

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

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**Purpose:** 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 2 previous prospective studies from September 2018 to April 2022 at a Level I 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 2 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 72.6% for the diagnosis “overweight.” Only 2 diagnoses, diabetes without complications (kappa = 0.794) and acquired immunodeficiency syndrome (AIDS) (kappa = 0.798) demonstrated Cohen’s kappa values to indicate substantial agreement. Sensitivity of EMR coding ranged widely from 0% to 100%, and specificity ranged from 82.6% to 100%. Further sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) data are available in Table 1.

**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 or AIDS, 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 NPVs 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				

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device they wish to use in clinical practice.