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An overlooked epidemic: Iron deficiency in surgical patients

Iron deficiency is incredibly common, especially among women of reproductive age, and we can't afford to ignore it, stresses general surgeon Dr. Duncan Rozario. 12 Aug 2025



Iron deficiency (ID), despite iron's abundance on Earth, represents a significant and frequently underestimated challenge within surgical care, profoundly impacting patient outcomes.

Affecting an estimated 1.24 to 1.46 billion people globally with iron deficiency anemia (IDA), and likely twice that number with ID without anemia, this condition carries substantial consequences.

In Canada, 12.6% of the population experiences ID, with rates soaring to 21.3% among women of reproductive age. Beyond anemia, ID itself causes debilitating symptoms like fatigue, impaired exercise tolerance, reduced concentration, cognitive decline and depression, all severely impacting quality of life and the capacity for surgical recovery. Preoperative ID is alarmingly common, affecting 30% to 40% of patients undergoing major surgery, a rate significantly higher than in the general population.

Beyond hemoglobin: The crucial role of ferritin in diagnosis

Historically, hemoglobin (Hb) levels have been the primary measure used to screen for anemia, with standard thresholds defining the condition (<130 g/L for males, <120 g/L for females). However, relying solely on Hb is inadequate for assessing a patient's true iron status.

ID represents a spectrum, starting with depleted iron stores that impair mitochondrial function, cellular metabolism and

tissue function long before Hb levels drop low enough to diagnose anemia. Patients can suffer the consequences of ID— such as poor wound healing, reduced immune function, and decreased exercise tolerance— even with seemingly normal Hb levels. Emerging evidence suggests even borderline low Hb levels (e.g., 120-129 g/L in women) are associated with increased postoperative risks compared to higher levels, further questioning conventional anemia thresholds in the surgical context.

Accurate diagnosis requires looking beyond Hb to markers of iron storage. Serum ferritin is a key indicator, acting as a proxy for the body's iron reserves. However, interpreting ferritin levels requires caution, as ferritin is an acute-phase reactant. Inflammation, common in surgical patients due to underlying conditions or the surgical stress response itself, can artificially elevate ferritin levels, masking true ID.

Therefore, comprehensive screening must include Hb, ferritin and transferrin saturation (TSAT), which indicates the availability of iron for transport. For accurate diagnosis, especially when inflammation is suspected (often indicated by C- reactive protein (CRP) >5 mg/L), adjusted thresholds are essential. Guidelines recommend diagnosing ID with ferritin <30 µg/L in non-inflammatory states, but using ferritin <100 µg/L combined with TSAT <20% when inflammation is present or suspected. This nuanced approach prevents misdiagnosis in patients with "functional iron deficiency," where iron stores might appear adequate (normal/high ferritin) but iron is sequestered and unavailable for use due to inflammation (low TSAT).

Optimizing outcomes: Treatment strategies and patient blood management

Identifying and treating ID preoperatively is a cornerstone of modern patient blood management (PBM)—a patient-centered, evidence-based approach focused on managing a patient's own blood, minimizing loss, and optimizing their physiological tolerance to anemia. Addressing ID directly tackles a major reversible cause of perioperative anemia and its associated risks.

Traditional oral iron supplements (ferrous salts) face significant limitations in the surgical setting, including poor absorption (around 10%), significant gastrointestinal side effects impacting adherence (up to 70% of patients), and ineffectiveness during inflammation due to hepcidin blockage. Furthermore, they require four to eight weeks for repletion, often exceeding the available preoperative window.

Modern intravenous (IV) iron formulations (like ferric carboxymaltose, ferric derisomaltose) offer significant advantages. They bypass intestinal absorption limitations, rapidly replenish stores even in inflammatory states, and allow for single-dose repletion with good safety profiles. Studies show preoperative IV iron effectively increases Hb, reduces transfusion needs by 30%-to- 40%, and improves functional outcomes. IV iron is recommended when time is limited (<4 weeks to surgery) or anemia is moderate/severe. Newer oral agents like sucrosomal iron, which utilize alternative absorption pathways less affected by hepcidin, also show promise and may be non-inferior to IV iron in some cases.

Implementing systematic ID screening (using Hb, ferritin, TSAT, CRP) and treatment protocols within PBM programs at least 30 days preoperatively yields substantial benefits. It reduces the need for allogeneic blood transfusions (which carry risks of immune modulation, infection, and increased mortality), decreases infection rates, shortens hospital stays, improves wound healing, enhances functional recovery, reduces fatigue, and ultimately leads to significant net cost savings despite initial investment. Universal screening, using appropriate ferritin/TSAT thresholds, is a high-value intervention critical for optimizing surgical care in the modern era.

Dr. Duncan Rozario is a general surgeon in Oakville, Ont., a speaker for Solventum (formerly 3M), and a medical consultant for Sigma Life Sciences.

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