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Original Contribution

An ED scribe program is able to improve throughput time and patient satisfaction ☆

Aveh Bastani, MD [a,*], Blerina Shaqiri, MS [a], Kristen Palomba, BS [a], Dominic Bananno, BA [b], William Anderson, MD [a]

[a] Department of Emergency Medicine, Beaumont Heath Systems-Troy, Troy, MI, USA
[b] Department of Management Engineering, Beaumont Heath Systems-Troy, Troy, MI, USA

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ABSTRACT

Introduction: At our institution, we previously described the detrimental effect of computerized physician order entry (CPOE) on throughput time and patient satisfaction (*Ann of Emer Med*, Vol 56, P S83-S84). To address these quality metrics, we conducted a pilot program using scribes in the emergency department (ED).
Methods: We conducted a before-and-after study of ED throughput at our 320-bed suburban community hospital with a census of 70000 annual visits. Our primary outcome measure was the effect of scribes on ED throughput as measured by the effect on (1) door-to-room time; (2) room-to-doc time; (3) door-to-doc time; (4) doc-to-dispo time; and (5) length of stay for discharged/admitted patients, between pre-CPOE and post-CPOE cohorts. Our secondary outcome measure was patient satisfaction as provided by Press Ganey surveys. Data were analyzed using descriptive statistics, and means were compared using a standard *t* test.
Results: Patient data from a total of 11729 patients in the before cohort were compared with data from 12609 patients in the after cohort. Despite a 7.5 % increase in volume between the post-CPOE and post-scribe cohorts, all throughput metrics improved in the post-scribe cohort. This process improved the overall door-to-doc time to 61 minutes in the after cohort from 74 minutes in the before cohort. Furthermore, patient and physician satisfaction was improved from the 58th and 62nd percentile to 75th and 92nd percentile, respectively.

1. Introduction

In 1999, the Institute of Medicine identified that handwritten reports or notes, manual order entry, nonstandard abbreviations, and poor legibility lead to errors and injuries to patients [1]. Specifically, prescribing errors have been identified as the largest source of preventable medication error. By 2006, the Institute of Medicine estimated that a hospitalized patient is exposed to a medication error each day of his or her admission [2]. The primary solutions offered to address this situation were the advent of electronic medical records (EMRs) and computerized physician order entry (CPOE). These are the processes whereby the physician logs into a computer to chart and input orders for each patient directly into the hospital's computer system. Within this process, there are many layers of safety built-in, which the physician must acknowledge, ensuring both the proper diagnostic and therapeutic orders have been entered.

Because of the fast-paced environment, high patient turnover, and the broad age of patients, many academic centers have used the emergency department (ED) to initiate the move toward EMR and CPOE. Most hospitals to publish successful transitions have been larger academic institutions [3]. In addition, pediatric centers, a subgroup within academic institutions whose weight-based dosing regimens are uniquely susceptible to medication errors, have also documented success after instituting CPOE [4,5]. Not all CPOE experiences have been positive. The "Cedar-Sinai Experience" in which the CPOE system had to be removed from an academic institution 3 months after initiation indicated that CPOE may require molding of the system specific to every institution's particular needs [6,7]. Even in the pediatric world, where CPOE tends to shine, "unexpected increased mortality" has been described after initiation of CPOE [8,9].

The bulk of the literature describing CPOE utilization comes from academic institutions; however, community hospitals outnumber academic institutions, 21 to 1 based on data by the Association of American Medical Colleges [10,11]. At our institution, we previously described the detrimental effect of CPOE on throughput time and patient satisfaction [12]. To address the detrimental effect of CPOE on throughput time and patient satisfaction, we conducted a pilot program using scribes in the ED of our community hospital.

2. Methods

2.1. Study design

We conducted a before-and-after study of throughput metrics and ED satisfaction scores at our suburban community hospital. There were 2 interventions, CPOE implementation and the scribe

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* Corresponding author. Troy, MI 48085, USA.
E-mail address: abastani@beaumont.edu (A. Bastani).

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implementation, both of which were broken down into preimplementation and postimplementation periods. The pre-CPOE period began with baseline data collection for 60 days beginning on August 28, 2009, through October 27, 2009. During this initial period, the ED was using an EMR while also continuing with manual order entry. Our institution began exclusively using CPOE alongside the EMR on November 4, 2009, which was followed by a 26-day washout period to allow for adjustments to CPOE to be made. This washout period was subsequently followed by 60 days of data collection (December 1, 2009, through January 31, 2010) during which CPOE and EMR were used exclusively in the ED; this period comprised the pre-scribe baseline period. A second washout period followed the pre-scribe baseline period, lasting 3.5 months (February 1, 2010, to May 14, 2010), during which the scribe program was phased into the ED. This phase took longer than the initial washout phase, to train and hire a full complement of scribes. The scribe data collection period immediately followed the second washout period (May 15, 2010, through July 14, 2010). During this final 60-day study period, EMR and CPOE continued, now augmented by the full complement of ED scribes. It must be noted that the time intervals including the washout periods between the different stages are varied throughout the study. As the financial stakeholder for scribe implementation, hospital administration requested the data to be collected in an abbreviated schedule to decide whether to proceed with a long-term scribe implementation. All ED throughput metrics were collected using quality assurance reports generated by the EMR system.

