

Impact of Pediatric Neuropsychiatric Disorders on Postoperative Outcomes Following Common Non-Spine Orthopedic Surgeries

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INTRODUCTION: Neuropsychiatric conditions, including ADHD, autism, anxiety, and depression, are increasingly prevalent among pediatric patients. While fractures and orthopedic injuries remain common, there is a limited understanding of how these psychiatric conditions influence postoperative outcomes in this vulnerable population. This study leverages a large national dataset to assess how neuropsychiatric diagnoses affect postoperative complications, length of stay (LOS), and hospital charges following common non-spine orthopedic procedures in children.

METHODS: We conducted a retrospective cohort study using the 2019 and 2022 Kids' Inpatient Database (KID). Pediatric patients undergoing fracture fixation, extremity joint fusion, or bone excision were identified by ICD-10-PCS codes. Neuropsychiatric conditions were identified via ICD-10-CM codes for ADHD, autism spectrum disorder (ASD), anxiety, and depression. To control for confounding, patients with neuropsychiatric diagnoses were matched 1:1 with controls based on age, sex, ethnicity, and APR-DRG severity score. Primary outcomes included postoperative surgical complications, including postoperative infection (superficial and deep), hardware-related failures (mechanical complications of internal fixation devices), wound dehiscence, and osteomyelitis. Secondary outcomes encompassed medical complications (acute kidney injury, urinary retention, constipation, nausea/vomiting, postoperative anemia, hypotension), hospital length of stay, and total hospital charges. Paired t-tests and McNemar's tests assessed differences between matched pairs, with multivariate logistic regressions validating significant findings. Statistical significance was set at $p < 0.05$.

RESULTS: A total of 4,931 ADHD-matched pairs were analyzed. Patients with ADHD had longer LOS (5.07 vs 4.69 days, $p = 0.041$) and increased risk of osteomyelitis (OR 1.42, $p = 0.0017$) and soft tissue infection (OR 1.39, $p = 0.009$). In 5,673 anxiety-matched pairs, patients with anxiety had significantly longer stays (7.16 vs 5.54 days, $p < 0.01$), higher charges (11.8% increase, $p < 0.01$), and increased risk of soft tissue infection (OR 1.55, $p < 0.01$), mechanical implant complications (OR 1.28, $p = 0.036$), and constipation (OR 2.03, $p < 0.01$). For depression (2,950 pairs), patients had longer LOS (8.31 vs 6.00 days, $p < 0.01$), higher osteomyelitis risk (OR 2.04, $p < 0.01$), and elevated rates of acute kidney injury (OR 1.45, $p = 0.049$). The autism cohort (2,322 pairs) showed no significant LOS difference, but higher odds of pneumonia (OR 1.76, $p = 0.025$) and postoperative ileus (OR 1.71, $p = 0.040$). Conversely, autism was associated with a significantly decreased risk of osteomyelitis (OR 0.62, $p = 0.004$) and vascular injury (OR 0.14, $p < 0.01$).

DISCUSSION AND CONCLUSION:

This study reveals that children with neuropsychiatric diagnoses experience heightened risks of specific postoperative complications and longer hospital stays following orthopedic surgeries. ADHD and anxiety were strongly linked to increased infection rates, likely driven by impulsive behaviors, stress-related immunomodulation, or reduced adherence to postoperative care. Depression was uniquely associated with higher osteomyelitis risk, potentially reflecting physiological stress and impaired immune function. In contrast, children with autism demonstrated increased rates of pneumonia and ileus, possibly due to sensory sensitivities and communication barriers that complicate care delivery. The decreased risk of osteomyelitis observed in children with autism may reflect underdiagnosis rather than a true reduction, as communication barriers in this population can make it more difficult to recognize and diagnose postoperative infections.

These findings highlight the need for tailored perioperative strategies. Interventions might include enhanced preoperative education for patients and caregivers, structured postoperative protocols, and closer collaboration with pediatric mental health services to mitigate behavioral and physiological risk factors. In conclusion, neuropsychiatric conditions significantly influence pediatric orthopedic outcomes, underscoring the importance of integrated, multidisciplinary perioperative care for children with these diagnoses. Mental health screening, targeted care pathways, and improved caregiver support are critical for reducing complications and optimizing recovery. Future research should explore tailored interventions to improve outcomes in this high-risk population.

In conclusion, neuropsychiatric conditions significantly influence pediatric orthopedic outcomes, underscoring the importance of integrated, multidisciplinary perioperative care for children with these diagnoses. Mental health screening, targeted care pathways, and improved caregiver support are critical for reducing complications and optimizing recovery. Future research should explore tailored interventions to improve outcomes in this high-risk population.