Re-engineering the Healthcare Team: 
Meeting the needs of Providers with Information Specialists

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Abstract: Implementation of electronic health records (EHRs) impacts provider workflow at the point-of-care. Information access and data entry tasks have been appended to provider workload, adversely affecting clinical workflow as well as provider cognitive resources and job satisfaction. The quantity and complexity of information required for patient care and the documentation required for administrative and medico-legal purposes is expanding rapidly, leading to ever-increasing impacts on provider cognitive function. We addressed these challenges by introducing a new member into the healthcare team whose role is to function as the intermediary between the provider and the information system. We have shown that re-engineering the healthcare team in a large otolaryngology practice through the addition of information specialists has increased productivity. “Off-loading” provider information system tasks to an information specialist optimizes provider-patient interaction by reducing provider cognitive workload while simultaneously improving efficiency, documentation, and revenue.

INTRODUCTION

Implementation of electronic health records (EHRs) is widely considered to be a critical solution to the challenges facing US Healthcare in the 21st century (IOM 2001). Nevertheless, implementation has progressed slowly due to cost, impact on the revenue cycle and workflow, lack of system inter-operability, and disruption of the physician-patient interaction (Ash 2004, Embi 2004, Jha 2009). Despite substantial financial incentives, physicians remain hesitant to implement EHR systems regardless of their overwhelming adoption of other technology. Large integrated health care systems such as Kaiser Permanente and the Veterans Health Administration (VHA) have successfully implemented EHR systems; but the financial and workflow costs have been substantial. Physicians in the VHA have noted that interaction with the electronic health record may impair cognitive function for patient interaction (Embi 2004). The Agency for Healthcare Quality and Research (AHRQ) and the National Institute of Standards and Technology (NIST) have recently published two seminal reports elucidating the need to adapt systems to workflow and to focus on human computer interaction and the usability of the system (Schumacher 2010, Carayon 2010). Among other findings, the authors noted that increased provider workload accompanying EHR implementation was a universal finding (Carayon 2010). “We have discovered that some workflow changes associated with implementation seem to be nearly universal, such as the increased workload of physicians who have implemented an EHR”.

The current emphasis on implementation of EHRs impacts provider workflow at the point-of-care. Information access and data entry tasks have been appended to provider workload, already the busiest member of the healthcare team in an ambulatory office. These new tasks adversely affect clinical workflow as well as provider cognitive resources and job satisfaction. The quantity and complexity of information required for patient care and the documentation required for administrative and medico-legal purposes is expanding rapidly, with an ever-increasing impact on provider function. A critical goal established by this group of physicians
prior to implementing an EHR was to minimize the requirement for direct provider interaction with the computerized EHR to avoid impacting provider workload and secondarily, productivity. Achieving this goal was predicated on the use of remote "scribes" to facilitate bi-directional transfer of all data between providers and the EHR system. Information specialists ("scribes"), located in separate work stations, communicate with providers utilizing wireless headsets and enter and retrieve all EHR data.

The goal of all information system designers is to utilize user-centered design strategies that facilitate navigating, accessing, and entering information into the EHR while minimizing added cognitive, technologic, and temporal burdens on the practitioner. This goal remains elusive as EHR vendors have yet to achieve the goal of integrating the EHR into workflow without significant impact on productivity and workflow. The "out-of-box" approach we present addresses these challenges by introducing a new member into the healthcare team who functions as the intermediary between the provider and the information system. As EHR vendors find a more user-friendly solution to the problem in the future, this new team member will be unnecessary. Until that time, the strategy we describe here is a viable solution for busy, data-intensive, practice settings.

**METHODS**

A “remote scribe” strategy was implemented commensurate with introduction of a new EHR in a large single-specialty otolaryngology practice in 2008.

**Pre-implementation**

Pre-implementation charting was accomplished with pre-designed "check-box" templated record that was augmented if necessary by dictated text that was later transcribed, printed, and pasted (paste out of a bottle) into the appropriate portion of the paper record. An internal audit process was established in this practice in 2000 to ensure that sufficient documentation existed to support both the procedure codes and the evaluation and management (E/M) codes submitted for reimbursement. “High” level codes (4s and 5s), all visits that consisted of an E/M code as well as a CPT procedure code, and all consultation visits were audited prior to their submission for reimbursement. If the audit determined that the documentation did not support the higher code, the code was reduced to the appropriate level. The audit never resulted in raising a code from a lower level to a higher one.

**Implementation Process**

Repurposed office staff (nurses, medical assistants and transcriptionists) were trained as information specialists ("remote scribes") and tasked with retrieval and entry of information to and from the EHR. A two-way headset communication system with 7 channels was purchased. Seven remote scribe computer stations with multiple remote monitors and remote monitor switching apparatus was purchased and installed. Information specialists located in a separate room maintain continuous voice communication with providers during office hours. These information specialists quickly assumed their role as new members of the healthcare team. All but one of the remote scribes had previously served in clinical roles in the office and were therefore familiar with each providers’ nuances allowing more seamless integration of the scribe into the office workflow.