2.2. Study setting

Our study occurred at a suburban community hospital with a current annual ED census of 78000 visits, composed of both adults and pediatrics. The ED has 41 acute care beds and 3 resuscitation bays fully staffed for 99 hours per day by board-certified emergency medicine physicians (ECPs) who are also hospital employees. The ECPS also supervise a 9-bed minor care and an 18-bed observation unit staffed by physician assistants (PAs) which cover both areas for 57 hours per day. The EMR/CPOE system being used is EPIC. The scribe program was instituted through PhysAssist. PhysAssist provides a turn-key operation for the ED by employing, training, managing, and scheduling the scribes.

2.3. Outcome measures

Our primary outcome measure was to quantify the effect of scribes on ED throughput as measured by changes between cohorts in:

1. Door-to-room time—the length of time between when patient arrives to the ED to when patient is placed into a room.
2. Room-to-doc time—the length of time between when patient is placed into a room to when an ECP sign-up for the patient.
3. Door-to-doc time—the length of time between when patient arrives to the ED to when an ECP sign-up for a patient.
4. Doc-to-disposition time—the length of time between time ECP sign-up for a patient to time the patient is discharged or admitted.
5. Length of stay for discharged/admitted patients between the before and after cohorts.

Our secondary outcome measure was patient satisfaction for both the institution and the ECPs as provided by responses to Press Ganey surveys. Cases staffed with PAs, residents, or pediatric nurse practitioners were not included in the analysis. Our study was institutional review board exempt.

2.4. Data analysis

Study data were retrieved from both the management engineering and human resources departments. It was subsequently tabulated into a Microsoft Excel spreadsheet. Given the large numbers of patient encounters with each study period, it was felt that the generalizability and increased in power afforded by using means and the standard *t* test to assess for significance outweighed the possible skewness of the data typical of administrative throughput research. Data were analyzed using descriptive statistics and Student *t* test, as appropriate.

3. Results

Data analysis was conducted on the 10578 patient encounters in the initial cohort, 11729 patient encounters in the pre-scribe cohort, and 12609 patient encounters in the post-scribe cohort (Table). Because of the large number of patients in each cohort, all variations are statistically significant ($P < .0001$). There was a 10-minute increase (34.2%) in the time it took an ECP to sign-up for a patient once the patient was placed in a room from the initial cohort to the pre-scribe cohort ($P < .0001$). This increase made up most of 14-minute increase (23.1%) in door-to-doc time that also occurred after CPOE initiation ($P < .0001$). After the scribe program was fully instantiated, all throughput metrics improved in the post-scribe cohort. This improvement occurred despite a 7.5% increase in volume between the pre-scribe and post-scribe cohorts. Consequently, the overall door-to-doc time improved to 61 minutes post-scribe from 74 minutes pre-scribe, returning it back to pre-CPOE levels. Furthermore, both door-to-room and room-to-doc times decreased by 1 minute ($P < .0001$) and 8 minutes ($P < .0001$), respectively.

Press Ganey surveys were used to assess the effect of CPOE introduction on patient satisfaction at our institution across all 3 cohorts. In the initial cohort, the ED's percentile ranking was 72%, and the ECP's percentile ranking was 89%. After CPOE initiation but before scribe implementation, there was a marked decrease in the ED's percentile ranking to 58% ($P < .0001$) and ECP's percentile ranking to 62% ($P < .0001$). After scribe implementation, both of these rankings returned to their pre-CPOE rankings (Figs. 1 and 2).

4. Discussion

There is a definite burden, which both EMR and CPOE impose in a community hospital ED. By design, EMR/CPOE juxtaposes a computer between the ECP and patient care. After the initiation of CPOE, the ECPs at our institution took an average of 10 minutes longer to get each patient every day. These data extrapolated more than 150 patients evaluated at by ECPs at our institution daily results in 25 hours per day spent in front of the computer rather than seeing patients. Furthermore, this is just the time lost at the initial encounter with a patient. Every order, every note, and every review of the medical record require the physician to locate and log into the computer system. This results in relegating the work previously performed by the secretarial staff to the most highly trained professional in the ED.

