

Preoperative Consultation: A Rapid Review

A Lambrinos

March 2014

Evidence Development and Standards Branch at Health Quality Ontario

Suggested Citation

This report should be cited as follows:

Lambrinos, A. Preoperative consultations: a rapid review. Toronto: Health Quality Ontario; 2014 March. 19 p.
Available from: <http://www.hqontario.ca/evidence/evidence-process/appropriateness-initiative#preop-consult>.

Permission Requests

All inquiries regarding permission to reproduce any content in Health Quality Ontario reports should be directed to EvidenceInfo@hqontario.ca.

How to Obtain Rapid Reviews From Health Quality Ontario

All rapid reviews are freely available in PDF format at the following URL:
<http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/rapid-reviews>.

Conflict of Interest Statement

All reports prepared by the Evidence Development and Standards branch at Health Quality Ontario are impartial. There are no competing interests or conflicts of interest to declare.

Rapid Review Methodology

Rapid reviews are completed in 2–4-week time frames. Clinical questions are developed by the Evidence Development and Standards branch at Health Quality Ontario, in consultation with experts, end users, and/or applicants in the topic area. A systematic literature search is then conducted to identify relevant systematic reviews, health technology assessments, and meta-analyses. The methods prioritize systematic reviews, which, if found, are rated by AMSTAR to determine the methodological quality of the review. If the systematic review has evaluated the included primary studies using the GRADE Working Group criteria (<http://www.gradeworkinggroup.org/index.htm>), the results are reported and the rapid review process is complete. If the systematic review has not evaluated the primary studies using GRADE, the primary studies in the systematic review are retrieved and the GRADE criteria are applied to 2 outcomes. If no systematic review is found, then RCTs or observational studies are included, and their risk of bias is assessed. All rapid reviews are developed and finalized in consultation with experts.

About Health Quality Ontario

Health Quality Ontario is an arms-length agency of the Ontario government. It is a partner and leader in transforming Ontario's health care system so that it can deliver a better experience of care, better outcomes for Ontarians, and better value for money.

Health Quality Ontario strives to promote health care that is supported by the best available scientific evidence. The Evidence Development and Standards branch works with expert advisory panels, clinical experts, scientific collaborators, and field evaluation partners to conduct evidence-based reviews that evaluate the effectiveness and cost-effectiveness of health interventions in Ontario.

Based on the evidence provided by Evidence Development and Standards and its partners, the Ontario Health Technology Advisory Committee—a standing advisory subcommittee of the Health Quality Ontario Board—makes recommendations about the uptake, diffusion, distribution, or removal of health interventions to Ontario's Ministry of Health and Long-Term Care, clinicians, health system leaders, and policy-makers.

Health Quality Ontario's research is published as part of the *Ontario Health Technology Assessment Series*, which is indexed in MEDLINE/PubMed, Excerpta Medica/Embase, and the Centre for Reviews and Dissemination database. Corresponding Ontario Health Technology Advisory Committee recommendations and other associated reports are also published on the Health Quality Ontario website. Visit <http://www.hqontario.ca> for more information.

About Health Quality Ontario Publications

To conduct its rapid reviews, Evidence Development and Standards and its research partners review the available scientific literature, making every effort to consider all relevant national and international research; collaborate with partners across relevant government branches; consult with expert advisory panels, clinical and other external experts, and developers of health technologies; and solicit any necessary supplemental information.

In addition, Evidence Development and Standards collects and analyzes information about how a health intervention fits within current practice and existing treatment alternatives. Details about the diffusion of the intervention into current health care practices in Ontario add an important dimension to the review. Information concerning the health benefits, economic and human resources, and ethical, regulatory, social, and legal issues relating to the intervention may be included to assist in making timely and relevant decisions to optimize patient outcomes.

