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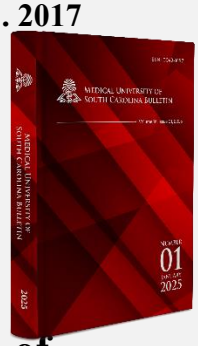

MEDICAL UNIVERSITY OF SOUTH CAROLINA BULLETIN

Review of Foundational Evidence of The Influence of Intraoperative Hypothermia on Postoperative Complications in General Surgery

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ABSTRACT

Introduction: Intraoperative hypothermia, defined as a core body temperature below 36∘C during surgery, is a common occurrence in general surgical procedures. This review explores the relationship between intraoperative hypothermia and the incidence of various postoperative complications. **Literature Review:** Maintaining normothermia during surgery is crucial for optimal patient outcomes. Studies have consistently demonstrated that even mild hypothermia can significantly increase the risk of adverse events. These complications include an increased incidence of **surgical site infections** due to impaired immune function and vasoconstriction, prolonged emergence from anesthesia, and **coagulopathy** leading to increased blood loss and transfusion requirements. Furthermore, hypothermia can exacerbate myocardial ischemia and arrhythmias, especially in patients with pre-existing cardiovascular disease. Shivering, a common response to hypothermia, can also increase metabolic demand and patient discomfort. **Conclusion:** Intraoperative hypothermia is a modifiable risk factor associated with a wide

range of preventable postoperative complications in general surgery. Proactive strategies for maintaining normothermia are essential to improve patient safety and optimize recovery. Implementing consistent temperature monitoring and active warming interventions throughout the perioperative period should be a standard of care to mitigate these risks and enhance overall surgical outcomes.

Keywords: Intraoperative Hypothermia, Postoperative Complications, General Surgery, Surgical Site Infection, Coagulopathy, Normothermia.

Introduction

Maintaining physiological homeostasis during surgical procedures is paramount for ensuring patient safety and promoting optimal recovery. Among the various physiological parameters meticulously monitored, core body temperature plays a critical role. **Intraoperative hypothermia**, conventionally defined as a core body temperature falling below 36∘C (96.8∘F), is a surprisingly prevalent occurrence in general surgical settings. Despite advancements in surgical techniques and anesthetic agents, inadvertent perioperative cooling remains a common challenge.

The consequences of even mild intraoperative hypothermia extend beyond simple discomfort, impacting numerous physiological systems and potentially leading to a cascade of adverse events. Understanding the direct correlation between intraoperative temperature fluctuations and the development of **postoperative complications** is crucial for all healthcare professionals involved in surgical care. This literature review aims to explore the evidence linking intraoperative hypothermia to various postoperative complications encountered in general surgery, highlighting the mechanisms by which temperature dysregulation contributes to these adverse outcomes.

Literature Review

The maintenance of core body temperature within a normal range (**normothermia**) during surgical procedures is recognized as a fundamental component of perioperative care. Despite this understanding, intraoperative hypothermia frequently occurs due to factors such as

anesthetic-induced vasodilation, exposure to cool operating room environments, and infusion of cold intravenous fluids. A substantial body of evidence dating back several decades has consistently linked intraoperative hypothermia to a myriad of adverse postoperative outcomes in general surgery patients.

One of the most significant and well-documented complications associated with intraoperative hypothermia is an increased risk of **surgical site infections (SSIs)**. Hypothermia impairs immune function by reducing neutrophil chemotaxis and phagocytosis, thereby compromising the body's ability to combat bacterial contamination (Kurz et al., 1996). Furthermore, peripheral vasoconstriction induced by hypothermia leads to decreased tissue perfusion and oxygen delivery to the surgical wound, hindering the oxidative killing capacity of neutrophils and impairing collagen deposition necessary for wound healing (Kurz et al., 1996; Melling et al., 2001). This direct impact on both systemic immunity and local tissue oxygenation significantly elevates the susceptibility to infection.

Beyond infection, intraoperative hypothermia has a profound effect on the coagulation cascade, leading to **coagulopathy** and increased blood loss. Reduced core body temperature impairs platelet function and inhibits the activity of various coagulation factors, resulting in a prolonged prothrombin time and activated partial thromboplastin time (Frank et al., 1997). This impaired hemostasis often necessitates increased blood transfusions, which themselves carry risks such as transfusion reactions and infectious disease transmission.

The cardiovascular system is also vulnerable to the effects of hypothermia. Even mild decreases in core temperature can induce **myocardial ischemia and arrhythmias**, particularly in patients with pre-existing cardiovascular disease (Frank et al., 1993). Hypothermia increases systemic vascular resistance, leading to an elevated cardiac workload and oxygen demand. This can precipitate angina, myocardial infarction, or life-threatening dysrhythmias during the intraoperative and immediate postoperative periods.

Furthermore, intraoperative hypothermia can prolong the duration of action of anesthetic agents and muscle relaxants, leading to **delayed emergence from anesthesia** and prolonged recovery room stays (Leslie & Sessler, 2005). Patients experiencing hypothermia are also prone to **postoperative shivering**, which can be distressing, increase metabolic rate, oxygen consumption, and carbon dioxide production, potentially leading to respiratory compromise

and lactic acidosis (Sessler, 1997). This increased metabolic demand is particularly concerning for patients with limited cardiac or pulmonary reserve.

Given these wide-ranging adverse effects, proactive measures to maintain **normothermia** are critical. Strategies include pre-warming patients, maintaining a warm operating room environment, using warmed intravenous fluids and irrigation solutions, and employing active warming devices such as forced-air warmers and circulating water mattresses throughout the perioperative period (Scott & Buckland, 2006).

Conclusion

Intraoperative hypothermia is a significant and modifiable risk factor that consistently contributes to a diverse array of adverse **postoperative complications** in general surgical patients. The compelling evidence underscores its detrimental effects on immune function, coagulation, cardiovascular stability, and anesthetic recovery. From increasing the incidence of **surgical site infections** and exacerbating **coagulopathy** to elevating the risk of cardiac events and prolonging recovery times, the consequences of inadequate temperature management are profound and clinically impactful.

Recognizing intraoperative hypothermia as a preventable complication, it is imperative for all perioperative teams to prioritize active temperature management. Implementing systematic strategies for continuous temperature monitoring and utilizing effective active warming interventions should be standard practice. By diligently maintaining **normothermia** throughout the surgical journey, healthcare providers can substantially mitigate these preventable risks, enhance patient safety, optimize recovery trajectories, and ultimately improve overall surgical outcomes in general surgery.

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