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RESEARCH ARTICLE

Use of dictation as a tool to decrease documentation errors in electronic health records

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ABSTRACT

Background: Use of Electronic Health Records is increasing. Copy-and-paste function is frequently used with higher rates of documentation errors. Studies to determine the nature of such errors are needed.

Objectives: Determination of the effect of implementing a dictation system for completing notes on the quality of clinical documentation. We hypothesized that implementation of the dictation system for note writing would decrease the rate of errors in the progress notes as well as decrease the rate of copying and pasting.

Design/Methods: A prospective interventional study in inpatient medical service for six months' duration starting in July 2016. Resident physicians' charts were reviewed by the attending physician on a daily basis. This study was done in a community based hospital affiliated to a university program. Residents' physicians included Internal Medicine, Transitional year and Combined Internal Medicine Pediatrics residents. Charts reviewed for hospitalized patients. A total of 54 residents were offered a pre-intervention survey indicating their subjective use of copy/paste function. Response rate of 85.18%. Progress notes were reviewed on a daily basis for residents on their inpatient rotation. A total of 621 notes were reviewed.

Results: Percentage of notes copied prior to the intervention was 92.73% which decreased to 49.71% post-intervention (RR of 0.54, 95% CI 0.48 0.60 Z statistic 11.005 with p-value <0.0001). Of the copied notes percentage of errors pre-intervention was 58% with no errors identified post-intervention (RR of 0.005, 95% CI 0.0003 0.0795 Z statistic 3.752 with p-value 0.0002). Most of the errors are from notes copied by the same author (85.8%). The most common documentation error was in the physical examination section.

Conclusion: Implementing a dictation system eliminated documentation errors over our six months' study. Further studies are needed to check long effects of using such systems on documentation errors

1. Introduction

The recent advancement in information technology led to multiple changes in health care systems. One of them is the use of electronic medical records (EMR). The use of EMR among health care providers is rapidly increasing [1,2]. The use of EMR has been shown to improve the quality of medical documentation and also reduce both medical error and mortality rates [3–6]. Indeed, it leads to better communication between physicians [7]. The Health Information Technology for Economic and Clinical Health Act in the USA has also encouraged the use of EMR.

However, the use of EMR is associated with many drawbacks [1,8–12]. Implementation of EMR has led to an increase in the time spent completing notes, resulting in an increased use of the copy-and-paste function by physicians [13,14]. The last few years have seen an increased interest in the evaluation of EMR. Copying and pasting leads to an increase in

redundancy and outdated information, which may affect patient care. Studies have found the rate of copying is almost 90% [13]. There is no doubt that the use of the copy-and-paste function is rampant, including among resident physicians. However, the vast majority of the work in this area has focused on the prevalence of the issue. To date, scant attention has been paid to intervene, aiming to reduce such a practice. A recent study using a lecture and individual feedback on progress notes as an intervention to improve clinical documentation did not find improvement in clinical documentation [15].

The aim of this study was to determine the effect of implementing a dictation system for completing notes on the quality of clinical documentation. We hypothesized that implementation of the dictation system for note writing would decrease the rate of errors in the progress notes as well as decrease the rate of copying and pasting.

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2. Methods

We conducted a prospective intervention study in in-patient medical service on an internal medicine residency training program in USA, after receiving approval from the institutional review board at Hurley Medical Center. We collected data from the in-patient progress notes of the staff medicine service patients who had to stay at Hurley Medical Center for more than 24 hours.

All the reviewed notes were written in Epic EMR. We gathered all electronic progress notes written during the rotation under a pre-specified medical team under the staff medicine service. In addition, we surveyed residents regarding the use of the copy-and-paste function and their perceptions about it. We included interns and residents from the following residency programs: internal medicine categorical (36 residents), combined medicine-pediatrics (12 residents) and transitional (six residents). All the residents surveyed were from Hurley Medical Center. Surveys were administered during the pre-intervention period via email. Participation was voluntary. Initial pre-intervention data were collected from July 2016 to September 2016. We measured the pre-intervention outcomes during these three months. The intervention was implemented during October 2016. Three months of post-intervention data collection was done. Data on the frequency of copied-and-pasted documentation, documentation of physical examination, and documentation of assessment and plan were collected for all progress notes included in the study.

We manually reviewed the content of the errors. The attending physician on the team reviewed the notes on a daily basis to verify all the content. Such review was based on the daily round by the same physician who saw and examined the patient to verify knowledge of the appropriate documentation. We also used an EMR-based option to identify copied-and-pasted content in the note. This option highlighted any parts copied in the note. During the intervention, residents received lectures about the hazards associated with copying and pasting. In addition, during the intervention period we introduced a dictation system with front-end speech recognition technology, which includes Natural Language Understanding (NLU). All the residents under the three residency programs were scheduled for formal training on the dictation system. The notes written by the residents who were involved in the research team were excluded from our study.

