

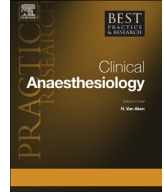


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Preoperative patient assessment: Identifying patients at high risk



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Postoperative mortality remains alarmingly high with a mortality rate ranging between 0.4% and 4%. A small subgroup of multi-morbid and/or elderly patients undergoing different surgical procedures naturally confers the highest risk of complications and perioperative death. Therefore, preoperative assessment should identify these high-risk patients and stratify them to individualized monitoring and treatment throughout all phases of perioperative care. A “tailored” perioperative approach might help further reduce perioperative morbidity and mortality.

This article aims to elucidate individual morbidity-specific risks. It further suggests approaches to detect patients at the risk of perioperative complications.

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Introduction

Due to many improvements in perioperative care, the overall mortality has significantly decreased over the last decades. However, an unsatisfyingly high proportion of patients still suffer from permanent damage or die after an operation, with evidence suggesting an overall postoperative mortality of 0.4–4% [28,49]. The highest mortality is observed only in a smaller proportion of patients, who either suffer from preexisting morbidity or are subjected to major surgery or both.

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Hence, effective preoperative assessment is important to identify patients at risk of perioperative complications. This should lead to an individualized perioperative approach from both the surgical and anesthesiological perspectives with the surgeon balancing efficacy and invasiveness of the planned surgical procedure and with the anesthesiologist planning for an adequate preoperative optimization, intraoperative monitoring and anesthesia technique, as well as adequate postoperative surveillance and care.

Advanced surgical techniques such as minimal invasive surgery have been implemented in clinical practice to improve postoperative outcomes. However, these are not the focus of this article, and they have been extensively reviewed elsewhere [44,84,104]. For the anesthesiologist, several recommendations have been made to predict organ-specific postoperative morbidity, for example, adverse cardiac events or even death. However, whether easy-to-use and inexpensive assessment tools allow predicting the overall outcome remains uncertain. Furthermore, in many preoperative scenarios, preoperative assessment is performed relatively late, often only a day before surgery opposing careful and effective preoperative planning.

Which patients are at high risk?

Due to many improvements made over the past decades, modern anesthesia itself seems to be relatively safe with 0.68–0.82 anesthesia-related deaths in 100,000 cases [59,60,90]. As expected, all studies have shown that an increasing number of comorbidities and age significantly influence the incidence of postoperative death [59,60]. Basically, only for a small subgroup of patients, surgery poses a significant risk with a high mortality rate [78]. These mostly elderly patients represent only 12% of the overall population of surgical patients, who additionally suffer from diverse comorbidities, which are briefly described in the following section of this article.

Age

In developed countries, the demographic change steadily increases the number of elderly patients subjected to surgical procedures [2]. Hence, the increasing number of elderly patients is expected to increase the proportion of high-risk patients. In the United States, roughly about a third of all adults aged 60–69 years suffer from at least one chronic disease and a large proportion from two or more. In many elderly patients, this was associated with functional limitations [80]. Although age itself has been shown in several studies to be an independent risk factor for perioperative mortality [26,29,64,79], preoperative considerations should include the difference between biological and chronologic age, for example, by assessing individual frailty [48].

Cardiovascular disease and perioperative risk

The several advances in the treatment of patients with cardiac diseases have led to a decrease in age-specific cardiovascular deaths. However, the absolute number of cardiac deaths worldwide continues to increase due to the growing population [2]. In Western Europe alone, the overall incidence of cardiovascular death is decreasing due to a slower population growth [86]. A significant proportion of patients with cardiac risk suffer from major adverse cardiac events (MACE) after surgery [20]. If perioperative myocardial infarction (MI) is diagnosed, the intrahospital mortality increases up to 25% [64], and with postoperative cardiac arrest the mortality increases even up to 65% [101]. However, the incidence of postoperative overt MI diagnosis is relatively low with 0.4–0.5%, so it contributes only 10% of overall mortality [29].

Apart from these well-known detrimental outcomes of overt postoperative MI, another, so far unrecognized factor has been found to contribute additionally to a significant number of deaths after noncardiac surgery: The VISION trial has shown that not only MI with clinical symptoms but to a greater extent silent “Myocardial Injury after Non-cardiac Surgery,” which has been termed “MINS,” pose a high risk to patients [102]. Here, a (mainly clinically silent) troponin elevation of >0.02 ng/ml was associated with a risk of 30-day mortality of 4–17%. Although patients with MINS are now clearly known to be at a greater risk of complications in the postoperative period, the differences between

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