

Blood Transfusion Prevalence, Risk Factors and Postoperative Infection Rates in Lumbar Spinal Fusion Surgery: A National Population-based Investigation

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Introduction

Lumbar spinal fusion surgery is a common and increasingly prevalent procedure aimed at stabilizing the spine, correcting deformities, and alleviating pain in patients with degenerative disc disease, spinal stenosis, or spondylolisthesis. While advancements in surgical techniques have improved outcomes, blood transfusion remains a critical consideration due to the significant blood loss often associated with the procedure. Transfusion practices can influence patient recovery, and the need for blood products has been linked to complications such as postoperative infections and longer hospital stays. The goal of this article is to present a comprehensive national population-based investigation into the prevalence of blood transfusion during lumbar spinal fusion surgery, identify the risk factors associated with the need for transfusion, and examine the impact of blood transfusions on postoperative infection rates. Understanding these factors can guide clinicians in optimizing perioperative care, reducing the need for transfusions, and minimizing the risk of complications [1-3].

Description

Blood transfusion is frequently required in lumbar spinal fusion surgery due to the significant blood loss that can occur during the procedure. The reported prevalence of transfusions in lumbar spinal fusion varies depending on the complexity of the surgery, patient demographics, and institutional practices. Population-based studies: Data from national databases such as the National Inpatient Sample or the American College of Surgeons National Surgical Quality Improvement Program have shown that transfusion rates in lumbar fusion surgery can range from 10% to 30%. These figures can vary based on the number of levels fused, the use of minimally invasive techniques versus open surgery, and preoperative patient factors such as anemia or coagulopathy. Complex spinal fusion procedures, particularly those involving multiple vertebral levels or requiring osteotomies for deformity correction, are associated with higher transfusion rates.

The longer operative times and greater soft tissue dissection in such cases lead to increased intraoperative blood loss. Understanding the prevalence of blood transfusion in lumbar spinal fusion surgery is essential for healthcare providers to anticipate the need for transfusion, implement blood management strategies, and counsel patients on the risks and benefits. The need for blood transfusion in lumbar fusion surgery is directly related to the amount of intraoperative blood loss. Multi-level fusions generally result

in greater blood loss compared to single-level procedures. Open lumbar fusion surgery typically involves greater blood loss compared to minimally invasive techniques. Posterior lumbar fusion procedures may result in more bleeding due to the extensive muscle dissection required. Patients with pre-existing conditions such as obesity, diabetes, or cardiovascular disease may experience more intraoperative blood loss due to prolonged operative times and increased surgical complexity.

Blood loss can be minimized through meticulous surgical technique, the use of hemostatic agents, and advanced tools such as electrocautery and ultrasonic scalpels. Identifying and addressing preoperative anemia through iron supplementation or erythropoietin administration can reduce the likelihood of requiring a transfusion. The use of cell-saver technology, which collects and re-infuses the patient's blood during surgery, has been shown to reduce transfusion rates. Additionally, minimizing intraoperative blood loss through meticulous dissection and the use of topical hemostatic agents can lower transfusion requirements. Implementing restrictive transfusion thresholds, where transfusions are only administered if hemoglobin levels fall below a certain level (typically <7 g/dL for stable patients), can reduce unnecessary transfusions without compromising patient outcomes [4,5].

Conclusion

Population-based studies have demonstrated a clear association between blood transfusion and increased infection rates in lumbar spinal fusion surgery. Patients who receive blood transfusions are more likely to develop surgical site infections, urinary tract infections, and respiratory infections in the postoperative period. Transfused patients are particularly at risk for deep wound infections, which can have devastating consequences, including the need for reoperation, extended hospital stays, and long-term antibiotic therapy. Postoperative infections in lumbar fusion surgery can lead to increased morbidity, including prolonged recovery times, impaired functional outcomes, and higher healthcare costs. Addressing modifiable risk factors such as preoperative anemia, diabetes, and obesity can reduce the need for transfusion and lower infection risk. Administering prophylactic antibiotics before and during surgery is essential for preventing infections, particularly in patients who require transfusion.

Ensuring proper timing and dosing of antibiotics is crucial for reducing infection rates. Implementing restrictive transfusion protocols and blood conservation techniques can reduce the number of patients exposed to transfusions, thereby lowering the risk of infection. Early mobilization, appropriate wound care, and vigilant monitoring for signs of infection can help prevent postoperative complications in patients who require blood transfusion. Blood transfusion is a common and necessary intervention in lumbar spinal fusion surgery, particularly in complex and multi-level procedures. However, the need for transfusion is associated with several risk factors, including patient demographics, preoperative health status, and the complexity of the surgery. Importantly, blood transfusion has been linked to an increased risk of postoperative infections, which can significantly impact patient outcomes and recovery.

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Conflict of Interest

None.

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