Disclaimer

This rapid review is the work of the Evidence Development and Standards branch at Health Quality Ontario, and is developed from analysis, interpretation, and comparison of published scientific research. It also incorporates, when available, Ontario data and information provided by experts. As this is a rapid review, it may not reflect all the available scientific research and is not intended as an exhaustive analysis. Health Quality Ontario assumes no responsibility for omissions or incomplete analysis resulting from its rapid reviews. In addition, it is possible that other relevant scientific findings may have been reported since completion of the review. This report is current as of the date of the literature search specified in the Research Methods section. Health Quality Ontario makes no representation that the literature search captured every publication that was or could be applicable to the subject matter of the report. This rapid review may be superseded by an updated publication on the same topic. Please check the Health Quality Ontario website for a list of all publications: <http://www.hqontario.ca/evidence/publications-and-ohrac-recommendations>.

Table of Contents

List of Abbreviations	5
Background	6
Objective of Analysis	6
Clinical Need and Target Population.....	6
Technology/Technique	7
Rapid Review.....	8
Research Question	8
Research Methods.....	8
Expert Panel.....	8
Quality of Evidence	9
Results of Rapid Review	9
Conclusions.....	12
Acknowledgements	13
Appendices.....	15
Appendix 1: Literature Search Strategies	15
Appendix 2: Evidence Quality Assessment	16
References.....	18

List of Abbreviations

CI	Confidence Interval(s)
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
LOS	Length of Stay
RR	Relative Risk

Background

Overuse, underuse, and misuse of interventions are important concerns in health care and lead to individuals receiving unnecessary or inappropriate care. In April 2012, under the guidance of the Ontario Health Technology Advisory Committee's Appropriateness Working Group, Health Quality Ontario (HQO) launched its Appropriateness Initiative. The objective of this initiative is to develop a systematic framework for the ongoing identification, prioritization, and assessment of health interventions in Ontario for which there is possible misuse, overuse, or underuse.

For more information on HQO's Appropriateness Initiative, visit our website at www.hqontario.ca.

Objective of Analysis

The objective of this rapid review was to determine the clinical utility of preoperative consultations by internal medicine specialists or anesthesiologists prior to intermediate risk, noncardiac, elective surgery.

Clinical Need and Target Population

Description of Disease/Condition

The goal of preoperative consultations is to better document comorbid disease, selectively order investigations, optimize pre-existing medical conditions, discuss perioperative care, and defer or cancel surgery, if necessary. (1)

Those patients who do receive consultations are more likely to be older (2;3) and have more comorbid conditions such as coronary artery disease, hypertension, diabetes mellitus, atrial fibrillation, vascular disease, renal failure, congestive heart failure, or chronic obstructive pulmonary disease. (1-3)

There has been consistent evidence that preoperative consultations for low-risk and high-risk non-cardiac surgical procedures lead to a decrease in last minute cancellations, delays of surgery (4;5), and hospital length of stay (LOS) (4;6), although data are not as plentiful.

The American College of Cardiology/American Heart Association (ACC/AHA) created a classification of noncardiac surgical procedures for the purpose of risk stratification; these are shown in Table 1. (7)

Table 1: Cardiac Risk* Stratification for Noncardiac Surgical Procedures

Risk Stratification	Procedure Examples
Vascular (reported cardiac risk often > 5%)	Aortic and other major vascular surgery Peripheral vascular surgery
Intermediate (reported cardiac risk generally 1% to 5%)	Intraperitoneal and intrathoracic surgery Carotid endarterectomy Head and neck surgery Orthopedic surgery Prostate surgery
Low (reported cardiac risk generally < 1%)	Endoscopic procedures Superficial procedure Cataract surgery Breast surgery Ambulatory surgery

*Risk of myocardial infarction and cardiac death within 30 days after surgery.

Source: Fleisher LA, Beckman JA, Brown KA, Calkins H, Chaikof E, Fleischmann KE, et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *Circulation*. 2007;116:e418–99.