Table
Throughput metric and patient satisfaction results of pre-CPOE, post-CPOE/pre-scribe, and post-scribe cohorts

	Pre-CPOE	Post-CPOE and pre-scribe	Post-scribe
Door-to-room (min)	34	35	34
Room-to-doc (min)	29	39	31
Door-to-doc (min)	60	74	61
Doc-to-admit dispo (min)	231	237	185
Length of stay—discharged patients (min)	283	289	269
Length of stay—admitted patients (min)	455	448	442
Emergency center census	11,731	11,729	12,609
Emergency center satisfaction (percentile)	75%	58%	72%
Emergency physician satisfaction (percentile)	91%	62%	86%

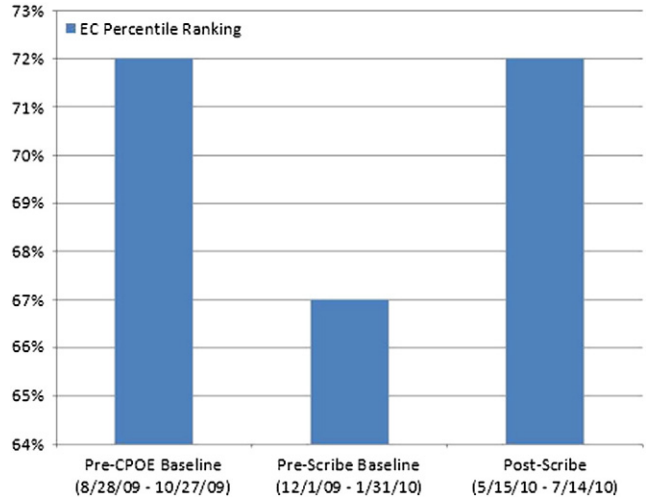

Fig. 1. Press Ganey percentile rankings of ED at pre-CPOE, pre-scribe (and post-CPOE), and post-scribe implementation periods.

Scribes in the ED have provided relief from EMR/CPOE [13]. This is especially true in the community hospital setting where residents are not present to relieve this encumbrance. The scribes consist of premedical/prenursing/pre-PA students from a local 4-year university. Each ECP is paired with a single scribe during their shift. The primary role of the scribe is to complete the EMR. This includes accompanying the ECP into each patient's room, documenting the initial history, review of systems, and physical examination. After the initial evaluation, the scribe then records all procedures, consultations, and re-evaluations. Documentation of electrocardiogram, pulse oximetry, and rhythm strip interpretation as well as critical care time is also provided. Finally, the scribes are responsible for detailing all diagnoses, treatment plans, prescriptions, and discharge/follow-up information for each patient. Scribes further assist the ECP by tracking results from laboratory and imaging tests, keeping a task list, cross-checking consultation, and admission requests with the private attending staff's preference guide, and ensuring completion of all charts before the end of the shift. It is important to note that EMR and CPOE each have their own respective time burdens. While taking place at other institutions, scribes did not input orders under ECP supervision at our institution as it was believed that doing so would circumvent the entire CPOE process. Therefore, the extent of benefit realized by the scribes in offloading physician time from the computer may be even greater than has initially been described.

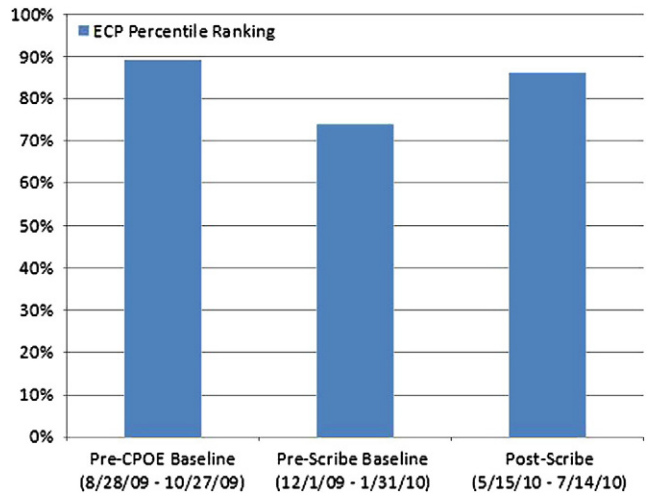

Fig. 2. Press Ganey percentile rankings of emergency center physicians at pre-CPOE, pre-Scribe (and post-CPOE), and post-Scribe implementation periods.

