

### International Classification of Diseases-10 (ICD-10) for inflammatory arthritis: not taking advantage of added granularity

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**INTRODUCTION:** In 2015, The International Classification of Diseases (ICD) was revised from ICD-9 to ICD-10 to increase granularity in patient diagnoses in areas that include inflammatory arthritis. This transition expanded the total number of codes from 14,500 to 70,000, and the number of inflammatory arthritis-specific codes from 14 to 425. However, it remains to be seen if providers are taking advantage and using the expanded breadth of codes, which would improve clinical care, research, and billing. Thus the purpose of the current study is to investigate adoption of ICD-10 in the context of inflammatory arthritis.

**METHODS:** The PearlDiver Mariner15 dataset (2011-2018) was utilized to identify patients with inflammatory arthritis with ICD-9 codes (n=14) and ICD-10 codes (n=425). The ICD-10 group was subsequently divided by year and provider specialty. The distribution of code utilization was compared using the chi-square and Kolmogorov-Smirnov test.

**RESULTS:** A cohort of 374,748 inflammatory arthritis patients was identified (ICD-9: 55.1%, ICD-10: 44.9%). 28.6% of ICD-9 inflammatory arthritis codes were high usage (used more than 1% of the time). 1.9% of ICD-10 codes were high-usage. The ICD-10 coding distribution showed poorer performance and narrower code usage than ICD-9 (p<0.001). To assess the learning curve for ICD-10 usage, annual ICD-10 subgroups were assessed by percentage of high-usage codes as follows: 2015--1.9%, 2016--1.9%, 2017--2.1%, 2018--1.9%. No year-to-year improvement was observed (p=0.993). To compare ICD-10 usage between specialties, specialty subgroups were assessed by percentage of high-usage codes as follows: primary care--1.9%, rheumatology--1.9%, orthopaedics--0.7%, other--1.7%. The distribution for the orthopaedic group showed poorer performance and narrower code usage compared to other specialty groups (p=0.036).

**DISCUSSION AND CONCLUSION:** ICD-10 opened the door for increased specificity in coding. Despite a thirty-fold increase in available codes, adoption of ICD-10 has been lackluster with a heavy reliance on a small subset of nonspecific codes. This has been marked by a lack of year-to-year improvement as well as by underperformance by orthopaedists relative to colleagues in other specialties. This underscores the need to better incorporate ICD-10 in areas such as inflammatory arthritis to facilitate clinical care, research, and billing.

Figure 1: ICD-9 vs. ICD-10 High Usage Codes (%)

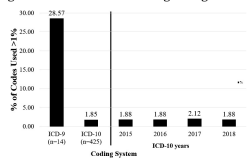


Figure 2A: ICD-9 Code Breakdown

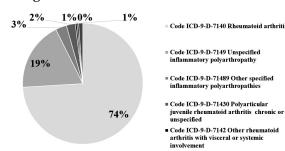


Figure 2B: ICD-10 Code Breakdown

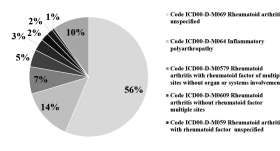


Table 1: Diagnosis Systems	
ICD-9 (1979-2015)	ICD-10 (2015-present)
14,025 codes	69,823 codes
3-5 characters in length	3-7 characters in length
First digit is alphanumeric, following digits are numeric	First digit is alpha, digits 2 and 3 are numeric, digits 4-7 are alphanumeric
Limited space for adding new codes	Flexible for adding new codes
Lacks detail	Very specific
Lacks laterality	Includes laterality
Lacks anatomical specificity	Includes anatomical specificity
Allows for 4 codes per claim	Allows for 12 codes per claim