Intermediate risk procedures cover a wide variety of surgical procedures and carry a 1% to 5% risk of adverse cardiac events. These types of surgeries are the focus of this rapid review.

Ontario Context

Anesthesia consultation rates have increased in Ontario from 19% in 1994 to 53% in 2003. (1) However, rates for medical consultations have remained relatively stable. (3) Within the fiscal year of 2011, there were approximately 43,000 preoperative consultations by anesthesiologists in an assessment clinic setting and 20,000 preoperative consultations by internal medicine specialists. (Data provided by ICES on September 20, 2013)

Technology/Technique

We looked at preoperative consultations that are occurring at in-hospital assessment clinics and are done at least two days prior to surgery to optimize the medical fitness of the patient.

Rapid Review

Research Question

What is the clinical utility of preoperative consultations by internal medicine specialists or anesthesiologists that occur at in-hospital preoperative assessment clinics?

Research Methods

Literature Search

Search Strategy

A literature search was performed on August 14, 2013, using Ovid MEDLINE, MEDLINE In-Process, and Other Non-Indexed Citations, EMBASE; all EBM databases, for studies published from January 1, 2003, to August 14, 2013. (Appendix 1 provides details of the search strategies.) Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

Inclusion Criteria

- English-language full-text publications
- published between January 1, 2003, and August 14, 2013
- systematic reviews, meta-analyses, health technology assessments, randomized control trials, and observational studies
- Adult patients scheduled to undergo intermediate-risk noncardiac elective surgery

Exclusion Criteria

- Case reports, editorials, letters, comments, and conference abstracts
- Patients who underwent emergency surgery
- Studies that compare preoperative consultations led by different specialties
- Studies where results on outcomes of interest could not be abstracted

Outcomes of Interest

- Postoperative Length of Stay
- Mortality

Expert Panel

In August, 2013, an Expert Advisory Panel on Appropriate Use of Preoperative Assessments was struck. Members of the panel included physicians and personnel from the Ministry of Health and Long-Term Care.

The role of the Expert Advisory Panel on Appropriate Use of Preoperative Assessments was to contextualize the evidence produced by Health Quality Ontario and provide advice on the appropriate use of preoperative consultations in the Ontario health care setting. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of Expert Advisory Panel members.

Quality of Evidence

The quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria. (8) The overall quality was determined to be high, moderate, low, or very low using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that randomized controlled trials (RCTs) are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that may raise the quality of evidence were considered: large magnitude of effect, dose response gradient, and accounting for all residual confounding factors. (8) For more detailed information, please refer to the latest series of GRADE articles. (8)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	High confidence in the effect estimate—the true effect lies close to the estimate of the effect
Moderate	Moderate confidence in the effect estimate—the true effect is likely to be close to the estimate of the effect, but may be substantially different
Low	Low confidence in the effect estimate—the true effect may be substantially different from the estimate of the effect
Very Low	Very low confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of effect

Results of Rapid Review

The database search yielded 1,136 citations published between January 1, 2003, and August 14, 2013, (with duplicates removed). Articles were excluded based on information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

Three observational studies met the inclusion criteria. (1;9;10)

A summary of study characteristics and results of the three observational studies are shown in Table 2.

Chan et al (9) performed a retrospective study to assess the impact of preoperative anesthesia consultations on LOS in patients (N = 620) undergoing elective surgery. Of the 620 patients, 109 had intermediate risk surgery. For patients who underwent an intermediate risk surgery, the mean (standard

deviation) postoperative LOS was 4.5 (\pm 9.3) days for those who did not receive preoperative consultation versus 1.3 (\pm 0.5) days for patients who received preoperative consultations ($P = 0.001$).

