Can Large Datasets Generated from Billing Data Be Used to Study New Technology in Knee Arthroplasty?

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INTRODUCTION: Administrative databases are increasingly being used to study the use of new technology in total knee arthroplasty (TKA). Billing codes are typically used to generate these databases, although it is unclear whether this data is accurate enough to reliably study this topic. We studied our own institutional data to determine the validity of these codes.

METHODS: A retrospective chart review was completed for 1001 consecutive patients who underwent TKA from 2021-2023 at an academic medical center. Manual chart review was performed to document whether technology was used. The associated Current Procedural Terminology (CPT) code documentation in the chart and billing information was then examined to determine agreement between (1) technology usage noted in patients' charts and billing records and (2) CPT codes in patient's charts and billing records.

RESULTS: Almost half (45%) of patients had technology used during their procedure. The concordance between chart documentation and billing records was good with only 3% disagreement, or 27 patients (Kappa = 0.945 (95% CI 0.925 to 0.966); Phi coefficient = 0.947). The billing record was 94% sensitive and 100% specific for technology use. However, when observing the concordance of CPT codes in the chart and billing records, discrepancy was found in 30%, or 302 patients (Kappa = 0.324 (95% CI 0.276 to 0.372); Phi coefficient = 0.43).

DISCUSSION AND CONCLUSION: Overall, there appears to be good concordance between the documented use of technology in the patient chart and billing record. However, substantial discrepancy was noted when relying on chart CPT codes only. This study is the first to validate chart and billing records against a manual chart review and has clear implications for the validity of large database studies looking at technology in TKA. Further study is needed to determine if the results at our medical center are generalizable to other institutions.

Table 1. Agreement of Documented Use of Technology during TKA in the Patient Chart and Billing Records

Documentation of Technology Use	Count *(total n=1001)*	Percentage
Chart Only	27	2.7%
Both Chart and Billing	427	42.7%
Neither Chart nor Billing	547	54.6%

Kappa = 0.945 (95% CI 0.925 to 0.966); Phi coefficient = 0.947

Table 2. Agreement of CPT Codes in the Patient Chart and Billing Records

CPT Code Documentation	Count *(total n=1001)*	Percentage
Billing Only	298	29.8%
Chart Only	4	0.4%
Both Chart and Billing	129	12.9%
Neither Chart nor Billing	570	56.9%

Kappa = 0.324 (95% CI 0.276 to 0.372); Phi coefficient = 0.43