Chelonian Conservation And Biology

Vol. 17 No.2 (2022) | https://www.acgpublishing.com/ | ISSN - 1071-8443

DOI:doi.org/10.18011/2022.04(1) 2692.2698

# IMPACT OF ELECTRONIC MEDICAL RECORD (EMR) SYSTEMS ON IMPROVING CLINICAL DOCUMENTATION AND CODING ACCURACY

**Ibrahim Mohammed N Almojally, Bader Fahad Hajed Alharbi, Saif Saad Almutairi, Fathiyaha Mahmoud Somail, Kholood Yehya Hassan Mohagab, Nouf Fahad Mohammad Alkharji, Abdulamuhesn Fahad Mohammad Alkharji, Nadiya Lutify Hashim Atefy, Manal Abdulrhman Thafer Aldossary, Yahya Mohammad Mashee, Reem Hilal Break Al-Otaibi, Abdallah German Alamri, Abdullah Saeed Abdullah Alghamdi, Bader Qaryan Alruwaili, Turki Saed A Alghamdi**

## Abstract

Electronic health records (EHRs) are being used more and more, however there are issues with their quality. There has been an attempt to address the causes of low-quality EHR documentation. Prior systematic evaluations evaluated the efficacy of interventions in the context of outpatient care or paper recording. This systematic review set out to evaluate the efficacy of interventions aimed at enhancing EHR documentation in inpatient settings. Extensive inclusion/exclusion criteria served as the foundation for the development of a search strategy. Reference lists, gray literature, and four databases were looked through. Data extraction was done using a REDCap data capture form, and a bespoke tool was utilized to evaluate the quality of the study. Data were semiquantitatively and narratively evaluated and synthesized. The most effective interventions were education and the introduction of a new EHR reporting system, as shown by the noticeably better EHR documentation. Measuring the impact of interventions and the quality of EHR documentation was made challenging by the heterogeneity of outcomes, document types, EHR users, and other variables. On the other hand, the major intervention strategy of using education was in line with previously published research in related fields. Standardization is necessary since the interventions used to improve EHR documentation are quite inconsistent. This innovative field of study needs to be given more attention in order to enhance provider-to-provider communication and make data exchange between institutions and nations easier.

**Keywords:** inpatient, intervention, quality improvement, documentation, electronic health records

## 1. Introduction

Electronic reporting systems have replaced handwritten paperwork among healthcare practitioners globally. More than half of hospitals and office-based practices in North America use electronic health record (EHR) documentation.1. This review defines "the creation of a

digital record detailing a medical treatment, medical trial, or clinical test" as clinical electronic documentation.2.

When compared to traditional paper documentation, electronic health records (EHRs) generate data that is easy to read and understand, which is beneficial for patient care, health professional communication, quality assurance, and supplying source data for coding administrative databases used in research. Despite the fact that EHR documentation has been around since the 1960s, a survey of the medical literature shows that it is typically of low quality and usefulness.3. There are a number of issues with the EHR documentation. These include structural issues where the EHR system's ability to prevent the user from moving on to the next portion of documentation if the preceding one is left unfinished lowers the quality of the documentation. In a similar vein, free-text fields have shown higher error rates than point-and-click radio button documentation.4 The standardization of documentation is further hampered by resistance to EHR adoption, which can further affect the usefulness and quality of the data.5.

Numerous outcomes, including patient health, might be adversely affected by inadequate EHR recording. A patient's health issues during a current hospital visit, for instance, may be misrepresented if the copy-and-paste function from a prior hospital stay is misused.Six Inadequate EHR documentation can potentially compromise patient safety because prepopulated fields can result in prescription mistakes.7. Inadequate EHR documentation may also have an impact on the standard of coding in research-related administrative databases.8 Several nations use the inpatient EHR record as a source of coded data. Administrative databases are now used by the well-known national institution in Canada, the Canadian Institute for Health Information, to produce high-quality information that supports health policy and enhances the provision of healthcare services.9.