Just like all other new technologies brought into the work environment, it has been previously noted that EMR/CPOE requires an adjustment period before it can reach its maximum potential and efficiency [14]. Although this statement may be correct, it neglects 3 facts regarding our results. First, we incorporated a 1-month washout period where ECPs had an opportunity to hone their skills with CPOE before data collection. The length of time for this washout and all other periods within the study were tightly constrained by our hospital administration, to make a final decision regarding the long-term implementation of scribes. Second, just as physicians would become more facile with CPOE over time, they would also become more efficient in using scribes over time. We are currently collecting long-term data to evaluate whether the positive effect of scribes changes over time. Finally, our hospital system is composed of 3 individual hospitals. All 3 initiated EMR and CPOE simultaneously. The largest of the 3 hospitals is composed of an active academic core and resident-driven ED. Our institution and the third institution are both community hospitals with similar patient populations. However, the scribe program was only initially implemented at our institution. Therefore, to determine whether time alone could have accounted for the improvement illustrated by our results, we conducted a pilot comparison of the throughput metrics at our institution to those of our sister community hospital during the pre-scribe and post-scribe cohorts (Fig. 3). Between the pre-scribe and post-scribe cohorts, the average time it took an ECP to see a patient who was waiting in a room decreased by 8 minutes at our institution while increasing by 15 minutes at our sister community hospital. This difference was so revealing that hospital administration has since initiated a scribe program at the other community hospital.

5. Limitations

Our study has several limitations, which merit further discussion. First, the before-and-after design of our study limits our ability to make causal claims regarding the results. This is a valid and common critique of studies in which randomization is not practical. We took several key steps to diminish the possibility for outside factors to explain our results. First, no changes to the staffing model were introduced during the study period, specifically including ED physicians, physician assistants, nurses, technicians, and secretaries. Second, by comparing our results to those of our

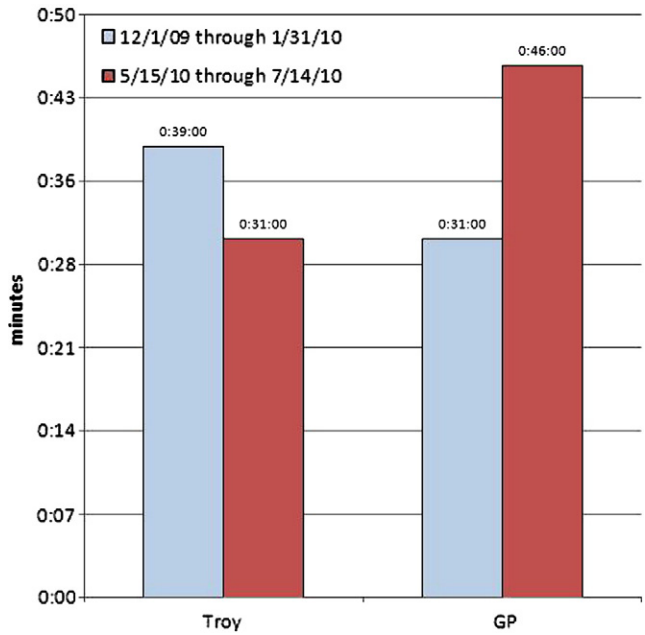

Fig. 3. Pre-scribe and post-scribe cohort room-to-doc time comparisons of our institution (Troy) to our sister institution (GP).

sister community hospital, we were able to show that standard threats to internal validity, such as maturation and regression toward the mean, were not adequate to explain our results.

Another limitation of our study is experimenter's bias. Our institution has previously presented both subjective and objective data regarding the negative effect of EMR/CPOE on physician productivity and satisfaction as well as patient satisfaction [12,15]. Our desire for a solution may have prejudiced our outcomes. We made 2 heedful decisions to address this possibility. First, we defined our variables before collecting any data. A data collection spreadsheet was created at the beginning of the study period to include the variables, which were considered the most vital to ED efficiency. We then had the variables and subsequent data collection vetted by hospital administration for accuracy. Because the ECPs at our institution are all hospital employees rather than a private group, long-term funding for the scribes would be provided by the hospital administration. By including the administration in the research project from the beginning and allowing them to vet the data for themselves, we not only added a level of confidence to the accuracy of our results but also provided the administration the information it required to make the scribe program a long-term solution.

There are also many other processes that have been described, which improve throughput and satisfaction, such as utilization of a physician in triage or the creation of a "disposition team" [16,17]. It is possible that either of these or other models may provide more cost-effective or superior benefits than the scribe program. However, the utilization of scribes in the ED is the only one described thus far that directly addresses the inefficiencies with EMR/CPOE. It is possible to envision a future in which the integration of EMR/CPOE into health care is so user-friendly that the scribe will become superfluous. However, in the resource-limited community hospital, where overcrowding is the norm and patient satisfaction is paramount, the implementation of a scribe program may prove to be a viable solution.

6. Conclusion

In the community hospital setting, an ED scribe program was able to improve throughput time and patient satisfaction.

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