

Can Researchers Trust ICD-10 Coding in Orthopaedic Trauma Patients?

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INTRODUCTION:

The 10th revision of the International Classification of Diseases (ICD-10) coding system may prove useful to orthopaedic trauma researchers to efficiently identify and document populations based on comorbidities. However, its use for research first necessitates determination of its reliability. The purpose of this study was to assess the reliability of ICD-10 coding of non-orthopaedic diagnoses in orthopaedic trauma patients. We hypothesized that retrospective electronic medical record (EMR) review to obtain ICD-10 diagnostic codes would be reliable relative to prospective data collection.

METHODS: Manually abstracted data obtained by an experienced research team from 263 patients in two previous prospective studies from September, 2018 to April, 2022 at a level 1 trauma center was used as the gold standard. These data were compared to EMR ICD-10 code abstraction for components of the Charlson Comorbidity Index (CCI), obesity, alcohol abuse, and tobacco use. Percent agreement and Cohen’s kappa reliability index between these two abstraction methods were calculated to assess ICD-10 reliability.

RESULTS: Percent agreement ranged from 86.7% to 96.9% for all CCI diagnoses and was as low as 68.1% for the diagnosis “overweight.” Only diabetes without complications (kappa=0.794), AIDS (kappa=0.798), and morbid obesity (kappa=0.746) demonstrated Cohen’s kappa values to indicate substantial agreement. Sensitivity of EMR coding ranged widely from 0% to 100%, and specificity ranged from 76.2% to 100%. Further sensitivity, specificity, PPV, and NPV data are available in Table 1.

DISCUSSION AND CONCLUSION:

This study demonstrates disappointing reliability of EMR diagnostic coding in orthopaedic trauma patients for most comorbidities. Researchers may be able to rely on EMR coding to identify patients with diabetes without complications, AIDS, and morbid obesity, but in these cases, chart review may be necessary to confirm diagnoses. EMR ICD-10 coding is unreliable to calculate CCI. High percent agreement with low reliability was present due to low prevalence of most comorbidities. High negative predictive values suggest utility in using EMR ICD-10 codes to identify populations that exclude most comorbidities.

Sensitivity, Specificity, PPV and NPV of EMR ICD-10 coding for common diagnoses

| Diagnosis | | Prospective | | Sensitivity | Specificity | PPV | NPV |
|--------------------------|-----|-------------|-----|-------------|-------------|-------|-------|
| | | Yes | No | | | | |
| Morbidly Obese | Yes | 12 | 3 | 75.00 | 97.54 | 80.00 | 96.75 |
| | No | 4 | 119 | | | | |
| Obese | Yes | 20 | 11 | 52.63 | 89.00 | 64.52 | 83.18 |
| | No | 18 | 89 | | | | |
| Overweight | Yes | 0 | 2 | 0.00 | 97.92 | 0.00 | 69.12 |
| | No | 42 | 94 | | | | |
| Alcohol Abuse | Yes | 9 | 11 | 75.00 | 91.27 | 45.00 | 97.46 |
| | No | 3 | 115 | | | | |
| Tobacco Use | Yes | 36 | 23 | 87.80 | 76.29 | 61.02 | 93.67 |
| | No | 5 | 74 | | | | |
| Diabetes without insulin | Yes | 33 | 12 | 94.3 | 94.7 | 73.3 | 99.1 |
| | No | 2 | 216 | | | | |
| Diabetes with insulin | Yes | 2 | 22 | 100.0 | 91.6 | 8.3 | 100.0 |
| | No | 0 | 239 | | | | |