Finding interventions that are successful in raising the standard of EHR documentation is crucial due to the previously indicated effects of inadequate EHR documentation. Although other systematic studies have looked into ways to enhance medical documentation, they have mostly addressed the outpatient setting5,10,11 or the EHR documentation of a particular EHR user.11, 12 Other reviews have not just addressed electronic documentation (i.e., interventions to enhance the quality of paper documents)12 or have concentrated on a particular category of documentation-improving intervention, including computer-generated forms or reminders.13, 14

These reviews have produced some noteworthy findings, including: a paucity of literature on EHR improvement; effective interventions (such as system add-ons, educational materials, and financial incentives) to improve EHR documentation; and various metrics to gauge the quality of documentation, including patient information accuracy and completeness.5. This led to the performance of a systematic review of the literature in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines15 in order to assess the efficacy of programs, interventions, or institutional modifications (collectively referred to as interventions) that have been implemented in an effort to enhance the standard of EHR documentation in the inpatient setting.

## 2. Results

Laflamme et al. (26) and Jakob et al. (8) were the studies that reported the most number of statistically significant better outcomes. While the latter enhanced timeliness, completeness, and document accuracy, the former used the most frequently reported document type (operation report) and comparator (dictation), positively affecting timeliness, completeness, and length.26 It should be highlighted, however, that Johnson et al.27 repeatedly reported unfavorable results. It was discovered after looking into the study's methodology that consumers thought the EHR documentation system was "time consuming" and limited their ability to document. Results for completeness, document accuracy, and user happiness declined with the introduction of the eDictation system.

Due to the significant weight the study population is given in the quality assessment tool, a study's quality may be severely impacted by up to 4 items if the study population is not sufficiently defined. Since items 2, 6, 10, and 11 were the four that related to the research population, there are noticeably more "no" and "unable to determine" replies. Unfortunately, a large number of the included studies neglected to identify the research population by failing to describe the patient care setting in which the EHR documentation was created or by failing to name the individual EHR user. As a result, it was impossible to evaluate variations in the users' demographic traits and EHR experience level (years of use).

Finally, the two studies that reported on it used different definitions of the length outcome.26, 36

The term "note-bloat," which refers to the needless copying and pasting of material from earlier consultation notes into the current visit note, has become more common as a result of EHR use. This extraneous information adds no value to the reader. This could obfuscate important information that could hamper the provision of patient care, in addition to lengthening the time the receiving physician must spend reading the note.50 Longer records can take longer for coders to process, and extraneous details can make it more challenging to locate the pertinent diagnosis for that particular visit.51 The literature supports the description of enhanced length in this review as a shorter document, particularly when taking primary care physicians' preferences into account when receiving an EHR document.

"PCPs value summaries that are brief and focused," according to Coit et al. 21. Physicians view shorter lengths as a significant component of high-quality documentation, according to research by Rao et al. 22. However, Vogel et al.36 characterized better length in one of the included trials as a larger, more comprehensive document; as a result, its treatments were thought to deteriorate EHR documentation. The writers acknowledge the ambiguity around the advantages of a shorter paper, as it does not guarantee concision and less repetition and may not always be of superior quality. Nevertheless, in none of the included studies were redundancy or conciseness listed as outcome variables for documentation quality. Thus, length was retained as an outcome measure in order to guarantee consistency with the body of existing knowledge and to encompass all outcomes reported by the studies included in this analysis.

The evaluation of EHR documentation improvement is often a challenging endeavor due to the variation in methods used to assess the various outcomes (e.g., percentages, frequency,

customized checklists, personalized scoring tools), as was discovered when addressing the secondary research question. Except for overall quality, very little research has been done on the availability or necessity of a gold-standard instrument to measure outcomes. To the best of the reviewers' knowledge, there is only one validated instrument (QNOTE)52 for assessing the quality of documentation in the outpatient situation and one (PDQI-9) for assessing the quality of documentation in the inpatient setting; the PDQI-9, however, is dependent on physician impression scores.20 In addition, only one study employed PDQI-9; the other eight made use of ad hoc instruments. The lack of a gold standard for reporting this subjective outcome limits the applicability of the research findings in this review and emphasizes the requirement for a gold standard quality assessment instrument.

