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Economic evaluations of comprehensive geriatric assessment in surgical patients: a systematic review

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ABSTRACT

Background: Seniors presenting with surgical disease face increased risk of postoperative morbidity and mortality and have increased treatment costs. Comprehensive Geriatric Assessment (CGA) is proposed to reduce morbidity, mortality, and the cost after surgery.

Methods: A systematic review of CGA in emergency surgical patients was conducted. The primary outcome was cost-effectiveness; secondary outcomes were length of stay, return of function, and mortality. Inclusion and exclusion criteria were predefined. Systematic searches of MEDLINE, Embase, Cochrane, and National Health Service Economic Evaluation Database were performed. Text screening, bias assessment, and data extraction were performed by two authors.

Results: There were 560 articles identified; abstract review excluded 499 articles and full-text review excluded 53 articles. Eight studies were included; one nonorthopedic trauma and seven orthopedic trauma studies. Bias assessment revealed moderate to high risk of bias for all studies. Economic evaluation assessment identified two high-quality studies and six moderate or low quality studies. Pooled analysis from four studies assessed loss of function; loss of function decreased in the experimental arm (odds ratio 0.92, 95% confidence interval [CI]: 0.88-0.97). Pooled results for length of stay from five studies found a significant decrease (mean difference: −1.17, 95% CI: −1.63 to −0.71) after excluding the nonorthopedic trauma study. Pooled mortality was significantly decreased in seven studies (risk ratio: 0.78, 95% CI: 0.67-0.90). All studies decreased cost and improved health outcomes in a cost-effective manner.

Conclusions: CGA improved return of function and mortality with reduced cost or improved utility. Our review suggests that CGA is economically dominant and the most cost-effective care model for orthogeriatric patients. Further research should examine other surgical fields.

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Introduction

In the developed world, improved medical technology, support, and experience have allowed greater numbers of elderly patients to become surgical candidates.[1,2] Elderly patients are commonly defined as those who are aged 65 years and older[3,4] although some western countries define it as age 60 years and older.[5] Currently, 15.7% of Canadians are over the age of 65 years [6] and by 2050, 22% of all North Americans will be over 65 years.[7]

Indications for surgery in those over 65 years have been expanding as surgical technique and technology have improved; however, seniors presenting with surgical disease continue to face increased risk of postoperative morbidity and mortality. They are at higher risk of postoperative complications, prolonged hospitalization, increased dependency, and institutionalization.[8-10] This population also experiences higher health care costs,[11] particularly following postoperative complications,[12,13] and are more prone to complications after emergency surgery.[14] Spending on health care represents 17.1% of US gross domestic product (GDP) in 2015 and 10.4% of Canadian GDP[15,16] in 2016; costs are expected to increase as our population ages.

Comprehensive Geriatric Assessment (CGA) is a multidimensional assessment designed to define an elderly individual's medical, psychosocial, and functional capabilities and allow for restoration of their premorbid function.[17] CGA is typically performed by a multidisciplinary team and, for nonelective surgical patients, is performed during the postoperative inpatient period. Assessment can include physical assessment, medication review, sensory assessment (vision, hearing evaluation, and so on), neuropsychiatric assessment, and evaluation of a patient's social supports and environment. CGA has been proposed to reduce morbidity, mortality, and costs after surgery in geriatric surgical populations. Randomized controlled studies have demonstrated improved clinical outcomes predominantly in hip fracture patients;[18-20] however, most of these studies did not assess the cost-effectiveness of the intervention. CGA models include (1) having a standard geriatric consultation, (2) comanaged care, or (3) geriatricians as the primary physician. Traditional models of care, or "usual care," can include (1) a traditional single-discipline surgical team without automatic geriatric consultation; (2) the surgeon as the primary caregiver and an automatic internal medicine consultation; or (3) the surgeon as the independent primary physician without any team-based care. This systematic review aims to synthesize the available evidence from economic evaluations of CGA of elderly patients undergoing surgery.

Methods

A systematic search of MEDLINE, Embase, Cochrane, and National Health Service Economic Evaluation Database was designed and conducted by a trained research librarian on March 11, 2016 asking: do surgical patients over 65 receiving CGA, compared with usual care, receive more cost-effective care. The search strategy was divided into three key concepts: geriatric assessment, economic analysis, and surgery while limiting results to patients aged 65 years and older (Appendix 1).

Systematic abstract and full-text screening, bias assessment, and data extraction were performed by two authors. Inclusion and exclusion criteria were defined a priori. Articles were included if an economic evaluation of CGA *versus* usual care was conducted on emergency surgery patients aged 65 years and older. Studies were excluded if they included nonsurgical patients, included patients under 65 years, did not report economic outcomes, only performed a cost analysis or did not perform a full CGA. We did not exclude studies solely based on their study design. The predefined primary outcome was cost-effectiveness, and secondary outcomes were length-of-stay, return of function and end-of-study mortality (as determined using vital statistics). Conflict between reviewers was resolved through consensus. Cost-effectiveness was examined by assessing the Incremental Cost Effectiveness Ratio (ICER) when available or comparing outcomes and change in cost when the ICER was not reported. When outcomes were improved and costs decreased, the intervention was deemed to be cost-effective without further calculation.

Each included article was assessed for bias according to the Cochrane collaboration guidelines[21] using Covidence software.[22] Studies were assessed as low risk of bias if at least five of the seven categories were graded as having a low risk of bias. Moderate risk of bias studies had three or four low-risk assessments, and high-risk studies had fewer than three low-risk assessment categories.[21] The quality of the economic evaluation was assessed according to the validated Quality of Health Economic Surveys (QHES) instrument.[23] Studies were defined as low quality if their QHES score was less than 50, moderate if they scored 50-74, and high if they scored 75 or higher on a 0-100 scale.

Data extraction was conducted with Covidence software,[22] and meta-analysis was performed using the fixed-effects model with RevMan5 software.[24] Dichotomous outcomes will be reported with odds ratios (ORs) and continuous outcomes will be reported with mean difference along with their 95% confidence intervals (CIs). When appropriate, comparable groups will be pooled separately (e.g., orthopedic patients). Economic evaluations and reported costs will be converted to constant 2016 United States Dollars (USDs) using purchasing

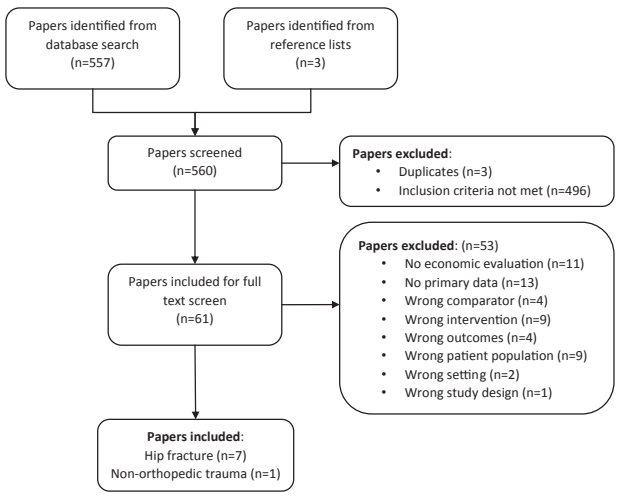

Fig. 1 – Flow diagram of study selection.