Limitations to this observational study include:

- the authors did not list the guidelines they used to define ‘intermediate risk surgery’
- there was no inclusion or exclusion criteria
- there was a very small sample size (109 patients undergoing intermediate risk surgery, 8 of whom had a preoperative anesthesia consultation)
- there was no information on the baseline characteristics of the sample
- the authors do not list the controlled variables or whether they controlled for confounders in the analysis
- there was no follow-up as this was a retrospective study

Wijeysundera et al (1) performed a population cohort study to assess whether preoperative anesthesia consultation was associated with reduced hospital length of stay and mortality 30 days and 1 year after intermediate and high risk noncardiac surgery. After matching consultation patients to no-consultation patients ($n = 90,127$ for each arm), postoperative LOS was found to be shorter in patients who received consultations versus those patients who did not receive consultation (difference, -0.12 days; 95% confidence interval [CI], -0.04 to -0.12 ; $P = 0.003$). However, anesthesia consultation was not associated with reduced mortality at 30-days (relative risk [RR], 1.04; 95% CI, 0.96-1.13; $P = 0.36$) or 1-year (RR, 0.98; 95% CI, 0.95-1.02; $P = 0.20$) after surgery.

Wijeysundera et al (10) used the same cohort described above to assess whether preoperative medical consultation was associated with reduced hospital length of stay and mortality 30 days and 1 year after intermediate and high risk noncardiac surgery. Within this matched cohort ($n = 95,926$ for each arm), consultations were associated with an increased mean hospital LOS compared to patients who had no consultation (difference 0.67 days; 95% CI, 0.59 - 0.76; $P < 0.001$). Consultation was also associated with increased 30-day (RR, 1.16; 95% CI, 1.07-1.25; $P < 0.001$) and 1-year (RR, 1.08; 95% CI, 1.04-1.12; $P < 0.001$) mortality after surgery.

Limitations to these observational studies include:

- the studies were overpowered
- the authors did not stratify intermediate and high risk surgery when examining the relationships between consultations and outcomes of interest
- mean hospital LOS was not categorized into preoperative and postoperative LOS
- the underlying mechanisms for how consultation did or did not influence mortality or LOS is unknown
- the cohorts did not capture patients whose planned noncardiac surgery was canceled based on the conclusions of a preoperative consultation

Table 2: Summary of Observational Studies Examining Clinical Utility of Preoperative Consultations

Author, Year	Objective	Outcomes	Population	General Results
Chan et al, 2011 (9)	To assess the use of a preoperative assessment clinic and its impact on hospital LOS and discharge destinations.	Postoperative LOS	Patients undergoing elective noncardiac surgery.	N = 640 patients were included; 109/640 (17%) had intermediate risk surgery (8 POAC/101 no-POAC). Postoperative LOS for patients who had a consultation was reduced compared to patients who had no consultation (difference, -3.20 days; $P = 0.001$).
Wijeyesundera et al, 2009 (1)	To assess whether preoperative anesthesia consultation is associated with reduced hospital LOS and mortality (30 day and 1 year) rates.	Postoperative LOS and Mortality	Patients undergoing elective intermediate to high risk noncardiac surgery.	Within the matched cohort, n = 180,254 patients were included. Consultation was associated with reduced postoperative LOS (difference, -0.12 days; $P = 0.003$). Consultation was not associated with reduced mortality at 30 days (RR, 1.04; $P = 0.36$) or 1 year (RR 0.98; $P = 0.20$). ^a
Wijeyesundera et al, 2010 (10)	To assess whether preoperative medical consultation is associated with reduced hospital LOS and mortality (30 day and 1 year) rates.	LOS and Mortality	Patients undergoing elective intermediate to high risk noncardiac surgery.	Within the matched cohort, n = 191,852 patients were included. Consultation was associated with increased mean hospital LOS (difference, 0.67 days; $P < 0.001$). Consultation was associated with increased mortality at 30 days (RR, 1.16; $P < 0.001$) and 1 year (RR, 1.08; $P < 0.001$). ^b

Abbreviation: POAC, Preoperative Assessment Clinic.

