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Mini Review

Identifying the High-Risk Surgical Patients with Scoring Systems: A Mini Review

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Abstract

The number of surgical procedures performed increases each year. Advances in anaesthetic and postoperative care have decreased the rate of perioperative mortality and morbidity in recent years, limiting it to a group of high-risk patients, who became crucial to identify preoperatively to properly prepare for the operation and aftercare. The aim of this review is to discuss the methods for identifying high-risk surgical patients.

There are various scoring systems used around the globe for identification of high-risk surgical patients. American Society of Anaesthesiologists' Physical Status (ASA-PS) classification, Revised Cardiac Risk Index (RCRI) and American College of Surgeons' National Surgical Quality Improvement Program Risk Calculators (ACS-NSQIP) are three of the most widely used scoring methods. They consider the preoperative data of the patients, while Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) and its modification, P-POSSUM score take into account both preoperative and discharge data to predict high risk of mortality. The latter two are validated in three continents, which allows for their wider use.

In the last twenty years, many scoring systems to predict high-risk surgical patients have been developed and validated for use around the world. They will continue to improve for routine use and all algorithms will be stand on evidence-based medicine to ameliorate the management and treatment of such patients.

Keywords: *Scoring Systems; ASA-PS; RCRI; ACS-NSQIP; POSSUM*

Introduction

The number of surgical procedures performed increases each year. According to the statistical brief of Healthcare Cost and Utilization Project, the total number of surgeries performed in ambulatory and inpatient settings in the United States of America reached 21.796.100 in 2014 [1]. Advances in anesthetic and postoperative care have decreased the rate of perioperative mortality and morbidity in developed countries [2], limiting it to a group of high-risk patients [3], who became crucial to identify preoperatively in order to properly prepare for the operation and aftercare.

A successful surgery includes thorough preoperative evaluation, meticulous surgical technique, and proper post-operative care until discharge. In this review, we aimed to discuss the methods for identifying high-risk surgical patients.

Scoring systems that use preoperative data

Accurately predicting peri- and postoperative surgical risk is of foremost importance to adequately prepare for surgery and inform the patient and his/her family. In previous times, surgery type was deemed the most important parameter in estimating surgical risk. That changed over the years, and various risk calculators began considering parameters relating to the patient as the major factors in risk estimation.

American Society of Anesthesiologists' Physical Status (ASA-PS) classification, Revised Cardiac Risk Index (RCRI) and American College of Surgeons' National Surgical Quality Improvement Program Risk Calculators (ACS-NSQIP) are three of the most common risk scoring systems which use preoperative data [4]. ASA-PS classifies patients into six groups, ranging from ASA I to VI, based on the presence and the severity of a systemic disease, with ASA VI including brain-dead patients whose organs are being removed for donor purposes. The nature and severity of the systemic diseases are evaluated by whether they cause functional limitations. For example, ASA I includes healthy non-smokers and minimal alcohol drinkers. ASA II includes current smokers, social alcohol drinkers, and pregnant women; ASA III includes patients with one or more symptomatic and severe systemic disease such as chronic obstructive pulmonary disease, poorly controlled diabetes mellitus, active hepatitis etc. Patients with severe systemic diseases that are a constant threat to life, namely, ongoing cardiac ischemia, sepsis, disseminated intravascular coagulation, are classified as ASA IV while a patient who is not expected survive without operation is included in the ASA V category [5]. However, the ASA Grading System shows poor interrater reliability in pediatric practice than it does in adults, which should be kept in mind during the evaluation of a pediatric patient [6].

RCRI takes into account the risk of surgery, history of ischemic heart disease, congestive heart failure and cerebrovascular disease, pre-operative treatment with insulin and preoperative creatinine values to add 1 point for positivity of each of the above-mentioned criteria, and based on the final score, estimates the risk of major cardiac event following a major non-cardiac surgery with 95% confidence interval. The original article was published in 1977 by Goldman L., *et al.* [7], later to be validated by various studies to reach a final risk percentage [8-12].

ACS-NSQIP includes the age group, gender, functional status, ASA class, history of steroid use for chronic condition, ascites and congestive heart failure in 30 days prior to surgery, ventilator dependence, systemic sepsis within 48 hours prior to surgery, hypertension requiring medication, smoking status, history of severe COPD, dialysis, acute renal failure, BMI value, dyspnea, whether it is an emergency case and over 1500 procedural terminology codes (CPT) to calculate a score in order to predict procedure-specific patient outcomes. It is not validated outside the US, which limits its generalizability to centers in other countries [4].

Scoring systems that use intraoperative and postoperative data

Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM) and its modification, P-POSSUM score, take 12 preoperative and 6 discharge variables into consideration to calculate an estimation of postoperative morbidity and mortality. P-POSSUM is validated in three continents, thus can be utilized around the world [13,14].

Conclusion

In the last twenty years, many scoring systems to predict high-risk surgical patients have been developed and validated for use around the world. They will continue to improve for routine use and all algorithms will be stand on evidence-based medicine to ameliorate the management and treatment of such patients.

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