

Measure Title	RISK-ADJUSTED COMPLICATION LIKELIHOOD FOR SURGERIES		
Disease State	Appendectomy Cholecystectomy	Indicator Category¹	Outcome
Strength of Recommendation²		Quality of Evidence³	
Physician Specialties	General Surgery		
Clinical Rationale	<p>Disease Burden</p> <ul style="list-style-type: none"> • Appendicitis is a very common condition, with an incidence of over 40,000 cases per year, [1] and is most often treated by appendectomy.[2] • In 1997, over 5% of appendectomy procedures resulted in post-operative complications, including infection.[3] • Similarly, cholecystectomy has an annual rate of 260.8 per 100,000 population.[4, 5] • Complications related to cholecystectomy procedures occur in about 3-6% of cases.[6] <p>Reason for Indicated Intervention or Treatment</p> <ul style="list-style-type: none"> • Cohort studies have shown that appendectomy is an effective treatment for appendicitis.[7] Likewise, for gallstones and other digestive disease, cholecystectomy is an effective treatment.[8] • Open and closed appendectomy and cholecystectomy have shown to be safe procedures.[9, 10] Most often, complications are usually limited to elderly patients with comorbid conditions or are attributable to physician error or oversight.[11] <p>Evidence Supporting Intervention or Treatment</p> <ul style="list-style-type: none"> • Studies have shown that there are substantial costs associated with post-operative complication management, which can oftentimes be avoided. [12, 13] Surgical outcomes have also been shown to vary substantially by provider.[14, 15] • Risk-adjustment methodologies have been used in several studies utilizing outcomes data to accurately reflect quality of care.[16] • The National Surgical Quality Improvement Program (NSQIP) also recommends the use of risk-adjusted outcomes to identify aspects of surgical care that are in need of improvement.[17] <p>Clinical Recommendation</p> <ul style="list-style-type: none"> • NSQIP was created by the Department of Veteran Affairs as a result of the poor surgical care they were providing at the VA hospitals. Since the introduction of NSQIP, several VA hospitals have reduced complication significantly reduced surgical complication rates.[18] • NSQIP and other surgical improvement programs have developed valid risk adjustment methodologies that permits the use of outcomes data to assess quality.[15, 16, 19, 20] • Medical centers that perform surgery need to implement these risk-adjustment and measurement techniques in order to point out areas in which quality improvement efforts such as NSQIP can be deployed to improve the quality of surgical care. [13, 15, 18, 21, 22] 		

Methodology**Step 1: Identifying surgery procedures (appendectomy and cholecystectomy)**

Continuously enrolled members aged 18 and over by the end of the enrollment period who underwent either an appendectomy or cholecystectomy procedure.

Step 2: Flagging comorbidities and complication

Primary and secondary diagnosis codes were listed for each surgery procedure. Health Benchmarks' team of physicians, which includes a practicing surgeon, distinguished between diagnoses that represented complications and those that represented comorbidities. Clinical experts also identified those comorbidities that could be considered especially severe (severe disease characteristics). The resulting procedure-specific listings of complications, comorbidities, and severe disease characteristics were incorporated in the patient case mix adjustments.

Interpretation of Score

High score implies better performance.

Physician Attribution

Score only the physicians who performed the index surgery.

References

1. Addiss, D.G., et al., *The epidemiology of appendicitis and appendectomy in the United States*. Am J Epidemiol, 1990. **132**(5): p. 910-25.
2. Nowzaradan, Y., et al., *Laparoscopic appendectomy: treatment of choice for suspected appendicitis*. Surg Laparosc Endosc, 1993. **3**(5): p. 411-6.
3. Davies, G.M., E.J. Dasbach, and S. Teutsch, *The burden of appendicitis-related hospitalizations in the United States in 1997*. Surg Infect (Larchmt), 2004. **5**(2): p. 160-5.
4. Berci, G., *Complications of laparoscopic cholecystectomy*. Surg Endosc, 1998. **12**(4): p. 291-3.
5. Urbach, D.R. and T.A. Stukel, *Rate of elective cholecystectomy and the incidence of severe gallstone disease*. Cmaj, 2005. **172**(8): p. 1015-9.
6. Thompson, M.H. and J.R. Benger, *Cholecystectomy, conversion and complications*. HPB Surg, 2000. **11**(6): p. 373-8.
7. Kelley, J.E., et al., *Safety, efficacy, cost, and morbidity of laparoscopic versus open cholecystectomy: a prospective analysis of 228 consecutive patients*. Am Surg, 1993. **59**(1): p. 23-7.
8. Mancini, G.J., M.L. Mancini, and H.S. Nelson, Jr., *Efficacy of laparoscopic appendectomy in appendicitis with peritonitis*. Am Surg, 2005. **71**(1): p. 1-4; discussion 4-5.
9. Paganini, A.M., et al., *Laparoscopic cholecystectomy and common bile duct exploration are safe for older patients*. Surg Endosc, 2002. **16**(9): p. 1302-8.
10. Oka, T., et al., *Open and laparoscopic appendectomy are equally safe and acceptable in children*. Surg Endosc, 2004. **18**(2): p. 242-5.
11. Deziel, D.J., *Complications of cholecystectomy. Incidence, clinical manifestations, and diagnosis*. Surg Clin North Am, 1994. **74**(4): p. 809-23.
12. Dimick, J.B., et al., *Hospital costs associated with surgical complications: a report from the private-sector National Surgical Quality Improvement Program*. J Am Coll Surg, 2004. **199**(4): p. 531-7.
13. Dimick, J.B., et al., *Complications and costs after high-risk surgery: where should we focus quality improvement initiatives?* J Am Coll Surg, 2003. **196**(5): p. 671-8.
14. O'Connor, G.T., et al., *A regional prospective study of in-hospital mortality associated with coronary artery bypass grafting. The Northern New England Cardiovascular Disease Study Group*. Jama, 1991. **266**(6): p. 803-9.