^aMatched by age, sex, year, surgical procedure, hospital type, comorbid disease, other specialist consultations, intraoperative invasive monitoring, and income.

^bMatched by age, sex, year, surgical procedure, income quintile, hospital type, comorbid disease, anesthesia consultation, intraoperative invasive monitoring.

Conclusions

Based on low quality of evidence, there was mixed results for both outcomes of interest:

- Two observational studies found that patients who had preoperative anesthesia consultations had a reduced postoperative LOS compared to patients who had no preoperative consultation. However, one observational study found that patients who had preoperative medical consultations had an increased hospital LOS compared to those who did not have medical consultations.
- One observational study found that preoperative anesthesia consultation was not associated with reduced mortality rates (30 days and 1 year). However, one observational study found that preoperative medical consultation was associated with increased mortality rates (30 days and 1 year).

Expert Opinion

On September 19, 2013, the expert panel came to the consensus that there was a need for more data on the subject of preoperative consultations. The expert panel believed that the weakness of the existing data preclude them from making firm conclusions regarding the benefit, or lack thereof, from preoperative consultations. They stated that there were limitations to the datasets used (i.e., administrative datasets) and that they do not speak to key factors needed for addressing the clinical utility of preoperative consultations for intermediate noncardiac elective surgery. The reason why a consultation takes place, the “processes of care” that are involved in a consultation, and who can benefit from a consultation have not been addressed in the current literature. The expert panel recommended that the first step towards addressing the limitations of the data be to complete a field evaluation.

The purpose of a field evaluation:

- (1) To assess differences in hospital structures and processes that may explain variations in consultation rates, such as presence or absence of a preoperative clinic facility.
- (2) To evaluate potential screening questionnaires to better standardize the criteria determining which patients are referred for preoperative consultation.
- (3) To evaluate standardized approaches for conducting preoperative consultations; namely, the assessment of a minimum core set of elements within all preoperative consultations.

Acknowledgements

Editorial Staff

Timothy Maguire

Medical Information Services

Corinne Holubowich, BEd, MLIS

Kellee Kaulback, BA(H), MSt

Expert Advisory Panel on Appropriate Use of Routine Preoperative Assessment Procedures in Patients Undergoing Elective Surgeries

Panel Member	Affiliation(s)	Appointment(s)
Panel Chair		
Dr Duminda Wijeyesundara	Li Ka Shing Knowledge Institute of	Research Scientist
	St. Michael's Hospital	
	University of Toronto	Assistant Professor
	Toronto General Hospital	Anesthesiologist
	Institute of Clinical Evaluative Sciences	Adjunct Scientist
Anesthesiology		
Dr Davy Cheng	University of Western Ontario, Schulich School of Medicine	Professor and Chair, Department of Anesthesia & Perioperative Medicine
	London Health Sciences Centre St Joseph's Health Care London	Chief, Department of Anesthesia and Perioperative Medicine
Dr Gregory Bryson	The Ottawa Hospital	Director of Research
	University of Ottawa	Associate Professor
Dr William Scott Beattie	Toronto General Hospital	Deputy Anesthesiologist-in-Chief, Director of Clinical Research
	University of Toronto	Professor
Internal Medicine		
Dr Christine Soong	Mount Sinai Hospital	Director, Hospital Medicine Program
	University of Toronto	Assistant Professor
Dr Mirek Otremba	Mount Sinai Hospital	
	University Health Network	Director, Medical Consultation Service
	University of Toronto	
Dr Marko Mrkobrada	University of Western Ontario	Assistant Professor