SAS9.4 was used for data analysis. The significant level of confidence interval (CI) was 95%. The significant p-value was defined as less than 0.05. Notes, rather than patients, were the unit of analysis. We did not include any patient characteristics, attending characteristics, or resident characteristics in the data analysis. All parts of the progress note, including the subjective, laboratory results, physical examination, and assessment and plan, were reviewed to identify copying and pasting from previous notes. We did not quantify the amount of copying and pasting in a note, rather we collected data on the presence or absence of copying, determined at the reviewer's discretion. We used a visual technique available through EPIC to identify copying and pasting to help with manual review. We manually reviewed all the notes. To prevent the Hawthorne bias, residents were not made aware of the fact that their notes were being reviewed.

3. Results

We reviewed 621 progress notes (275 in pre-intervention and 346 in post-intervention period) for the presence of copying and pasting and errors in the progress notes. The response rate of our survey was 85.18 (46 out of 54 completed the survey). Almost 98% of the surveyed residents reported using the copy-and-paste function, while only 15.56% thought about the associated negative consequences in patient care. More than half of the resident physicians believe that copying and pasting will result in redundant notes. All the results of the survey are summarized in Tables 1 and 2.

The percentage of notes copied prior to the intervention was 92.73%, which decreased to 49.71% post-intervention (RR of 0.54, 95% CI 0.48 0.60 Z statistic 11.005 with p-value <0.0001) (Figure 1). Of the copied notes, the percentage of errors pre-intervention was 58%; no errors were identified post-intervention (RR of 0.005, 95% CI

Table 1. Results of the survey (*yes/no questions*).

Questions	No. of resident responding yes (%)	No. of resident responding no (%)
1. Do you ever copy and paste notes?	45 (97.83)	1 (2.17)
2. Did you copy and paste more than 50% of your notes during the last month?	21 (45.65)	25 (54.35)
3. Do you think copying and pasting has a negative impact in overall patient care?	7 (15.56)	38 (84.44)
4. Do you think copying HPI should be acceptable?	16 (35.56)	29 (64.44)
5. Have you ever had any incident leading to negative impact in patient care due to copying and pasting?	6 (13)	40 (86.96)
6. Have you ever copied and pasted another author's note?	17 (36.96)	29 (63.04)
7. Do you think copying and pasting leads to repetition of expired clinical assessment and leads to redundancy in notes?	33 (71.74)	13 (28.26)
8. Do you think using the copy-and-paste function leads to a lack of new clinical information in most of the notes?	21 (45.65)	25 (54.35)

Table 2. Results of the survey (*multiple answers questions*).

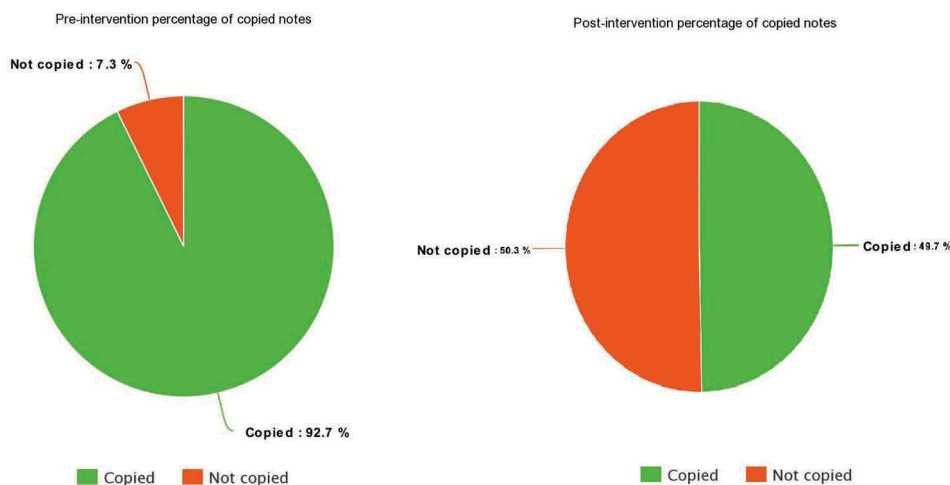|	
1. Which medical information do you think should not be allowed to be copied and pasted?	1. Laboratory data: 12 (27.27) 2. Vitals: 14 (31.82) 3. Assessment and plans: 24 (54.55) 4. Subjective part: 31 (70.45) 5. Examination: 26 (59.09)
2. What is the primary reason you use CIT?	1. Saves time: 41 (89.13) 2. More time for patient care: 29 (63.04) 3. Less thinking: 1 (2.17) 4. Other: 4 (8.7)

Figure 1. Percentage of copied notes pre-intervention and post-intervention.

