Coding Definition Choice Makes a Difference in Total Joint Arthroplasty Administrative Database Studies

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INTRODUCTION: While many studies identify cohorts from administrative databases with Current Procedural Terminology (CPT) codes, others use International Classification of Diseases Procedural Coding System (ICD-10-PCS) codes due to their increased granularity. However, because ICD-10-PCS codes were designed for use only on inpatient services, this may introduce inherent biases when used to identify total hip arthroplasty (THA) and total knee arthroplasty (TKA) cases. This study aimed to investigate the effects of potential selection bias from choosing different coding systems which is poorly characterized currently.

METHODS: This study used a large, national administrative database – the M170Ortho PearlDiver Mariner Patient Claims Database. Patients of both sexes who underwent THA or TKA between 2021-2022 (583,426 patients total) were identified and grouped using either CPT codes or ICD-10-PCS codes. Exclusion criteria included: age < 18 years, and those with concomitant knee and hip trauma, neoplasm, or infection diagnosed within three months prior to surgery. Patient demographics were compared between cohorts via Chi-squared and t-test. The incidence and univariate odds ratios (OR) of notable 90-day postoperative adverse events after arthroplasty were also calculated with Bonferroni correction of $p<0.004$ applied in order to analyze how surgery outcomes were affected.

RESULTS SECTION: A total of 583,426 (215,646 THA; 367,780 TKA) cases were identified based on CPT codes while 133,658 TJA (52,899 THA; 80,759 TKA) cases were identified with ICD-10-PCS codes. Compared to the CPT cohort, the ICD-10-PCS cohort was older with a higher comorbidity burden (Elixhauser Comorbidity Index) ($p<0.001$ for both).

Relative to the CPT cohort, patients identified by ICD-10-PCS codes demonstrated greater odds of all 90-day postoperative adverse events assessed for both THA and TKA: transfusion, myocardial infraction, pulmonary embolus, deep vein thrombosis, sepsis, pneumonia, urinary tract infection, acute kidney injury, hematoma, wound dehiscence, surgical site infection, emergency department visits, hospital readmission, and revision ($p<0.001$ for all) (Figure 1).

DISCUSSION: Patient samples identified via ICD-10-PCS codes differ significantly with higher morbidity and worse outcomes than those created based on CPT codes. Reliance on ICD-10-PCS codes may thus introduce selection bias and should be used with caution. Adjustments for this via controlling or matching may be considered to improve study design.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): This study highlights an important consideration for avoiding confounding factors when designing or interpreting studies that rely on administrative coding to identify the study sample.

IMAGES AND TABLES:

Figure 1. Incidence of Adverse Events In ICD-10-PCS Cohort Compared to CPT Definition For THA and TKA