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Review Article

# Perioperative hemodynamic optimization: a revised approach<sup>☆</sup>



Paul E. Marik MBBCh, FCP(SA), DA(SA), FCCM, FCCP (Professor of Medicine; Chief, Division of Pulmonary and Critical Care Medicine)\*

*Division of Pulmonary and Critical Care Medicine, Eastern Virginia Medical School, Norfolk, VA 23507, USA*

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**Abstract** Contemporary data suggest that approximately 18% of patients undergoing surgery will develop a major postoperative complication, and 3% to 5% will die prior to hospital discharge. Patients who develop a postoperative complication are at an increased risk of long-term mortality. Multiple studies have shown that perioperative hemodynamic optimization reduces the risk of postoperative complications and death in elective noncardiac surgical patients.

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## 1. Introduction

More than 230 million major surgical procedures are undertaken worldwide each year [1]. Data from the United States and Europe suggest that approximately 18% of patients undergoing surgery will develop a major postoperative complication, and 3% to 5% will die before hospital discharge [1–4]. Those patients who develop a postoperative complication and survive to hospital discharge have diminished functional independence and reduced long-term survival. In a landmark study, Khuri and coworkers demonstrated that survival up to 8 years after major surgery was strongly related to the development of a major postoperative complication within 30 days of surgery [4]. Interventions that reduce the risks of postoperative death and complications, particularly in

high-risk patients, have become a priority in perioperative medicine [5].

Preemptive goal-directed hemodynamic therapy (GDT) appears to be a promising approach to reducing postoperative complications and deaths. In general, GDT is based on the titration of fluids and inotropic drugs to physiological, flow-related endpoints. Randomized controlled trials (RCTs) performed over the last two decades have shown that GDT improves patient outcomes [6–9]. Furthermore, the U.K. National Health Service's National Institute for Health and Clinical Excellence (NICE) has recommended GDT (using esophageal Doppler) for patients undergoing major or high-risk surgery [10,11]. However, these recommendations and the encouraging results from clinical trials have not led to the widespread adoption of perioperative hemodynamic optimization [12].

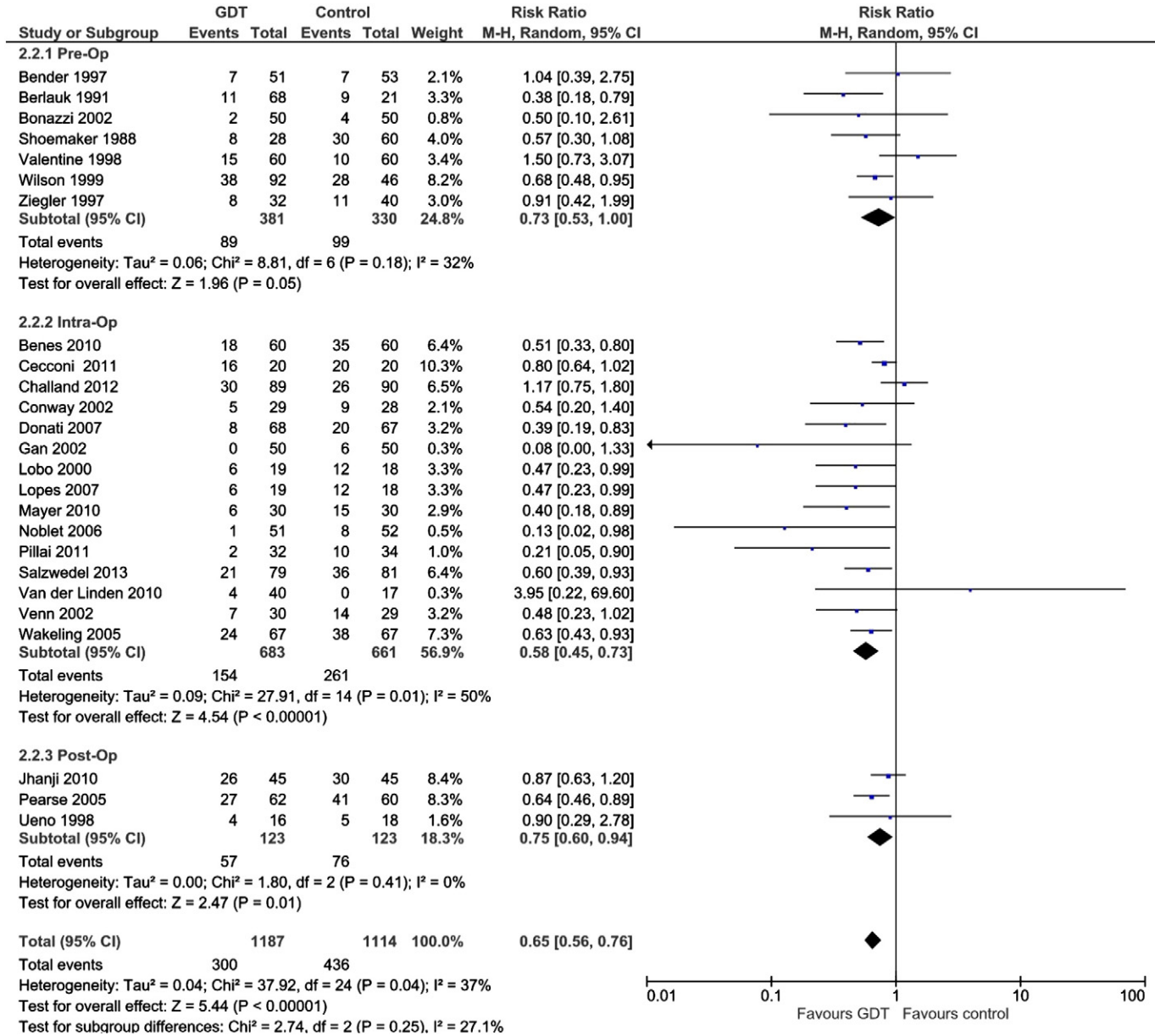
## 2. Discussion

Over 30 RCTs have been performed to explore the benefits of GDT. A number of different technologies (pulmonary artery

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\* Correspondence: Paul Marik, MD, Eastern Virginia Medical School, 825 Fairfax Ave., Suite 410, Norfolk VA 23507, USA.

E-mail address: marikpe@evms.edu.



**Fig. 1** Comparison of the risk of postoperative complications in studies that compared goal-directed hemodynamic therapy (GDT) with standard therapy (control) in elective noncardiac surgical patients. Studies are grouped by timing of initiation of hemodynamic optimization. Weight is the relative contribution of each study to the overall treatment effect [risk ratio and 95% confidence interval (CI)] on a log scale, assuming a random-effects model. Metaanalysis was performed using Review Manager 5.1 (RevMan; The Cochrane Collaboration, Oxford, UK).

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