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EDITORIAL

# Why is the surgical high-risk patient still at risk?

H. Kehlet[1]* and M. Mythen[2]

[1] Section of Surgical Pathophysiology 4074, Copenhagen University Hospital, Rigshospitalet, Blegdamsvej 9, 2100 Copenhagen, Denmark
[2] Surgical Outcomes Research Centre (SOuRCe), UCL/UCLH National Institute of Health Research Biomedical Research Centre, London, UK

* E-mail: henrik.kehlet@rh.regionh.dk

Over the last decades, we have seen a continuous improvement of perioperative anaesthetic and surgical care leading to a general reduction of morbidity and mortality, despite the surgical population getting older and with more co-morbidity. Nevertheless, and despite these improvements, there is a general agreement that the preoperative high-risk patient still carries a high risk of postoperative morbidity and mortality. How are we going to change this?

Much attention has been paid to the ability to predict the individual patient at risk and several techniques have been developed from simple questionnaires to more invasive cardiopulmonary exercise tests, all showing some predictive value.[1–4] Such preoperative risk stratification is valuable if it allows subsequent optimization of organ dysfunction and thereby reduction of surgical risk. To some extent, interventions such as cessation of alcohol and smoking use,[5] exercise, and optimization of cardiopulmonary functional impairment have been shown to be effective.

Concomitant with the improved knowledge on preoperative risk assessment, many single modality interventions have been tested in the perioperative setting, such as antibiotics, pain relief, regional anaesthetic techniques, fluid management, pharmacological sympathetic blockade, minimally invasive surgery, nutrition, reduced use of tubes, drains, etc. All have been shown to provide some effects on postoperative outcome (Fig. 1). Although much of this evidence has come from several randomized controlled clinical trials (RCTs) and subsequent meta-analyses, they usually examine single interventions in single or few centres and thus only determine efficacy (i.e. may work). Few trials take a more pragmatic account of effectiveness (i.e. are effective in routine clinical practice), rather than the single one in question for an efficacy study. Many studies have been flawed by not standardizing all elements of perioperative care to current best evidence-based practice (or by not providing specific information of such care principles). Such studies include effects of pain relief on outcome,[6 7] use of perioperative β-blockers,[8] perioperative fluid management,[9 10] minimal invasive surgery,[11] etc. Furthermore, allocation of patients from different surgical interventions may not be appropriate since the pathophysiology of morbidity is likely to be different between procedures. Hence the growing interest and increasing support for the use of registries, prospective cohort studies, or both as the final step along the innovation pathway.[12] For example, over the past 10–12 yr, there has been a wider acceptance that postoperative morbidity and recovery problems should be considered as a multi-factorial problem that may not be solved by uni-modal interventions, but rather by a multi-modal intervention by combining several evidence-based principles of care.[13] Subsequent research using this multi-modal, best-evidence based approach (e.g. the 'fast-track methodology' or 'enhanced recovery programmes') has shown in a growing number of well-designed prospective cohort studies or RCTs to enhance postoperative recovery and reduce length of stay, morbidity, and convalescence.[14–16] Such is the level of acceptance of this approach that a number of European Countries now have Government-funded National Programmes for Enhanced Recovery (e.g. Holland, Denmark, Spain, and the UK).

What then can we expect, and what should we further explore in future efforts to understand and change the