Panel Member	Affiliation(s)	Appointment(s)
General Surgery		
Dr Ralph George	University of Toronto St. Michael's Hospital	Associate Professor Medical Director, CIBC breast Centre
Dr Dennis Hong	McMaster University	Assistant Professor
Ophthalmology		
Dr William Hodge	University of Western Ontario St. Joseph's Hospital	Professor Ophthalmologist-in-Chief
Cardiology		
Dr Sacha Bhatia	Women's College Hospital	Director, Institute for Health System Solutions and Virtual Care
Dr Robert Iwanochko	University Health Network	Director Nuclear Cardiology and Ambulatory Care
Health Administration		
Anne Marie Mcilmoyl	St. Joseph's Healthcare Centre	Director, Perioperative Services
Rhona McGlasson	North Simcoe Muskoka LHIN	Surgical Coordinator

Appendices

Appendix 1: Literature Search Strategies

Search date: August 14, 2013

Databases searched: Ovid MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE; All EBM Databases (see below)

Question: What is the clinical utility of preoperative consultations by 1) internal medicine specialists or 2) anesthesiologists that occur at in-hospital preoperative assessment clinics?

Limits: 2003-current; English

Filters: Removal of case reports, editorials, letters, comments and conference abstracts

Database: EBM Reviews - Cochrane Database of Systematic Reviews <2005 to July 2013>, EBM Reviews - ACP Journal Club <1991 to July 2013>, EBM Reviews - Database of Abstracts of Reviews of Effects <3rd Quarter 2013>, EBM Reviews - Cochrane Central Register of Controlled Trials <July 2013>, EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012>, EBM Reviews - Health Technology Assessment <3rd Quarter 2013>, EBM Reviews - NHS Economic Evaluation Database <3rd Quarter 2013>, Embase <1980 to 2013 Week 32>, Ovid MEDLINE(R) <1946 to July Week 5 2013>, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <August 13, 2013>

Search Strategy:

1 exp Preoperative Period/ (191714)
2 exp Preoperative Care/ (97277)
3 (pre?operat* or pre?an?esthe* or pre?surg*).ti,ab. (437306)
4 or/1-3 (587528)
5 "Referral and Consultation"/ use mesz,acp,cctr,coch,clcmr,dare,clhta,cleed (52333)
6 exp consultation/ use emez (56435)
7 ((Consult* or assessment* or evaluat* or work?up*) adj2 (physician* or specialist* or doctor* or surgeon* or an?esthesi* or an?esthetist* or internal medicine or hospitalist*)).ti,ab. (37394)
8 or/5-7 (141846)
9 4 and 8 (3820)
10 limit 9 to english language [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained] (3305)
11 limit 10 to yr="2003 -Current" [Limit not valid in DARE; records were retained] (2328)
12 Case Reports/ or Comment.pt. or Editorial.pt. or Letter.pt. or Congresses.pt. (4119650)
13 Case Report/ or Comment/ or Editorial/ or Letter/ or conference abstract.pt. (6907048)
14 or/12-13 (6985863)
15 11 not 14 (1585)
16 remove duplicates from 15 (1148)

Appendix 2: Evidence Quality Assessment

Table A1: GRADE Evidence Profile for Comparison of Clinical Utility of Preoperative Consultations

Number of Studies (Design)	Risk of Bias ^a	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
Anesthesia Consultation							
Postoperative LOS							
2 observational studies	No serious limitations	No serious limitations	No serious limitations ^b	No serious limitations	Undetected	-	⊕⊕ Low
30-Day Mortality							
1 observational study	No serious limitations	No serious limitations	No serious limitations	No serious limitations	Undetected	-	⊕⊕ Low
1-Year Mortality							
1 observational study	No serious limitations	No serious limitations	No serious limitations	No serious limitations	Undetected	-	⊕⊕ Low
Medical Consultation							
Postoperative LOS							
1 observational study	No serious limitations	No serious limitations	No serious limitations	No serious limitations	Undetected	-	⊕⊕ Low
30-Day Mortality							
1 observational study	No serious limitations	No serious limitations	No serious limitations	No serious limitations	Undetected	-	⊕⊕ Low
1-Year Mortality							
1 observational study	No serious limitations	No serious limitations	No serious limitations	No serious limitations	Undetected	-	⊕⊕ Low

^a Details on risk of bias are available in Table A2.

