Improving Inpatient Documentation:

Template Adoption Improving Provider Efficiency and Decreasing "Note-Bloat" in a Large Hospitalist Group

Dr. Erin Kirkegaard

B.S., University of Washington, 2005

M.D., American University of Antigua, 2013

A Capstone Project

Submitted in Partial Fulfillment of the Requirements for the

Master's of Healthcare Informatics

at the

University of Oregon School of Medicine

Spring 2025

MANUSCRIPT OUTLINE

1. Introduction
2. Materials and Methods
    1. Initiation phase
    2. Planning phase
    3. Execution phase
    4. Monitoring and controlling
    5. Closure
3. Results
4. Discussion
    1. Background
    2. Current challenges
    3. Existing EHR tools, improvements, and suggestions
    4. Template construction at MultiCare Health System
    5. Future direction
5. Conclusion
6. Acknowledgements
7. References

ABSTRACT

Background

Forty-nine percent of hospital physicians meet burnout criteria. [1],[2] Increased administrative burden, including documentation, is linked to provider dissatisfaction. [3] With recent technological advancements, simple and easy solutions to improve provider documentation are often overlooked, especially in the inpatient setting. Enhanced template construction can facilitate easy navigation and communication while ensuring accurate documentation and reimbursement for the time spent on patient care.

Project

In 2023, a series of templates were designed for the Inland Northwest Hospitalist teams based on multidisciplinary feedback. The feedback included surveys and dialogue with hospitalists, case managers, other care team members, health information management, and medical billing coders. The author took additional care to utilize the 2023 E/M changes, which aimed to decrease "note bloat" by allowing providers to forgo redundant documentation (i.e., laboratory data and medication lists) if these are documented elsewhere within a patient's records. Ultimately, these templates were adopted nearly universally by the MultiCare Inland Northwest Hospitalist team, comprising approximately 60 providers, and were used for almost all patient encounters in 2024.

Data was extracted from Epic Electronic Health Record to compare the number of note characters and the average number of minutes providers spent in a patient's chart per day. The data was compared before and after the template deployment. Similar-sized hospitals and

hospitalist groups within the MultiCare system, which use the same EHR and undergo the same update processes, were used as controls.

Key Objectives and Measure Value

The number of characters within a note was assumed to correlate with "note bloat." A decrease in note characters suggested a decline in "note bloat" and a reduction in provider visualization overload.

The number of minutes spent by a provider in a patient chart per day was assumed to be a marker of provider efficiency. A smaller average number of minutes in a patient's chart correlates with improved provider efficiency.

Subjective workflow improvements and provider satisfaction were measured using a post-implementation survey.

Conclusions

The analysis of hospitalist practice before and after the adoption of a revised, standardized hospitalist template revealed increased efficiency in provider workflow and reduced note bloat. Subjectively, providers also felt that this enhanced their workflow, with perceived improvements in provider satisfaction.

Improving Inpatient Documentation:

Template Adoption Increasing Provider Efficiency and Decreasing "Note-Bloat" in a Large Hospitalist Group

Dr. Erin Kirkegaard

B.S., University of Washington, 2005

M.D., American University of Antigua, 2013

INTRODUCTION

"The primary purpose of medical documentation is to support high-quality patient care"[4]. However, in addition to serving as a digital record for a clinical plan or treatment, provider documentation in the United States is also used for billing, legal purposes, research, quality measures, and regulatory compliance. The need to meet these overwhelming requirements, in conjunction with content importing technology (CIT), including copy forwarding functionality, has led to "chart bloat" and EHR redundancy.

Physicians spend twice as much time on their electronic documentation as they do on patient care, and as a result, this "EHR burden" has been linked to physician burnout. [3] The provider electronic documentation requirements are linked to increased medical error rates, patient safety threats, and job attrition, in addition to diminished provider satisfaction. [5] Consequently, inefficient but mandated EHR documentation practices can be costly to patients, providers, and healthcare institutions.

Identifying ways to improve EHRs is challenging due to the limited scoring modalities and the heterogeneity of documentation practices. However, there are four approaches to improving

provider documentation: speech recognition, medical scribes, digital scribes, and EHR templates and shortcuts.

In a systematic review of inpatient interventions to improve EHR documentation, education and the implementation of a new EHR reporting system were the most successful interventions. [6] A project to construct and refine hospitalist templates using a multidisciplinary approach in conjuncture with provider education was implemented for MultiCare's Valley Hospital and Deaconess Medical Center. Efforts were made to adopt current strategies for documentation advancement among hospitalists, which included minimizing the display of data, avoiding the use of the copy-paste function, and referencing appropriate information instead of direct data importation.

