was sample size sufficient based on study design and rationale?	☑ Yes	☐ No	
If there is a control group: • Were the characteristics and/or demographics similar in both the Control and Intervention groups? • If multiple settings were used, were the settings similar? • Were all groups treated equally except for the Intervention group(s)?	☐ Yes ☐ Yes ☐ Yes	☐ No ☐ No ☐ No	☑ NA ☑ NA ☑ NA
Are data collection methods described clearly?	☑ Yes	☐ No	☐ NA
Was instrument validity discussed?	☐ Yes	☐ No	☑ NA
Were the instruments reliable (eg, Cronbach's $\alpha \geq 0.70$)?	☐ Yes	☐ No	☑ NA
If surveys/questionnaires were used, was the response rate ≥ 25%?	☐ Yes	☐ No	☑ NA
If tables were presented, was the narrative consistent with the table content?	☑ Yes	☐ No	☐ NA
Were the results presented clearly?	☑ Yes	☐ No	
Were conclusions based on results?	☑ Yes	☐ No	
Were study limitations identified and addressed?	☑ Yes	☐ No	

A HIGH	Consistent, generalizable results Sufficient sample size Adequate control Definitive conclusions Consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence	☐
B GOOD	Reasonably consistent results Sufficient sample size for the study design Some control Fairly definitive conclusions Reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence	☑
C LOW QUALITY OR MAJOR FLAWS	Little evidence with inconsistent results Insufficient sample size for the study design Conclusions cannot be drawn	☐

ADDITIONAL COMMENTS:

Figure.

Data collection. The researchers clearly described the methods of data collection. The primary outcome measured was the rate of postsurgical acute care visits after each of the selected surgical procedures. The denominator the researchers used was the number of ambulatory surgical procedures; the numerator used was the number of those procedures that resulted in at least one subsequent ambulatory surgery visit or inpatient stay for a CS-SSI within 14 or 30 days. The researchers used an algorithm based on diagnosis and procedure codes to identify postsurgical encounters for CS-SSIs. The CS-SSIs included infections proximally related to surgical procedure (eg, abscess, SSI, skin infection) and those specific to the type of surgery (ie, directly related SSIs specific to abdominal surgical procedures [eg, hernia, hysterectomy]). The researchers conducted a sensitivity analysis to determine the validity of the algorithm.

Instrument reliability and validity. No instrument was used in this study.

Response rate. No surveys or questionnaires were used in this study.

Tables and figures. The article included three tables and one figure that presented

- ambulatory surgical procedures meeting study criteria;
- characteristics of patients undergoing ambulatory surgical procedures in hospital-owned settings, 2010;
- rates of postoperative acute care visits for CS-SSIs and for all causes within 14 days versus 30 days; and
- distribution of postoperative acute care visits for CS-SSIs within 14 days versus 30 days of ambulatory surgery by hospital setting, 2010.

The content of the tables and figure was consistent with the article narrative and clearly summarized the findings.

Results. The results were presented clearly. The researchers found that, among patients in eight states, the rate of CS-SSIs was relatively low. The overall rate of postoperative acute care visits for CS-SSIs within 14 days after the selected ambulatory surgical procedures was 3.09 (95% confidence interval [CI], 2.89-3.30) per 1,000 ambulatory surgical procedures. Visit rates varied by type of surgery and ranged from 0.27 (95% CI, 0.09-0.65) per 1,000 laparoscopic repairs of inguinal or femoral hernia to 6.44 (95% CI, 5.25-7.82) per 1,000 vaginal hysterectomies.

The overall rate of postoperative acute care visits for CS-SSIs across all surgical procedures increased from 3.09 (95% CI, 2.89-3.30) to 4.84 (95% CI, 4.59-5.10) per 1,000 ambulatory surgical procedures when the time frame was extended to 30 days. The 30-day rates of postoperative visits for CS-SSIs also varied by type of surgery, ranging from a low of 0.75% (95% CI, 0.40-1.30) per 1,000 laparoscopic repairs of inguinal or femoral hernia to a high of 11.38% (95% CI, 9.81-13.12) per 1,000 open repairs of incisional or abdominal hernia. The overall rate of postoperative visits within 30 days for all causes including CS-SSIs was 33.62 (95% CI, 32.96-34.29) per 1,000 ambulatory surgical procedures.

Result-based conclusions. The researchers found that most of the CS-SSIs occurred within two weeks of an ambulatory surgical procedure and resulted in hospital readmission. These findings suggest that reporting rates at 14 and 30 days are relevant and that routine follow-up visits for these procedures should occur earlier (ie, within two weeks of the procedure) to help identify and treat SSIs early, as well as to help reduce overall rates of morbidity.

Study limitations. The researchers identified several limitations of the study. The selected HCUP data used, although geographically dispersed across eight states in the United States, may not have reflected rates of SSIs in other areas of the country. In addition, the data sets used captured only postoperative visits for CS-SSIs in hospital-owned settings (ambulatory surgery or inpatient) and excluded CS-SSIs subsequently managed in physician offices and emergency departments.

Quality of evidence. When using the AORN Research Evidence Appraisal Tool, this study was classified as B for quality of evidence.

APPRAISAL RESULTS

When using the AORN Research Evidence Appraisal Tool, this study was given a score of III B.

- The study was scored as III for level of evidence because it was a retrospective nonexperimental study with no manipulation of independent variables and no controls.
- The study was scored as B for quality of evidence. The researchers concluded that among patients in eight states undergoing ambulatory surgery, the rates of postoperative visits for CS-SSIs were low relative to all causes. However, the researchers noted that in aggregate, these CS-SSIs may represent a substantial number of adverse outcomes. Consequently, these serious infections merit quality improvement efforts to reduce their occurrence.

A score of III B indicates that it may be appropriate for perioperative nurses to consider this evidence as a secondary source of evidence when designing policies and procedures for the perioperative setting provided that it supports other primary sources of evidence. Studies of lesser strength or quality are not necessarily inferior or unacceptable sources of evidence, and a

lower rating does not necessarily mean the evidence is unimportant or irrelevant.

PERIOPERATIVE IMPLICATIONS

The result of this study revealed that the rates of CS-SSIs were relatively low among patients in eight states. However, the researchers noted that given how common ambulatory surgery is, the absolute number of patients with these complications is substantial. Additionally, because the results of previous studies have shown significant lapses in infection control practices at ASCs, quality improvement efforts are warranted. Consequently, perioperative nurses and managers in ambulatory surgical settings should be prepared to develop and implement quality improvement initiatives to address SSI prevention after ambulatory surgery. ●

This article was appraised by George Allen, PhD, MS, BSN, RN, CNOR, CIC, director of infection control, Downstate Medical Center, and clinical assistant professor, SUNY College of Health Related Professions, Brooklyn, NY. *Dr Allen has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article.*