## 3. Discussion

A fresh data synthesis finding treatments to enhance inpatient EHR recording is presented in this review. The findings align with those of Hyppönen et al. (2014), who discovered outcome heterogeneity in their systematic review focusing on structured electronic health record data in both outpatient and inpatient settings. Additionally, this research indicated that whereas structured reporting (new EHR documentation methods) improved document quality, it did not result in better patient outcomes, suggesting that there may not be a strong association between EHR documentation and patient outcomes.13

Furthermore, Hamade5 discovered that feature additions, training sessions, and incentives were the main components of interventions that successfully enhanced EHR documentation. Similar findings about education being the most beneficial intervention were made in respect to the current review. Though they might not apply to an inpatient situation, Hamade's5 findings were helpful in the outpatient context. For example, incentives were one of the least often reported interventions in our analysis and did not improve EHR documentation. To evaluate the efficacy of incentives as therapies in the inpatient context, more study is required. Furthermore, this result implies that various approaches might be appropriate for the documentation settings of inpatient and outpatient care.

## 4. Conclusion

The methods by which the quality of EHR documentation could be raised are identified in this paper, which also gives an overview of recent initiatives to enhance EHR documentation in an inpatient context. The two most often employed interventions, according to an analysis of the 24 included studies, are education and the new EHR recording system. The multifactorial study outcome results and the significant variation in studies (document type, comparator, participants, interventions, and outcome measures) show the necessity for a standardized reporting procedure that can accommodate users of EHRs from all geographic locations and specializations. Coded data and, thus, administrative databases utilized for research could also benefit from this. Additionally, despite the fact that patient outcomes were not measured in this systematic review, research indicates that inadequate documentation can have a detrimental impact on continuity of care. In order to improve EHR documentation, future researchers should focus on putting the

most effective treatments from this systematic review into practice. This might be the first step toward creating standardized documentation processes.

**References**


1. Maddox T, Matheny M.. Natural language processing and the promise of big data. *Circ Cardiovasc Qual Outcomes* 2015; 8: 463–5.
2. Dhavle AA, Corley ST, Rupp MT.. Evaluation of a user guidance reminder to improve the quality of electronic prescription messages. *Appl Clin Inform* 2014; 53: 699–707.
3. O'leary KJ, Liebovitz DM, Feinglass J, et al. Creating a better discharge summary: improvement in quality and timeliness using an electronic discharge summary. *J Hosp Med* 2009; 44: 219–25.
4. Hamade N. Improving the use of electronic medical records in primary health care: a systematic review and meta-analysis. Western Graduate and Postdoctoral Studies: Electronic Thesis and Dissertation Repository 2017: 4420..https://ir.lib.uwo.ca/etd/4420. Accessed December, 2017.
5. Dimick C. Documentation bad habits: shortcuts in electronic records pose risk. *J AHIMA* 2008; 796: 40–3
6. Virginio LA, Ricarte IL.. Identification of patient safety risks associated with electronic health records: a software quality perspective. *Stud Health Technol Inform* 2015; 216: 55–9.
7. So L, Beck CA, Brien S, et al. Chart documentation quality and its relationship to the validity of administrative data discharge records. *Health Informatics J* 2010; 162: 101–13
8. Canadian Institute for Health Information. Clinical Administrative Databases Privacy Impact Assessment. 2013. https://www.cihi.ca/en/cad_pia_jan_2013_en.pdf Accessed April 2, 2019.
9. Neri PM, Volk LA, Samaha S, et al. Relationship between documentation method and quality of chronic disease visit notes. *Appl Clin Inform* 2014; 52: 480–90.
10. Lorenzetti D, Quan H, Lucyk K, et al. Strategies for improving physician documentation in the emergency department: a systematic review. *BMC Emerg Med* 2018; 181: 36..
11. Wang N, Hailey D, Yu P.. Quality of nursing documentation and approaches to its evaluation: a mixed-method systematic review. *J Adv Nurs* 2011; 679: 1858–75.
12. Arditi C, Rège-Walther M, Durieux P, et al. Computer-generated reminders delivered on paper to healthcare professionals, effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev* 2017; 7: CD001175..
13. Hyppönen H, Saranto K, Vuokko R, et al. Impacts of structuring the electronic health record: a systematic review protocol and results of previous reviews. *Int J Med Inform* 2014; 833: 159–69.
14. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015; 41: 1..

