Changes in Trauma Service Professional Fee Coding Following Electronic Health Record Implementation

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Abstract

Background: Implementing an electronic health record (EHR) system is an expensive and large-scale project. Few studies have examined the impact of inpatient EHRs on documentation, coding levels, and professional fee reimbursement. Trauma and Emergency Surgery services are ideal for studying this question given their high percentage of inpatient evaluation and management (E & M) work. This study elucidates effects of an EHR on coding practices for the inpatient Trauma and Emergency Surgery Service at an academic level I Trauma Center. We hypothesize that EHR implementation leads to higher coding levels and increased professional fee revenue.

Methods: De-identified data was extracted from the University Health System Consortium and Association of American Medical Colleges Faculty Practice Solution Center database. Our medical center transitioned from written physician notes to the EHR in May 2009. The database was queried for notes written by the Trauma and Emergency Surgery service in calendar years 2008 and 2011 to compare years before and after EHR implementation. The CPT codes of interest were for E & M Initial Hospital Care (99221, -2, and -3) and Subsequent Hospital Care (99231, -2, and -3). Coding levels were linked to standard Medicare Relative Value Units. Professional coders were used throughout and coding guidelines were unchanged over the study period.

Results: Coding levels for Initial Hospital Care notes increased immediately and markedly. Revenue from these codes increased by 28.1% while Subsequent Hospital Care codes increased less dramatically by 1.7%.

Conclusions: The increase in higher E & M coding levels due to HER implementation was statistically significant, immediate, and durable. The increase in total Initial Hospital Care notes resulted from improved coder note recognition and higher note quality. Revenue increased measurably.

Keywords: Electronic health record; Coding; Billing; Trauma

Introduction

Implementing an Electronic Health Record (EHR) system is an expensive, large-scale, multi-level organizational project. Hospitals, health systems, and clinics have adopted EHRs for reasons ranging from financial to legal to operational. EHRs have perceived benefits in clinical efficiency, communication, and continuity of care [1]. The effects of EHR have been studied in the outpatient setting. Some studies have reported positive returns on investment and improved productivity and quality [2-7], but others have not [8]. Fewer studies have examined the impact of inpatient EHRs, and some healthcare systems have been hesitant to adopt them because they are expensive and potentially cumbersome [9,10]. Examination of the effect of inpatient EHRs on documentation coding levels and professional fee reimbursement are sparse [11,12]. We investigated the impact of an inpatient EHR on coding levels and reimbursement for a busy trauma and emergency surgery service at a large teaching hospital. Trauma and emergency surgery is the ideal type of surgical service to study because of the high percentage of inpatient cognitive evaluation and management work done by the average trauma and emergency surgeon relative to other surgical specialties [13].

This retrospective study’s purpose was to elucidate the effect of switching to an EHR on coding practices for the inpatient trauma and emergency surgery service at the University of California, Davis, Medical Center (UCDMC), an academic level I Trauma Center. Our hypothesis was that the implementation of an EHR would result in more complete notes and higher levels of coding, which in turn would increase professional fee revenue.

Materials and Methods

This study was approved by the Institutional Review Board of The University of California, Davis. De-identified data was extracted from the University Health System Consortium and Association of American Medical Colleges Faculty Practice Solution Center Database (FPSC). The FPSC is an analysis and benchmarking tool created from the direct download of coding data from over 80 participating academic medical centers. Both evaluation and management (E & M) and procedural coding are collected. Data can be sorted to focus on specific surgeons and services. Our analysis concentrated on surgeons members of the trauma and emergency surgery service who care for all trauma patients and 75% of the emergency surgery patients at the institution. The service manages its own critical care patients.

UDMC transitioned from hand-written notes to the EHR in May 2009. The transition was done all at once in a “big bang” approach wherein all of the note creation was switched from paper to electronic in a single day. The FPSC database was queried for notes written in calendar years 2008 and 2011 for a comparison of the year before and the year after implementation of the EHR. Calendar years 2009 and 2010 were not used for before and after comparisons to minimize any...
potential transitional effects as the faculty group, coders, and health system converted to the EHR. However, data was analyzed for the entire period between January 1, 2008 and December 31, 2011 to track trends over time.

The CPT codes of interest were for Initial Hospital Care (99221, 99222, and 99223) and for Subsequent Hospital Care (99231, 99232, and 99233), representing initial history and physical notes and subsequent progress notes, respectively. Coding levels were linked to standard Medicare relative value units (RVUs), with higher levels of coding generating higher levels of RVUs. Paid medical abstractor coders performed all coding following both institutional and Medicare guidelines that were unchanged throughout the study time period.

