# Patients With Asthma Are At Increased Odds Of Both Pulmonary And Non-pulmonary Perioperative Adverse Events Following Total Knee Arthroplasty

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INTRODUCTION: Total knee arthroplasty (TKA) is a common procedure for which much effort is being given to optimizing patient outcomes. Patient factors are known to affect perioperative outcomes.  However, asthma has not been specifically considered in this regard, even though it is the most common inflammatory airways disease and has been shown to predispose to osteoarthritis.  The purpose of the current study was to investigate risk of perioperative adverse events in adult patients with asthma following TKA.

METHODS: Adult patients undergoing TKA for osteoarthritic indications were identified from 2015 – 2021Q3 Pearldiver M157 administrative datasets. Exclusion criteria included: age < 18 years, surgical indications of trauma, neoplasm, or presence of infection, as well as not being active in the database for 90 days following their procedure.

Asthma patients were matched to those without 1:1 based on age, sex, and Elixhauser Comorbidity Index (ECI). The incidence of 90-day adverse events and five-year revisions were compared using multivariable logistic regression (α=0.0023). The matched asthma group was then stratified based on disease severity for analysis of 90-day aggregated (any, severe, and minor) adverse events.

RESULTS: Among 721,686 TKA patients, asthma was noted for 76,125 (10.5%). Upon multivariable analysis of the matched populations, patients with asthma were at increased odds of experiencing numerous adverse events (Figure 1). Pulmonary-related adverse events associated with asthma in order of decreasing odds ratio (OR) included: pneumonia (OR=4.41), atelectasis (OR=3.64), respiratory failure (OR=2.81), pleural effusion (OR=2.61), failure to wean (OR=2.23), and re-intubation (OR=1.72) (p<0.0001 for each).  Non-pulmonary-related adverse events associated with asthma in order of decreasing OR included: emergency department visit (ED visits, OR=2.73), urinary tract infection (OR=2.62), cardiac event (OR=2.19), sepsis (OR=2.01), acute kidney injury (OR=1.67), pulmonary embolism (OR=1.63), hematoma (OR=1.49), deep vein thrombosis (OR=1.41), surgical site infection (OR=1.32), and wound dehiscence (OR=1.31), (p<0.0001 for each).  Finally, those with asthma were at 1.15 greater odds of five-year revision (p<0.0001).

Upon secondary analysis stratifying asthma by severity, patients with all severity levels of asthma showed elevated odds of adverse events following TKA. These associations increased in odds with increasing severity of asthma (Table).

DISCUSSION: Over a tenth of patients undergoing TKA were identified as having asthma, and these patients were found to be of greater odds of numerous pulmonary and non-pulmonary adverse events (a trend that increased with asthma severity), as well as five-year revisions. Clearly, patients with asthma need specific counselling and risk mitigation strategies when considering TKA.

SIGNIFICANCE/CLINICAL RELEVANCE: Noting that TKA patients with asthma are at greater risk of multiple pulmonary and non-pulmonary adverse events, specific counselling and preparations should be made for such patients and postoperative pathways should take such factors into account.
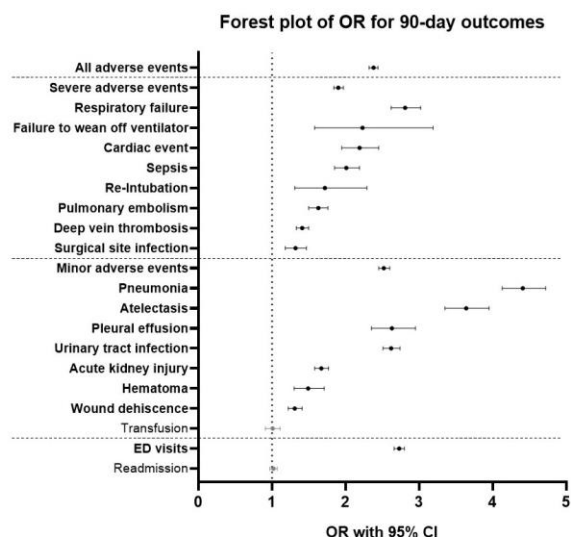
IMAGES AND TABLES:



Forest plot of OR for 90-day outcomes

**Figure.** Forest plot of odds ratios, 95% confidence intervals of multivariable analysis of 90-day outcomes following total knee arthroplasty in patients with and without asthma. Grey denotes nonsignificant odds ratios, black/bold denotes significant odds ratios.

**Table.** Multivariable analysis of 90-day outcomes of adult patients with varying severities of asthma who underwent primary total knee arthroplasty for osteoarthritis indications between 2015-2021 Q3. Reference level = Not Asthma

| | Mild Intermittent [OR (95% CI)] | P-value | Mild Persistent [OR (95% CI)] | P-value | Moderate Asthma [OR (95% CI)] | P-value | Severe Asthma [OR (95% CI)] | P-value |
|---|---|---|---|---|---|---|---|---|
| All adverse events | 2.25 (2.15,2.35) | P<0.0001 | 2.80 (2.64,2.97) | P<0.0001 | 3.34 (3.18,3.51) | P<0.0001 | 5.46 (4.99,5.99) | P<0.0001 |
| Severe adverse events | 1.76 (1.65,1.87) | P<0.0001 | 2.02 (1.86,2.19) | P<0.0001 | 2.52 (2.36,2.68) | P<0.0001 | 4.39 (3.95,4.87) | P<0.0001 |
| Minor adverse events | 2.40 (2.28,2.52) | P<0.0001 | 3.08 (2.89,3.29) | P<0.0001 | 3.55 (3.37,3.74) | P<0.0001 | 5.56 (5.06,6.10) | P<0.0001 |