

Electronic Health Record Implementation Is Associated With a Negligible Change in Outpatient Volume and Billing

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Abstract

The Health Information Technology for Economic and Clinical Health (HITECH) Act mandated that hospitals begin using electronic health records (EHRs). To investigate potential up-coding, we reviewed billing data for changes in patient volumes and up-coding around the time of EHR implementation at our academic medical center.

We identified all new, consultation, and return outpatient visits on a monthly basis in the general internal medicine and orthopedics departments at our center. We compared the volume of patient visits and the level of billing coding in these 2 departments before and

after their transitions to ambulatory EHRs. Pearson χ^2 test was used when appropriate.

Patient volumes remained constant during the transition to EHRs. There were small changes in the level of billing coding with EHR implementation. In both departments, these changes accounted for minor, but statistically significant shifts in billing coding (Pearson χ^2 , $P < .001$). However, the 44.7% relative increase in level 5 coding in our orthopedics department represented only 1.7% of patient visits overall.

These findings indicate that lay media reports about an association between dramatic up-coding and EHRs could be misleading.

Take-Home Points

- With EHR implementation there are small changes in the level of billing coding.
- Although these changes may be statistically significant they are relatively minor.
- In the general internal medicine department, level 4 coding increased by 1.2% while level 3 coding decreased by 0.5%.
- In the orthopedics department, level 4 coding increased by 3.3% while level 3 coding decreased by 3.1%.
- Reports in the lay media regarding dramatic up-coding after EHR implementation may be misleading.

The Health Information Technology for Economic and Clinical Health (HITECH) Act, which was signed into law in 2009, mandated that hospitals that care for Medicare patients either begin using electronic health records (EHRs) or pay a nontrivial penalty.¹ By now, the majority of orthopedic surgeons have implemented EHRs in their practices.² Despite ongoing debate in the orthopedic literature,³ EHRs are expected to improve coordination of care, reduce duplicate testing, and reduce costs over the long term as healthcare insurance coverage is extended to millions more Americans.

In early coverage, however, media reported that EHR implementation at some hospitals was correlated with substantial increases in Medicare payments.⁴ Journalists suggested the billion

Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

Table. **EHR Implementation Was Associated With Small Increases in CPT Coding Levels^a**

CPT Coding Level	General Internal Medicine Department				Orthopedics Department			
	Before EHR		After EHR		Before EHR		After EHR	
	n	%	n	%	n	%	n	%
1	30	0.4	4	0.1	74	0.2	81	0.5
2	68	0.9	27	0.4	2424	7.4	861	5.3
3	2529	34.4	2387	33.9	18898	51.5	7658	48.4
4	4287	58.3	4188	59.5	13597	37.1	6526	40.4
5	440	6	435	6.2	1377	3.8	894	5.5

^aFor each department, distribution before EHR implementation and distribution after EHR implementation differed significantly (Pearson χ^2 , $P < .001$). Abbreviations: CPT, Current Procedural Terminology; EHR, electronic health record.

dollars more paid by Medicare to hospitals in 2010 than in 2005 were partly attributable to up-coding facilitated by EHRs.⁵ The secretary of the Department of Health and Human Services (DHHS) and the attorney general of the Department of Justice also weighed in on this controversy by expressing their concerns in a letter to the presidents of 5 hospital associations.⁶ The inspector general of DHHS also published a report critical of Medicare officials' oversight of EHRs.⁷

Responding to the critical reception of EHR implementations, investigators studied the validity of the early reports and anecdotes. Some initial reports cited the emergency department (ED) as an area at high risk for using the convenience of EHRs to up-code visits.⁵ The DHHS Office of the Inspector General noted that, between 2001 and 2010, the proportion of claims for lower reimbursement categories of American Medical Association *Current Procedural Terminology* (CPT) codes decreased while the proportion for higher-paid billing codes increased for all visit types.⁸ Addressing these concerns, the American Hospital Association⁹ issued a brief that noted that any observed coding increases were more likely attributable to more ED use by Medicare patients and increased average illness severity. In a thoughtful perspective, Pitts¹⁰ conceded that, though utilization and illness severity may explain part of the trend, the trend may also be related to technological innovations and changes in culture and practice style in the ED.