Table 3. Results.

Parameter	Pre-intervention (%)	Post-intervention (%)
Copied notes	92.73	49.71
Copied from the same author	86.67	95.93
Documentation error in copied notes	58.04	0
Documentation error when note copied from same author	85.81	0
Documentation error when note copied from different author	14.19	0

Table 4. Documentation errors.

Documentation error	Example	Frequency
Physical examination	Patient is disoriented to time	74
Subjective patient information	Patient reported constipation	50
Diagnosis	SIRS criteria with no identifiable infection	28
Medications	Continue Rocephin day 4	10

Frequency of errors is higher than the total number of errors because of multiple errors per one note.

0.0003 0.0795 Z statistic 3.752 with p-value 0.0002). Most of the errors were from notes copied by the same author (85.8%). The percentage of notes copied from a different author decreased after the intervention (Table 3). The most common documentation error was in the physical examination section. One example of a physical examination

documentation error was tachycardia for a patient with a normalized heart rate. Other errors were related to subjective patient information, diagnosis and medication. (Table 4).

4. Discussion

Our study is the first intervention study using a dictation system to reduce the rate of copying and pasting and the rate of errors in documentation. We found that the implementation of the dictation system across our teaching community hospital was associated with a decrease in the rate of copying and pasting and eradication of errors in progress notes. The quality of the progress notes was significantly improved. In addition, our findings provide insight into differences between residents' perceptions about copying and pasting and the actual incidence of copying and pasting. The most common reason our resident physicians attributed the use of the copy-and-paste function was saving time.

Based on the survey, the prevalence of the use of the copy-and-paste function was about 97.83%. Our results are high compared to previous studies [13]. One factor that might be contributing to this is the setting of our research, which only analyzed notes written by residents, compared to other studies, which also included attending physicians. One study done in a critical care setting found 74% copying among attending physicians and 82%

among all the physicians in the medical critical care unit [14]. A study done in a Veterans Affairs hospital found the prevalence of copying to be 20% [16]. In addition, one study reported residents are more likely to report copying and pasting compared to attendings. We were surprised to find that about 85% of the residents were ignorant to the fact that copying and pasting notes is associated with negative impact to patient care. About 90% of the residents attributed the use of the copy-and-paste function to time constraints. About 39% of the residents copied other notes, which, in addition to affecting patient care, raises ethical questions. About 13% of the residents actually admitted having witnessed negative impacts in patient care due to copying and pasting.

A recently published prospective quality improvement project used either a lecture or a lecture and individual feedback on progress note as an intervention in two internal medicine residency programs [15]. However, in contrast to our study, it did not lead to any improvement in clinical documentation based on Physician Documentation Quality Instrument-9 [15].

A previous study showed that 69% of studied clinicians at a military hospital and its clinics continued to use voice recognition and felt the software was accurate [17]. Another study compared the use of a voice recognition data entry system versus typed data entry and showed no difference in the time physicians spend charting; however, the workflow interruptions with voice recognition was lower [18].

The results of this intervention study should encourage other residency programs to implement a dictation system since it leads to a significant reduction in documentation errors, which might lead to better patient care.

There are a number of limitations to our study. First, we did not include initial admission notes or discharge summaries. However, we think communications and information technology is highly abused in the process of writing progress notes in comparison to other types of notes. Second, we did not assess the change in the rate of medical errors associated with the change in the rate of copying and pasting and errors in the notes. Third, this study was only done in Hurley Medical Center. Fourth, the reviewer might have had some biased perception of the notes because of their awareness of the intervention, as can be anticipated with any non-randomized study. Fifth, our research setting was used in EPIC EMR, which is one of the most advanced and most used EMR in the USA. For that reason, the results of our study cannot be extrapolated to other EMR systems. Finally, we did not directly interview the note writers to understand their attitudes toward copying and pasting. Indeed, we did not take into account factors that might influence the rates of copying and pasting, including changes in resident workflow or year of residency.

One important aspect of this issue is the question whether EMR should even have the copy-and-paste function available. There is certainly a need for the concerned authorities to implement stricter guidelines regarding EMR. In the meantime, the use of dictation should be considered to reduce the documentation errors associated with copying and pasting.

Disclosure statement

No potential conflict of interest was reported by the authors.

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