^b Chan et al (9) was a pilot study from Hong Kong in the public health care sector.

Table A2: Risk of Bias Among Observational Studies for Comparison of Preoperative Consultations Versus No Preoperative Consultations

Author, Year	Appropriate Eligibility Criteria	Appropriate Measurement of Exposure	Appropriate Measurement of Outcome	Adequate Control for Confounding	Complete Follow-Up
Chan et al, 2011 (9)	Limitations ^a	No limitations	No limitations	Limitations ^b	Limitations ^c
Wijeyesundera et al, 2009 (1)	No limitations	No limitations	No limitations	No limitations ^d	No limitations
Wijeyesundera et al, 2010 (10)	No limitations	No limitations	No limitations	No limitations ^e	No limitations

^aThe authors did not specifically state inclusion or exclusion criteria, all patients who had elective surgeries were included.

^bThe authors do not address which confounders were controlled in analysis or whether they controlled for confounders in final analysis.

^cThere was no follow-up as this was a retrospective case series (April to June, 2008).

^dSensitivity analysis was conducted.

^eSensitivity analysis was conducted.

References

- (1) Wijeyesundera DN, Austin PC, Beattie WS, Hux JE, Laupacis A. A population-based study of anesthesia consultation before major noncardiac surgery. *Arch Intern Med.* 2009;169(6):595-602.
- (2) Auerbach AD, Rasic MA, Sehgal N, Ide B, Stone B, Maselli J. Opportunity missed: medical consultation, resource use, and quality of care of patients undergoing major surgery. *Arch Intern Med.* 2007;167(21):2338-44.
- (3) Wijeyesundera DN, Austin PC, Beattie WS, Hux JE, Laupacis A. Variation in the practice of preoperative medical consultation for major elective noncardiac surgery: A population-based study. *Anesthesiology.* 2012;116(1):25-34.
- (4) Ferschi MB, Tung A, Sweitzer B, Huo D, Glick DB. Preoperative clinic visits reduce operating room cancellations and delays. *Anesthesiology.* 2005;103(4):855-9.
- (5) van Klei WA, Moons KG, Rutten CL, Schuurhuis A, Knape JT, Kalkman CJ, et al. The effect of outpatient preoperative evaluation of hospital inpatients on cancellation of surgery and length of hospital stay. *Anesth Analg.* 2002 Mar;94(3):644-9. Available from: PM:11867390.
- (6) Pollard JB, Garnerin P, Dalman RL. Use of outpatient preoperative evaluation to decrease length of stay for vascular surgery. *Anesth Analg.* 1997 Dec;85(6):1307-11. Available from: PM:9390599.
- (7) Fleisher LA, Beckman JA, Brown KA, Calkins H, Chaikof EL, Fleischmann KE, et al. ACC/AHA 2007 guidelines on the perioperative cardiovascular evaluation and care for noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *Circulation.* 2007;116(17):e418-99.
- (8) Guyatt GH, Oxman AD, Schunemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. *J Clin Epidemiol.* 2011;64(4):380-2.
- (9) Chan FW, Wong F, Cheung YS, Chui PT, Lai PB. Utility of a preoperative assessment clinic in a tertiary care hospital. *Hong Kong Med J.* 2011 Dec;17(6):441-5. Available from: PM:22147312.
- (10) Wijeyesundera DN, Austin PC, Beattie WS, Hux JE, Laupacis A. Outcomes and processes of care related to preoperative medical consultation. *Arch Intern Med.* 2010;170(15):1365-74.

Health Quality Ontario
130 Bloor Street West, 10th Floor
Toronto, Ontario
M5S 1N5
Tel: 416-323-6868
Toll Free: 1-866-623-6868
Fax: 416-323-9261
Email: EvidenceInfo@hqontario.ca
www.hqontario.ca

© Queen's Printer for Ontario, 2014