

Anesthesia for Patients with Anemia



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KEYWORDS

• Anemia • Transfusion • Surgery • Iron • Patient blood management

KEY POINTS

- Anemia is common in perioperative settings and it is associated with worse clinical outcomes, including various complications and increased risk of morbidity and mortality.
- Factors contributing to anemia in surgical settings include nutritional deficiencies (including iron deficiency), inflammation, chronic underlying disorders, and surgical blood loss.
- Hospital-acquired anemia is increasingly recognized as an important contributor to worse outcomes in surgical patients, and it can persist long beyond the discharge.
- Allogeneic blood transfusion should not be considered as the default and first-line treatment of anemia given the associated risks and negative impact on the outcomes of patients and availability of other options.
- Patient blood management provides a multimodality framework for preventing and managing anemia in perioperative settings, with the ultimate goal of improving the outcomes of patients.

INTRODUCTION

As a simple and purportedly mundane diagnosis, anemia imposes a heavy burden on humankind. It is estimated that 1 out of every 3 to 4 people is anemic according to the criteria set by the World Health Organization (WHO; hemoglobin level <12 g/dL in adult nonpregnant women and <13 g/dL in adult men).^{1–3} Kassebaum and colleagues⁴ estimated that anemia had a global prevalence of 33% in 2010, and it caused 68.36 million years lived with disability, accounting for 8.8% of the total disability from all conditions.

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Anemia is commonly found incidentally in patients across the spectrum of care, including those undergoing surgery. For surgical patients, many present to the operating room with anemia, whereas many patients develop new-onset (hospital-acquired) anemia following surgery and during hospital stay. Some patients leave the hospital with anemia, which persists for months.⁵⁻⁸

The omnipresent nature of anemia and the assumption that a quick and easy treatment is always available (blood transfusion) might lead some to think it is a simple and even acceptable condition. In reality, this notion lacks validity because anemia is not just a simple laboratory diagnosis and certainly not a so-called innocent bystander.⁹ Development and progression of anemia is often a multifactorial process involving different causes. Inflammation (as commonly encountered in many chronic conditions) and iron deficiency (absolute or functional) are often among the key factors,^{10,11} and, as shown by the function of hepcidin (and its counterpart, erythroferrone), they often go hand in hand.^{12,13} Other factors, such as other nutritional deficiencies (zinc, folate, and B₁₂), blunted hematopoiesis, shortened survival of red blood cells, and blood loss, also commonly contribute to the development and exacerbation of anemia.¹⁴

Anemia has repeatedly been shown to be an independent predictor of worse outcomes across patient populations.¹⁵ The role anemia can play in worsening outcomes is perhaps best exemplified in cardiorenal anemia syndrome: patients with chronic conditions such as heart failure and renal disease are at increased risk of development of anemia, whereas anemia works to exacerbate the underlying chronic conditions in a pernicious loop, leading to worse patient outcomes, including increased mortality.¹⁶

Anemia in the context of surgical patients is similarly troublesome. Acute blood loss in the surgical theater is a visible contributor to anemia, whereas diagnostic blood loss in the perioperative setting and during the hospital stay might be a less obvious but similarly important contributor.¹⁷ Regardless of the cause, anemia takes its toll on surgical patients, because the independent link between anemia and worse outcomes has also been reported across various surgical populations.¹⁴ In addition, anemia is a known risk factor for allogeneic blood transfusions, and transfusions are also independently linked with worse clinical outcomes.¹⁵ Whenever faced with newly discovered anemia in the preoperative setting, clinicians should become alerted to potential underlying causes (eg, malignancy or chronic kidney disease) and consider referring the patients for additional investigation before surgery.¹⁸

Given all this, surgery and anesthesia in anemic patients requires a higher level of vigilance, to ensure proper diagnosis and management. Also important are the preventive measures, which can prove highly effective in this context. It is important for clinicians to screen for and recognize anemia as an important modifiable risk factor in their patients and take proper steps to address it.

DEFINITION OF ANEMIA AND ITS CONTROVERSIES

The WHO criteria define anemia based on hemoglobin concentrations.³ This definition is rooted in the observed distribution of hemoglobin values across the populations (with stratifications for gender, age, and so forth). Values that are a few standard deviations more than or beyond the observed mean are considered abnormal. Although this practice is widely accepted and applied to various naturally occurring physiologic parameters, this approach has the potential pitfall of considering something to be normal based solely on its high prevalence. In the case of anemia, because the hemoglobin level is usually lower in women compared with men, the population-derived

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