Because these studies and reports variously suggested that EHR implementation affects patient volume and up-coding, and because none of the reports specifically addressed orthopedics, we conducted a study to determine whether any significant up-coding or change in patient volumes

occurred around the time of EHR implementation in ambulatory practices at our academic medical center. In a recent national study, Adler-Milstein and Jha¹¹ compared billing data of hospitals that adopted EHRs and hospitals that did not. Although both groups showed increased billing trends, the increases were not significantly different between the EHR adopters and nonadopters. To more effectively control for the confounding differences between groups of EHR adopters and nonadopters, we studied individual departments during EHR implementation at our institution.

Methods

In 2011, our academic medical center began the transition to EHRs (Epic). We examined our center's trends in patient volumes and billing coding around the time of the transition in the outpatient practice of the general internal medicine (GIM) department (EHR transition, October 2011) and the outpatient practice of the orthopedics department (EHR transition, March 2012). These departments were chosen because they are representative of a GIM practice and a subspecialty practice, and because a recent study found that GIM practitioners and orthopedic surgeons were among those specialists who used EHRs the most.¹²

After this study was approved by our Human Investigations Committee, we began using CPT codes to identify all outpatient visits (new, consultation, and return) on a monthly basis. We compared the volume of patient visits and the billing coding level in the GIM and orthopedics departments before and after EHR implementation. Pearson χ^2 test was used when appropriate, and statistical analyses were performed with SPSS for Windows Version 16.0.

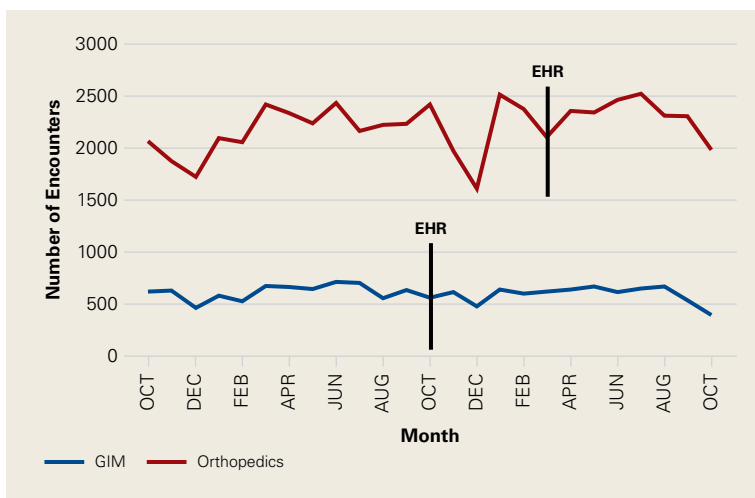


Figure 1. Volume of patient encounters per month in the general internal medicine (GIM) department (blue) and the orthopedics department (red).

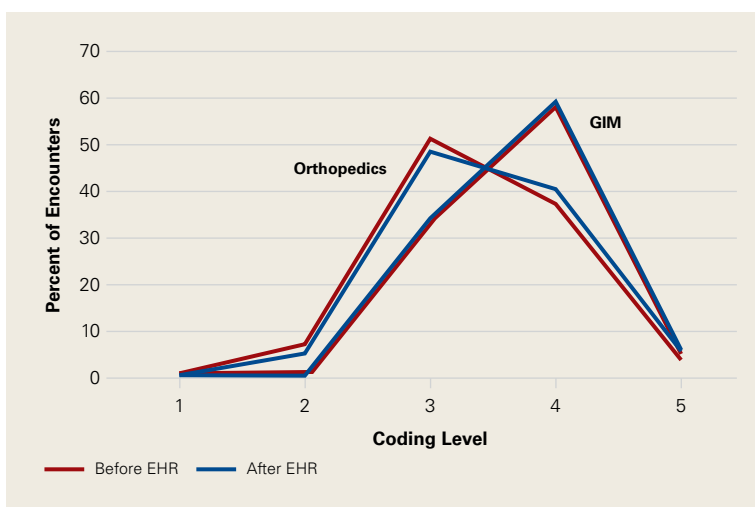


Figure 2. Current Procedural Terminology coding levels before (red) and after (blue) electronic health record (EHR) implementation in the general internal medicine (GIM) department (right) and the orthopedics department (left).

Results

In the GIM department, mean monthly volume of patient visits in the 12 months before EHR implementation was similar to that in the 12 months afterward (613 vs 587; $P = .439$). Even when normalized for changes in provider availability (maternity leave), the decrease in volume of patient visits after EHR implementation in the GIM department was not significant (6.9%; $P = .107$). Likewise, in the orthopedics department, mean monthly volume of patient visits in the 17 months before EHR implementation was similar to that in the 7 months afterward (2157 vs 2317; $P = .156$). In fact, patient volumes remained constant during the EHR transition (**Figure 1**).