15. Daley, J., et al., *Risk adjustment of the postoperative morbidity rate for the comparative assessment of the quality of surgical care: results of the National Veterans Affairs Surgical Risk Study*. J Am Coll Surg, 1997. **185**(4): p. 328-40.
16. Khuri, S.F., et al., *Risk adjustment of the postoperative mortality rate for the comparative assessment of the quality of surgical care: results of the National Veterans Affairs Surgical Risk Study*. J Am Coll Surg, 1997. **185**(4): p. 315-27.
17. Birkmeyer, J.D., J.B. Dimick, and N.J. Birkmeyer, *Measuring the quality of surgical care: structure, process, or outcomes?* J Am Coll Surg, 2004. **198**(4): p. 626-32.
18. Khuri, S.F., J. Daley, and W.G. Henderson, *The comparative assessment and improvement of quality of surgical care in the Department of Veterans Affairs*. Arch Surg, 2002. **137**(1): p. 20-7.
19. Daley, J., et al., *Validating risk-adjusted surgical outcomes: site visit assessment of process and structure. National VA Surgical Risk Study*. J Am Coll Surg, 1997. **185**(4): p. 341-51.
20. Heijmans, J.H., J.G. Maessen, and P.M. Roekaerts, *Risk stratification for adverse outcome in cardiac surgery*. Eur J Anaesthesiol, 2003. **20**(7): p. 515-27.
21. Fink, A.S., et al., *The National Surgical Quality Improvement Program in non-veterans administration hospitals: initial demonstration of feasibility*. Ann Surg, 2002. **236**(3): p. 344-53; discussion 353-4.
22. Kalish, R.L., et al., *Costs of potential complications of care for major surgery patients*. Am J Med Qual, 1995. **10**(1): p. 48-54.

¹ **Indicator Category** (Adapted from Health Plan Employer Data Information Set (HEDIS®) technical specifications and U.S. Preventive Services Task Force (USPSTF) Methodology)

Effectiveness

Primary Prevention Measures: Those that are applicable to individuals who are asymptomatic and are designed to prevent the onset of the targeted condition (e.g. immunizations);

Secondary Prevention Measures: Those that are applicable to asymptomatic patients who have risk factors or pre-clinical disease but in whom the condition has not become clinically apparent (e.g. pap smears, screening for elevated blood pressure);

Tertiary Prevention Measures: Those that are applicable to individuals who are diagnosed with a condition and are part of the treatment or management of patients with that condition (e.g. cholesterol reduction in patients with diabetes).

² **Strength of Recommendation** (Based on U.S. Preventive Services Task Force (USPSTF), 3rd Edition Criteria)

- A** It is strongly recommended that clinicians provide the service to eligible patients. *There is good evidence that the service improves important health outcomes and that benefits substantially outweigh harms.*
- B** It is recommended that clinicians provide the service to eligible patients. *There is at least fair evidence that the service improves important health outcomes and that benefits outweigh harms.*
- C** There is no recommendation for or against the routine provision of this service. *There is fair evidence that the service can improve health outcomes but the balance of benefits and harms is too close to justify a general recommendation.*
- D** It is recommended that clinicians DO NOT routinely provide the service to eligible patients. *There is at least fair evidence that the service is ineffective or that harms outweigh benefits.*
- I** The evidence is insufficient to recommend for or against routinely providing the service. *Evidence that the service is effective is lacking, or poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

³ **Quality of Evidence** (Based on U.S. Preventive Services Task Force (USPSTF), 3rd Edition Criteria)

- Good:** Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes.
- Fair:** Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of individual studies, generalizability to routine practice, or indirect nature of the evidence on health outcomes.
- Poor:** Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

Quality of Evidence (Based on U.S. Preventive Services Task Force (USPSTF), 3rd Edition Criteria)

- I:** Evidence obtained from at least one properly randomized controlled trial.
- II-1:** Evidence obtained from well-designed controlled trials without randomization.
- II-2:** Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- II-3:** Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- III:** Opinions of respected authorities, based on clinical experience descriptive studies and case reports or reports of expert committees.