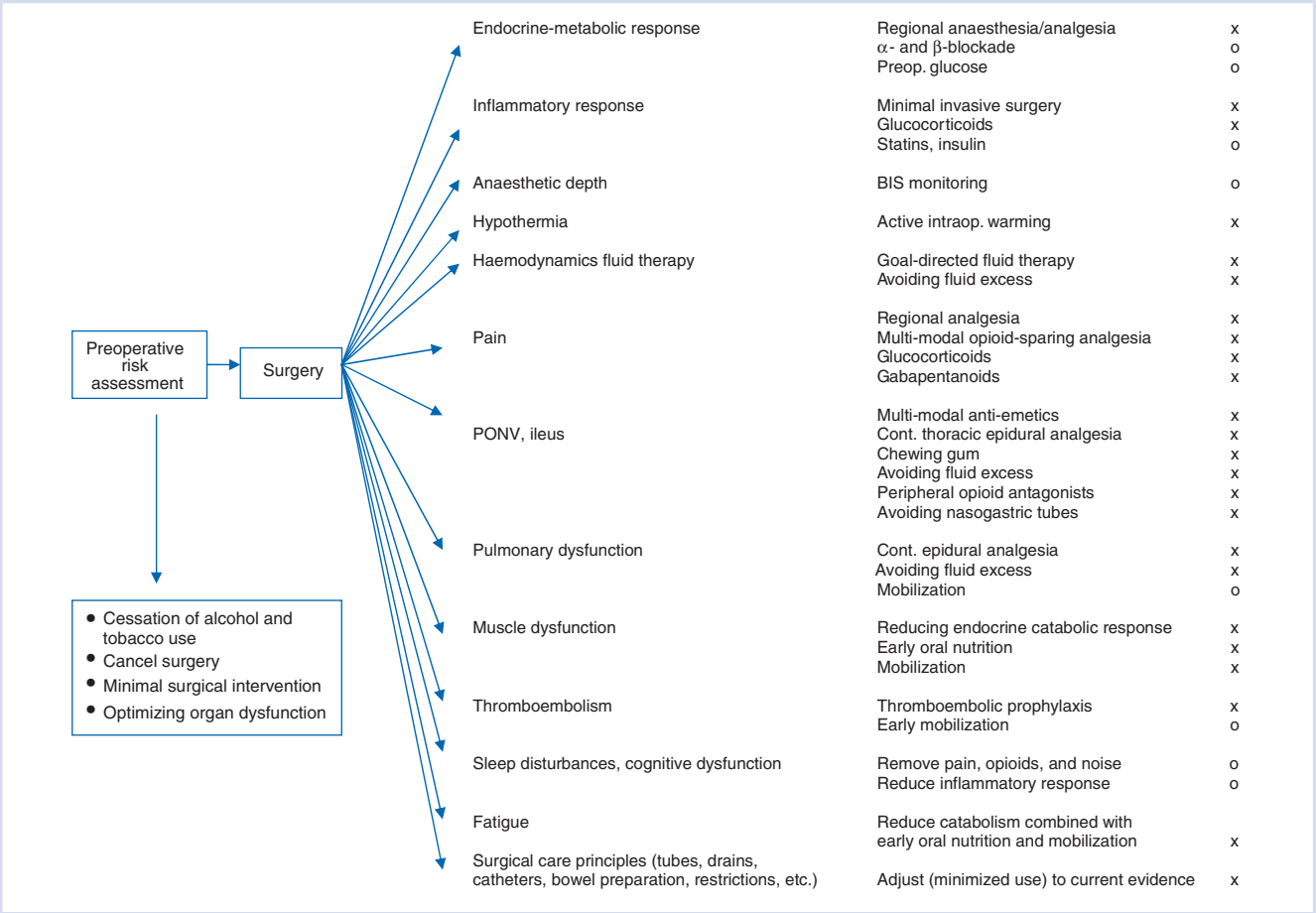


**Fig 1** Surgical stress responses and perioperative events to make a high-risk surgical patient at risk and potential strategies for intervention or prevention (x, evidence-based; o, need further studies).

surgical high-risk patient to a low- or no-risk patient? Obviously, the picture is extremely complicated with so many factors involved, including pathophysiology, specific anaesthetic and surgical factors, and organizational factors (Fig. 1).[17] Therefore, we first need better descriptions, records, and understanding of the pathogenesis of post-operative morbidity and of the drivers of risk. An area that needs particular focus is the relationship between medical and surgically related morbidity. Thus, a serious surgical mis-adventure such as an anastomotic dehiscence may obviously be followed by a higher risk of medical morbidity and mortality, but equally a preoperative medical morbidity such as pulmonary, cardiovascular, or thromboembolic disease may predispose to an anastomotic dehiscence. In other words, it is unlikely that a poorly prefused bowel anastomosis will be viable but similarly optimal gut perfusion will not compensate for poor suturing. There are some data from observational studies suggesting that surrogates of end-organ perfusion recorded at the end of major surgery predict poor outcome, but overall there is very little data on such time–cause relationships between medical and surgical morbidity. This is hindering exact interpretation of previous outcome data and, more importantly, our precise understanding of the pathogenic mechanisms and thereby our potential for rational intervention and prevention.

Such data and knowledge are also important when discussing the concept of outreach strategies[18] and critical care resources[19] where the data have shown the highest mortality rates among patients discharged and readmitted to critical care units, and those admitted to critical care units after initial care on a standard ward. Although not arguing against provision and more effective utilization of critical care resources, more detailed knowledge on the pathophysiology of perioperative risk, the exact level of care provided in critical care and standard wards, and the time course and reasons for morbidity will be required before we reorganize the anaesthetic and surgical care system. Such data are required since several multi-national surveys have shown that the provided perioperative care often is highly variable and not according to available evidence.[20 21] The availability of larger, prospective, high-fidelity data sets will generate hypotheses that can be explored on the bench and at the bedside. Basic science, including genomics, transcriptomics, and proteomics, will offer novel therapies that can be tested in RCTs and finally proven in large cohorts and registries. In the interim, slow progress will

continue with the testing of existing therapies as described above. Finally, after an updated multi-modal evidence-based fast-track surgery has been established, further investigations to achieve a 'stress and pain free' operation should be performed, including anti-inflammatory techniques such as minimal invasive surgery, glucocorticoids, insulin, or cytokine antagonists. In this context, preoperative identification of high pain responders and patients with a hyperactive inflammatory response may be helpful.

In summary, we have achieved a tremendous amount of knowledge within perioperative pathophysiology, anaesthetic and surgical care, and organizational issues that should also allow us in the future to substantially reduce the perioperative risk of a preoperative 'high-risk' patient. However, this will require development of better methodology to predict surgical risk,[22] a more intensive collaboration between the anaesthetic and surgical professions, surgical nurses, physiotherapists, etc. and also resource allocation for monitoring of the many factors involved in perioperative care and morbidity. The same considerations may also apply to the recent focus on long-term consequences of anaesthetic management.[23]

## Conflict of interest

None declared.

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