EHR implementation brought small changes in billing coding levels. In the GIM department, the largest change was a 1.2% increase in level 4 billing coding—an increase accompanied by a 0.5% decrease in level 3 coding. In the orthopedics department, the largest change was a 3.3% increase in level 4 coding—accompanied by a 3.1% decrease in level 3 coding (**Figure 2**). In both departments, these small changes across all levels represent minor but statistically significant shifts in billing coding levels (Pearson χ^2 , $P < .001$) (**Table**).

Discussion

It is remarkable that the volumes of patient visits in the GIM and orthopedics departments at our academic center were not affected by EHR implementation. Some EHR vendors have recommended decreasing patient scheduling by 10%, for 1 month after the transition, to adjust for providers' learning curves; managers of an academic pediatric primary care center reported maintaining the 10% scheduling reduction for 3 months because of the prevalence of inconsistent EHR users in continuity clinics and transient users such as medical students and interns.¹³

Rather than reduce scheduling during the EHR transition, surgeons in our practice either added or lengthened clinic sessions, and the level of ancillary staffing was adjusted accordingly. As staffing costs at any given time are multifactorial and vary widely, estimating the cost of these staffing changes during the EHR transition is difficult. We should note that extending ancillary staff hours during the transition very likely increased costs, and it is unclear whether they were higher or lower than the costs that would have been incurred had we reduced scheduling or tried some combination of these strategies.

Although billing coding levels changed with EHR implementation, the changes were small. In the GIM department, level 4 CPT coded visits as percentages of all visits increased to 59.5% from 58.3%, and level 5 visits increased to 6.2% from 6.0%; in the orthopedics department, level 4 visits increased to 40.2% from 37.1%, and level 5 visits increased to 5.5% from 3.8% (**Table**). The 1.2% and 0.2% absolute increases in level 4 and level 5 visits in the GIM department represent 2.1% and 3.3% relative increases in level 4 and level 5 visits, and the 3.3% and 1.7% absolute increases in the orthopedics department represent 8.4% and 44.7% relative increases in level 4 and level 5 visits after EHR implementation.

Although the absolute increases in level 4 and level 5 visits were relatively minor, popular media have raised the alarm about 43% and 82% relative increases in level 5 visits after EHR implementation in some hospitals' EDs.⁴ Although our orthopedics department showed a 44.7% relative increase in level 5 visits after EHR implementation, this represented an increase of only 1.7% of patient visits overall. Our findings therefore indicate that lay media reports could be misleading. Nevertheless, the small changes we found were statistically significant.

One explanation for these small changes is that EHRs facilitate better documentation of services provided. Therefore, what seem to be billing coding changes could be more accurate reports of high-level care that is the same as before. In addition, because of meaningful use mandates that coincided with the requirement to implement EHRs, additional data elements are now being consistently collected and reviewed (these may not necessarily have been collected and reviewed before). In some patient encounters, these additional data elements may have contributed to higher levels of service, and this effect could be especially apparent in EDs.

Some have suggested a potential for large-scale up-coding during EHR transitions. Others have contended that coding level increases are a consequence of a time-intensive data entry process, collection and review of additional data, and more accurate reporting of services already being provided. We are not convinced that large coding changes are attributable solely to EHR implementation, as the changes at our center have been relatively small.

Nevertheless, minor coding level changes could translate to large changes in healthcare costs when scaled nationally. Although causes may be innocuous, any increases in national healthcare costs are concerning in our time of limited budgets and scrutinized healthcare utilization.

This study had its limitations. First, including billing data from only 2 departments at a single center may limit the generalizability of findings. However, we specifically selected a GIM department and a specialty (orthopedics) department in an attempt to capture a representative sample of practices. Another limitation is that we investigated billing codes over only 2 years, around the implementation of EHRs in these departments, and therefore may have captured only short-term changes. However, as patient volumes and billing

are subject to many factors, including staffing changes (eg, new partners, new hires, retirements, other departures), we attempted to limit the effect of confounding variables by limiting the period of analysis.

Overall, changes in patient volume and coded level of service during EHR implementation at our institution were relatively small. Although the trend toward higher billing coding levels was statistically significant, these 0.2% and 1.7% increases in level 5 coding hardly deserve the negative attention from lay media. These small increases are unlikely caused by intentional up-coding, and more likely reflect better documentation of an already high level of care. We hope these findings allay the concern that up-coding increased dramatically with EHR implementation.

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This paper will be judged for the Resident Writer's Award.