To quantify the effect of coding changes on revenue, service-specific data from an institutional database (Decision Line) was used to generate CPT-code-specific data for revenue per RVU. For example, the average dollars of revenue generated per RVU when a note was coded out as a mid-level Initial Hospital Care note (99222) or as a low level Subsequent Hospital Care note (99231) were calculated. CPT-code-specific RVU and service-specific revenue per RVU data for 2011 was used for all analyses to determine the effects of coding level changes on revenue as an isolated variable. Using data from a specific year avoided any influence of payer mix or reimbursement rate changes over time. Using the above approach, the revenue per RVU that the service generated in 2008 and 2011 for each of the CPT codes of interest was calculated.

The total and the proportion of trauma service notes coded at each of the three coding levels for Initial Hospital Care and Subsequent Hospital Care were determined for each year. These proportions were used to calculate the revenue generated by each CPT code in a given calendar year. To focus solely on the effect of coding level changes and to eliminate any effects of changes in patient volume, the revenue generated by an average 100 patients in 2008 and 2011 was calculated and compared.

The Decision Line hospital database was used to quantify admission volume over time with data that was independent of CPT and coding level data.

Results

After switching to an EHR, a dramatic and sustained increase in Initial Hospital Care coding levels was observed. This trend is depicted in Figure 1 and in Table 1. The percentage of notes coded at the highest level for Initial Hospital Care was 12.7% in 2008 and 55.4% in 2011. A less dramatic increase in the percentage of notes coded at the highest level for Subsequent Hospital Care was also seen, increasing from 29.3% in 2008 to 37.1% in 2011 (Figure 2 and Table 1).

For Initial Hospital Care, revenue per 100 notes was 28.1% higher in 2011 after EHR implementation as compared to 2008 before EHR implementation. The increase for Subsequent Hospital Care was a more modest 1.7% (Table 2).

Discussion

The landscape of health care delivery is changing dramatically and quickly with rapid technological advances. Electronic Health Records, especially full EHR, remain relatively uncommon, but the number of hospitals adopting elements of an EHR is increasing rapidly, with substantial expansions in EHR capability seen over the matter of just a few years [14]. Academic medical centers and hospitals in urban settings have been more likely to implement an HER [14], but physician practices and smaller institutions are also adopting EHR more and more each year [15]. The US government is aggressively encouraging the transition from paper to digital records with a variety of incentives for EHR adoption and even penalties for failing to make the change [16]. It is clear that the EHR will be the main documentation and ordering system in our hospitals within the next generation.

The advantages and disadvantages of EHRs have been studied and discussed. Clinically, EHRs improve adherence to evidence-based guidelines for best-practice care measures [17]. In both inpatient and outpatient settings, EHRs increase rates of administering recommended vaccinations [18], increase use of appropriate chemical
Electronic health records are here to stay and will increasingly dominate medical record keeping and professional fee coding. Electronic health records clearly have both advantages and disadvantages, but the hope is that the advantages will ultimately outweigh the disadvantages, including when it comes to quantifiable costs and benefits as measured in dollars. A fairly convincing case has been made that EHRs are, in the long run, a good investment for institutions, but there is much less information about the effects of an EHR on physician coding and professional fee revenue. Elucidating these effects is becoming increasingly important as payors are starting to audit how EHR charting behaviors influence billing patterns [35]. Our study demonstrates a positive effect on professional coding and revenue with the implementation of an EHR for inpatient evaluation and management services provided by a busy trauma and emergency surgery service.

Table 2: Realized revenue and revenue change per 100 notes by coding level and overall.

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>$ / 100 Notes 2008</th>
<th>$ / 100 Notes 2011</th>
<th>Revenue Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Hospital Care, Total</td>
<td>11,129.67</td>
<td>14,252.41</td>
<td>+ 28.06%</td>
</tr>
<tr>
<td>Subsequent Hospital Care</td>
<td>6,460.03</td>
<td>6,568.01</td>
<td>+ 1.67%</td>
</tr>
</tbody>
</table>

References


26. Takian A, Sheikh A, Barber N (2012) We are bitter, but we are better off: case study of the implementation of an electronic health record system into a mental health hospital in England. BMC Health Serv Res 12: 484.


