Latest developments in peri-operative monitoring of the high-risk major surgery patient

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Peri-operative monitoring technology has made great strides in the last 20 years with the introduction of minimally invasive devices to measure inter alia stroke volume, cardiac output, depth of anaesthesia and cerebral and tissue oxygen monitoring. Despite these technological advances, peri-operative management of the high risk major surgery patient has remained virtually unchanged. The vast majority of patients undergo a pre-operative assessment which is neither designed to quantify functional capacity nor predict outcome. Anaesthetists then usually monitor these patients using the same technology (e.g. pulse oximetry (SpO2), invasive systemic BP and CVP, end tidal carbon dioxide (etCO2) and anaesthetic agent monitoring) that was available in the early 1980s. Conventional intra-operative management can result in occult low levels of blood flow and oxygen delivery that lead to complications that only occur days or weeks following surgery and give false re-assurance to the anaesthetist that he or she is doing a "good job". Post-operative management then often takes place in an environment with reduced levels of both monitoring equipment and staff expertise. It is perhaps not surprising that outcome still remains poor in high-risk patients.(1) In this review, we will briefly describe the role of peri-operative optimization, some of the available monitors and indicate how their combined use might be beneficial in managing the high-risk surgical patient. We believe that although there is now evidence to suggest that the use of individual new monitors (such as assessment of fluid status, depth of anaesthesia, tissue oxygenation and blood flow) can influence outcome, it will only be their combination that will radically improve the peri-operative management and outcome of high-risk surgical patients. It is a matter of some urgency that large scale, prospective and collaborative studies be designed, funded and executed to prove or disprove this hypothesis.