Skill set requirements for all scribes included knowledge of medical terminology, basic coding, computer and typing skills. Appropriate entry-level clinical staff were hired to replace the re-purposed scribes as necessary.

**EHR Access and Data Entry**

The EHR is opened by ancillary staff (medical assistants, nursing staff) who collect and direct the initial history and review of systems, inputting vitals and updating medications. With the assistance of the remote scribe, the provider reviews and verifies the previously collected documentation as well as information from prior visits and lab tests at the beginning of each encounter, usually prior to entering the examination room. The remote scribe is located in a dedicated workstation in the office separate from clinical staff and patients, interacting with the provider via wireless headset (Figure 1).
Each provider has a dedicated remote scribe for the entire clinical day. Each remote scribe has a dual-monitor computer that has the ability to display EHR contents and accessed tests etc... on a slave monitor in any of twenty exam rooms or on small monitors situated in the "pod" outside of the exam room. The provider views the evolving medical record on either a large monitor in the patient room or the small monitor at a nursing station in the "pod." This facilitates real-time revision and manipulation of the record by the provider through interaction with the remote scribe. The EHR application utilizes pre-designed templates that facilitate the population of standardized text or repetitive entries. When necessary, "free text" is entered by the remote scribe into any portion of the record under verbal direction by the provider. Records of prior encounters, laboratory tests, audiograms, radiology images and reports are accessed and displayed by the remote scribe, while the provider continues to attend to the patient. With the monitor in the room positioned behind the patient chair, eye contact with the patient is maximized throughout the encounter (Figure 2).

Prescriptions, referral letters and lab orders are entered by the remote scribe under the direction and approval of the provider actively viewing the monitor and in continuous verbal communication. Prescriptions and reports are forwarded electronically to the pharmacy, referring physician and the laboratory before the patient leaves the office. The encounter is coded immediately through provider interaction with the remote scribe and the application software to initiate the claim process. The physician views the document and may either accept or adjust the code prior to closing the record. The EHR is complete at the conclusion of the encounter, allowing the provider to move onto the next patient without having to return to the record later to review or enter further data.

Pre- and Post-Implementation Productivity Measures

Patient volumes for two eight month periods pre- and post-EHR implementation were assessed retrospectively, as well as total provider office hours, overhead costs, compliance with documentation requirements, and provider satisfaction. Overhead
costs of the remote scribe system were calculated from a total cost of workstation equipment and furniture, and differential in the number of support staff required. The cost of the EHR system was not included in these calculations. Internal audit of coding accuracy were performed following implementation and compared with prior audits. Data was examined retrospectively over two equivalent 8-month intervals (pre- and post-implementation; January-August 2008 and January-August 2009) by the practice administrator (RB) for the purpose of quality assurance. Analysis of the pre- and post-implementation data was conducted using PASW 18 statistical software (SPSS, Chicago IL).

RESULTS

After an anticipated three-month transition to the remote scribe-assisted EHR system, patient volumes increased by 3.6%. All providers noted increased efficiency as evidenced by an increase in number of patient encounters per hour (Figure 3).

Figure 3 - Patients per hour per provider

Following implementation, the average provider spent 37.5 fewer minutes per week in the office despite the increase in patient encounters. All seven providers used the EHR application fully; none continue to use paper charting. Some of the providers chose to take advantage of the increased efficiency by increasing patient load, others decided to take additional recreational time out of the office.

Implementation of the remote-scribe assisted EHR system resulted in an 8.7% increase in efficiency as measured by the average number of patient encounters per provider per hour (3.81 pre- vs. 4.14 post-implementation). This change was statistically significant as evident on the Wilcoxon signed-rank test (1-tailed) p = .009. Unbilled encounters such as post-op visits within the global period and visits for discussion of test results were excluded from analysis. The efficiency gains associated with the use of the remote scribe-assisted EHR system have been estimated to potentially yield either 155 extra patient encounters or 30 fewer hours worked annually, per provider.

E/M coding level accuracy increased due to improved documentation and real-time data entry. The change in coding levels was statistically significant at p < .001 (Pearson Chi-Square test). The effect size was large, with a Cramer’s V value of .461. Increased accuracy of coding was largely manifested by decreased down-coding (for insufficient documentation to support the appropriate code for the services rendered), a common practice of the internal auditing department prior to scribe-assisted EHR.

One time set-up expense for workstation equipment and furniture was approximately $6,500.00 per provider (Table 1).

