Billing Accuracy of Natural Language Processing Generated Evaluation and Management Codes in Total Joint Arthroplasty

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INTRODUCTION: Selecting the appropriate evaluation and management (EM) code when billing for a clinic visit is based on accurate documentation and recall by the provider sometimes days later. Several natural language processing (NLP) applications (apps) are commercially available for generation of billing codes. Previous research has shown that these apps can save time spent in documentation. This study aimed to determine the accuracy of NLP generated EM codes in a total joint arthroplasty clinic.

METHODS: Retrospective review of consecutive patients seen in clinic during May 2024. The provider generated EM code, NLP generated EM code, and a blinded and certified coder (auditor) generated EM code (gold standard) were compared for agreement. Encounters within global period and patients without all 3 codes were excluded from the analysis. Furthermore, E&M codes were converted to reimbursed charges based contractual agreements.

RESULTS:

The NLP was used on 182 patients, 77 patients were included, 67 were excluded due to missing codes, and 38 were excluded due to missing payor charge. Concordance in EM coding between provider and auditor was 31% (table 1), NLP and auditor was 25% (table 2), and provider and NLP was 65% (table 3). There was a statistically significant difference ($p<0.001$) in average charges between provider vs. auditor ($47.57; 95% confidence interval [95CI]: [36.36, 58.79]) and NLP vs. auditor ($55.43; 95CI: [44.46, 66.40]), but not provider vs. NLP (-$7.86; 95CI: [-17.35, 1.64]; $p=0.1$).

DISCUSSION AND CONCLUSION: The provider and NLP coded and charged higher than the auditor indicating a potential need for provider and NLP algorithm training. However, validation from a second auditor and additional cases would strengthen these conclusions.

Table 1

Provider Code	Auditor Code								
	99203	99204	99205	99211	99212	99213	99214	99215	Total
99203	0	0	0	0	0	0	0	0	0
99204	10	5	0	0	0	0	0	0	15
99205	4	2	0	0	0	0	0	0	6
99211	0	0	0	0	0	0	0	0	0
99212	0	0	0	0	0	2	0	0	2
99213	0	0	0	0	3	7	0	0	10
99214	0	0	0	0	0	17	12	0	29
99215	0	0	0	0	0	11	4	0	15
Total	14	7	0	0	3	37	16	0	77

TABLE 2

NLP Code	Auditor Code								
	99203	99204	99205	99211	99212	99213	99214	99215	Total
99203	1	0	0	0	0	0	0	0	1
99204	10	5	0	0	0	0	0	0	15
99205	3	2	0	0	0	0	0	0	5
99211	0	0	0	0	1	0	0	0	1
99212	0	0	0	0	1	0	0	0	1
99213	0	0	0	0	0	3	0	0	3
99214	0	0	0	0	1	20	9	0	30
99215	0	0	0	0	0	14	7	0	21
Total	14	7	0	0	3	37	16	0	77

TABLE 3

Provider Code	NLP Code								
	99203	99204	99205	99211	99212	99213	99214	99215	Total
99203	0	0	0	0	0	0	0	0	0
99204	1	13	1	0	0	0	0	0	15
99205	0	2	4	0	0	0	0	0	6
99211	0	0	0	0	0	0	0	0	0
99212	0	0	0	0	0	0	2	0	2
99213	0	0	0	1	1	1	7	0	10
99214	0	0	0	0	0	2	19	8	29
99215	0	0	0	0	0	0	2	13	15
Total	1	15	5	1	1	3	30	21	77