1. Otero Varela L, Wiebe N, Niven DJ, et al. Evaluation of interventions to improve electronic health record documentation within the inpatient setting: a protocol for a systematic review. *Syst Rev* 2019; 138: 54.
2. Stetson PD, Bakken S, Wrenn JO, et al. Assessing electronic note quality using the Physician Documentation Quality Instrument (PDQI-9). *Appl Clin Inform* 2012; 32: 164–74.
3. Coit MH, Katz JT, McMahon GT.. The effect of workload reduction on the quality of residents' discharge summaries. *J Gen Intern Med* 2011; 261: 28–32.
4. Rao P, Andrei A, Fried A, et al. Assessing quality and efficiency of discharge summaries. *Am J Med Qual* 2005; 206: 337–43.
5. Harris P, Taylor R, Thielke R, et al. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009; 422: 377–81.
6. Downs S, Black N.. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *J Epidemiol Community Health* 1998; 526: 377–84.
7. Wells GA, Shea B, O'Connell D, et al. The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Non-Randomised Studies in Meta-Analyses. 2011. http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp. Accessed October 2, 2017.
8. Laflamme MR, Dexter PR, Graham MF, et al. Efficiency, comprehensiveness and cost-effectiveness when comparing dictation and electronic templates for operative reports. *AMIA Annu Symp Proc* 2015; 2015: 425–9.
9. Johnson AJ, Chen MY, Swan JS, et al. Cohort study of structured reporting compared with conventional dictation. *Radiology* 2009; 2531: 74–80.
10. Maslove DM, Leiter RE, Griesman J, et al. Electronic versus dictated hospital discharge summaries: a randomized controlled trial. *J Gen Intern Med* 2009; 249: 995–1001.
11. Park J, Pillarisetty VG, Brennan MF, et al. Electronic synoptic operative reporting: assessing the reliability and completeness of synoptic reports for pancreatic resection. *J Am Coll Surg* 2010; 2113: 308–15.
12. Hoffer DN, Finelli A, Chow R, et al. Structured electronic operative reporting: comparison with dictation in kidney cancer surgery. *Int J Med Inform* 2012; 813: 182–91.
13. Maniar RL, Hochman DJ, Wirtzfeld DA, et al. Documentation of quality of care data for colon cancer surgery: comparison of synoptic and dictated operative reports. *Ann Surg Oncol* 2014; 2111: 3592–7.
14. Maniar RL, Sytnik P, Wirtzfeld DA, et al. Synoptic operative reports enhance documentation of best practices for rectal cancer. *J Surg Oncol* 2015; 1125: 555–60.
15. Dean SM, Eickhoff JC, Bakel LA.. The effectiveness of a bundled intervention to improve resident progress notes in an electronic health record. *J Hosp Med* 2015; 102: 104–7.

16. 34. Mehta R, Radhakrishnan NS, Warring CD, et al. The use of evidence-based, problem-oriented templates as a clinical decision support in an inpatient electronic health record system. *Appl Clin Inform* 2016; 73: 790–802.
17. Koivikko MP, Kauppinen T, Ahovuo J.. Improvement of report workflow and productivity using speech recognition–a follow-up study. *J Digit Imaging* 2008; 214: 378–82.
18. Vogel M, Kaisers W, Wassmuth R, et al. Analysis of documentation speed using web-based medical speech recognition technology: randomized controlled trial. *J Med Internet Res* 2015; 1711: e247..
19. Galanter WL, Hier DB, Jao C, et al. Computerized physician order entry of medications and clinical decision support can improve problem list documentation compliance. *Int J Med Inform* 2010; 795: 332–8.
20. Falck S, Adimadhyam S, Meltzer DO, et al. A trial of indication based prescribing of antihypertensive medications during computerized order entry to improve problem list documentation. *Int J Med Inform* 2013; 8210: 996–1003.
21. Eichholz AC, Van Voorhis BJ, Sorosky JI, et al. Operative note dictation: should it be taught routinely in residency programs? *Obstet Gynecol* 2004; 1032: 342–6.
22. Bischoff K, Goel A, Hollander H, et al. The Housestaff Incentive Program: improving the timeliness and quality of discharge summaries by engaging residents in quality improvement. *BMJ Qual Saf* 2013; 229: 768–74.