Table 1

<table>
<thead>
<tr>
<th>Expense</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scribe chair and desk</td>
<td>$550 per scribe</td>
</tr>
<tr>
<td>Scribe workstation</td>
<td>$1,300 per scribe</td>
</tr>
<tr>
<td>Scribe headphone</td>
<td>$249 per scribe</td>
</tr>
<tr>
<td>Physician headset</td>
<td>$287 per physician</td>
</tr>
<tr>
<td>Exam room monitor</td>
<td>$957 per room</td>
</tr>
<tr>
<td>(3 rooms/physician)</td>
<td></td>
</tr>
<tr>
<td>Switch transmitter/receiver</td>
<td>$2,142</td>
</tr>
<tr>
<td>Scribe wage and benefits</td>
<td>$41,724 per scribe annually</td>
</tr>
</tbody>
</table>

The ratio of scribe-to-provider was not one-to-one in this practice since rarely are all physicians present in the office simultaneously due to time spent in surgery and hospital rounds. The actual full-time ratio in this office is four scribes to seven providers (one provider is a full-time office physician assistant). Since the scribes were re-purposed from clinical staff, replacement wage and benefit expenses were at entry level scale. Scribes are available at all times for providers scheduled to be in the office. In the event that a provider added additional office hours or was in the office unexpectedly, several scribes were available on-site working other clinical or clerical roles and could be quickly re-tasked as needed. In the event of system failure or a scribe not being available, the provider reverted to either paper charting or dictation and the information entered into the medical record by the remote scribe or other clinical staff at a later time. No maintenance cost
DISCUSSION

Re-engineering the healthcare team in a large otolaryngology practice through the addition of information specialists ("remote scribes") led to increased productivity. “Off-loading” provider information system interaction by adding a remote scribe to the team conveyed the potential to improve the quality and efficiency of patient care delivery by eliminating the burden of data access and entry for the provider.

Currently available EHR systems fail to accommodate the workflow of busy, information-intense, modern medical practices, in part due to the necessity of hands-on data retrieval and entry by the provider. Tasking the busiest member of the healthcare team with time-consuming interaction with the EHR inevitably results in impairment of workflow. The more time the provider invests in chart review, data search, data assimilation, and data entry, the less time that provider has for patient interaction. The greater the complexity of the encounter, the more inefficient the interaction may become due to the need to access multiple sources of information. Inadequate provider computer skills can further compromise the effectiveness of EHR system integration (Ludwick 2010).

Voice recognition software has been touted as a viable alternative to free texting, but the editorial burden is often more than many physicians are willing to undertake (Lawrence 2009). While voice recognition software or standard dictation to a scribe can alleviate the burden of typing text into the chart, the provider must still navigate and probe the EHR for previously entered data such as typed reports, labs, radiology reports and images, and scanned documents.

Transition to a EHR system is associated with substantial training requirements and a steep learning curve. Experience with a particular system reduces workflow impact as the provider "learns" the system. Paradoxically, sustained usage of the technology is integrally dependent on provider satisfaction with the technology (for those who have a choice) (Menachemi 2010).

EHR system costs for physician practices range from several thousand to several hundred thousand dollars, with additional yearly costs for licensing, maintenance, upgrades etc. Many providers have found that decreases in productivity accompanying implementation represent even greater costs than the costs of system purchase (Jessen 2007). Typical reductions in productivity average 25-40% and may last many months (Cannon 2010). We believe that delegating system interaction to a specialist (remote scribe) was instrumental in eliminating the potential productivity drop often seen with EHR implementation. The revenue from increased numbers of patient encounters and decreased down-coding due to incomplete documentation has partially offset the cost of remote scribe EHR system investment.

Aware of experiences of others, this practice made a cogent decision to delay implementation of the EHR until the remote scribe-assistant strategy was in place. As a result, we are unable to compare a basic provider-manipulated EHR system with our scribe-assisted system. Review of our experience following implementation of a remote scribe-assisted EHR system demonstrates that reduced productivity associated with EHR-implementation can be avoided. Eliminating hands-on EHR computer access and data entry by the provider, the busiest member of the healthcare team, resulted in increased efficiency, increased accuracy and completeness of documentation while maintaining patient focused encounters.

CONCLUSION

Until highly usable, workflow compliant EHR systems become available, the remote scribe assisted EHR system described in this report is a viable alternative for busy information-intense practices planning EHR implementation. We have shown that avoidance of extensive provider training and workflow interruption can offset implementation costs by maintaining productivity.

The term "scribe" is often construed to mean an individual who records dictation. However, scribes historically have served as "information specialists", combining the roles of accessing previously recorded information (as in a librarian) with that of recording new information. We have elected to use the term "remote scribe" in the historical context as one who serves as an information specialist.
REFERENCES


