

# The Definition of Anemia Matters when Using Preoperative Hemoglobin Values as a Screening Tool Prior to Total Joint Arthroplasty

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## INTRODUCTION:

Low preoperative hemoglobin concentration has been well-demonstrated to be associated with worse outcomes following total hip arthroplasty (THA) and total knee arthroplasty (TKA). As a result of the known increased complications in patients with low preoperative hemoglobin, patients are often screened for anemia preoperatively. The World Health Organization (WHO) defines anemia as below 12 mg/dL in females and below 13 mg/dL in males, however, other definitions of anemia have also been described. We hypothesized that when anemia is used as a screening tool, the reduction in complications and postoperative transfusions would vary significantly depending on the definition utilized.

## METHODS:

681,141 patients were identified in a national database who underwent either THA or TKA from 2010-2020. Preoperative hemoglobin was classified according to the WHO definition, Cleveland Clinic (CC) definition (14mg/dL in men, 12.3mg/dL in women), or definition described by Beutler et. al in 2006 which stratifies patients by gender age and race (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1895695/>). The rate of postoperative complications and transfusions was then calculated in anemic patients using these various definitions, and results compared using chi-squared analysis.

## RESULTS:

91,826 (13%) of patients were classified as anemic using the WHO definition, 172,946 (25%) using the CC definition, and 112,048 (16%) using the Beutler definition. When using the WHO definition of anemia, 16,465 (18%) of anemic patients would have required a transfusion versus 21,177 (12%) using the CC definition or 17,617 (16%) using the Beutler definition,  $P < 0.001$ . Similarly, 630 (0.69%) of patients would have received a prosthetic joint infection (PJI) within 30 days using the WHO definition vs. 1,046 (0.60%) using the CC definition or 741 (0.66%) using the Beutler definition,  $p < 0.001$ . Using the WHO definition, 4,072 (5.3%) of patients would have sustained a major complication compared to 7,669 (4.4%) using the CC definition and 5,598 (5.0%) using the Beutler definition,  $p < 0.001$ .

## DISCUSSION AND CONCLUSION:

Small changes in the definition of preoperative anemia can significantly influence reductions in complications when anemia is used as a screening tool prior to TKA and THA. A standardized definition of anemia is important for future research on this topic, and arthroplasty surgeons should seek to achieve consensus on the definition of anemia utilized for preoperative evaluation.