MultiCare Health System, Inc. is a nonprofit healthcare organization based in Tacoma, Washington. The organization comprises twelve hospitals in Washington state [7]; however, Deaconess Hospital and Valley Medical Center were the two hospitals where the templates were implemented and reinforced.

MultiCare Health Systems utilizes Epic Systems Corporation's software for its electronic medical records. Epic Systems Corporation is a healthcare software company based out of Verona, Wisconsin, that a 2021 article estimated to have medical records from 78% of patients in the US.[8]

Aggressive stakeholder recruitment, combined with regular feedback, frequent check-ins, and chart auditing, facilitated the successful implementation of the template with nearly all hospitalist providers at Valley Hospital and Deaconess Medical Center. Analysis of the data demonstrated a significant decrease in the number of characters per note. It was assumed that the

number of characters correlated with "note bloat" and visualization overload by providers and the care team. The data also suggested that providers spent less time reviewing patient records per day, indicating improved provider efficiency.

MATERIALS & METHODS

This process of template construction and adoption was divided into five phases: initiation, planning, education, monitoring and controlling, and closure.

Initiation Phase

Stakeholder identification and recruitment were a significant concern and risks for the success of this project. Hospitalist providers, case managers, utilization management teams, and hospital and professional billing teams were recognized as key stakeholders. Additionally, with the 21st Century Cures Act enabling patients to have greater access to their medical records through MyChart, patients were also considered stakeholders, necessitating a clearly defined layout and structure.

To ensure the recruitment of appropriate stakeholders, effective construction, and adoption, regular meetings were held with representatives from case management, medical coders, utilization management, and the hospitalist teams.

The initiation phase consisted of defining discussions and surveys for the hospitalist group, asking questions about documentation practices, ideal formatting, and dislikes of their current

workflow templates. Provider preferences such as using a prepopulated physical exam over an Epic SmartBlock, structured sections, and avoiding "copy-pasting" of laboratory/imaging results were identified. As in earlier documentation studies[9], our providers preferred the APSO format over the SOAP format.

Planning Phase

The planning phase consisted of the template construction, trial with a select workgroup of hospitalists, and direct real-time feedback. Close attention was paid to the utilization of the new E/M requirements; more specifically, certain information already documented elsewhere does not need to be redocumented.

A template preview was also reviewed with the medical coder and case management teams, and a subsequent survey was distributed to the medical coding and professional billing team. Although it was a relatively small workgroup, six members of the coding team responded to the study. The results showed that 83% felt this would improve their workflow, 50% believed it would facilitate a higher level of service for billing, and 67% thought it would reduce provider queries.

Creating a formal project baseline involved identifying two SMART metrics. [10] Given the length of EHR clinical documentation and its increase over the past decade, [11] the number of characters in each note was proposed as a metric for the project. Timeliness was also utilized as a metric, as increased documentation time has been associated with increased provider burnout.3

Execution Phase

For the execution phase, the hospitalist history and physical, progress note, consult note, and discharge summary were released as Epic SmartPhrases, or automatic text phrases, to the Deaconess and Valley Hospitalist teams. They were designated as "optional use" in the fall of 2023 to facilitate more feedback. After positive preliminary reviews and the majority support of the hospitalists, the use of these templates was deemed mandatory by hospitalist leadership and medical directors. Minor customizations were permitted at the provider level. For example, providers could choose from either their physical exam format or a smart block; however, the overall template structure remained unchanged. Finally, documentation elements in the new template were required for quality metrics and the annual hospitalist bonus, further encouraging template adoption and consistent use.

Monitoring and Controlling

To ensure nearly universal adoption, the hospitalist charting was audited monthly by the author and Hospitalist Associate Medical Director. For each provider in the hospitalist group, a random chart by their authorship was selected for review. For admitting providers, this included history and physicals, and for rounding providers, progress notes and discharge summaries were evaluated. They were visually inspected for template use. If not in compliance, direct communication and encouragement were given to those providers to use the designated templates. This method enabled an initial adoption rate of over 88% (37/42) and a rate of over 92% (39/42) after 3 months. Due to the variability of locums and as-needed providers, they were

not included in the chart auditing process. However, they were encouraged to use the templates for consistency.

Closure

The hospitalist templates have continued to be utilized by the MultiCare Hospitalist groups in the Inland Northwest. A near-quarterly Plan-Do-Study-Act approach was implemented to gather feedback and make minor revisions.

RESULTS

Data from November 2023 to April 2024 regarding the number of characters per note and the average number of minutes the hospitalist spent reviewing a patient's chart per day, as recorded in the Epic Electronic Health Record. This comparison was made using the same metrics from data collected from November 2022 to April 2023. A paired t-test was performed using Python software to compare the data before and after the template implementation.

This demonstrated a decrease in the number of characters per note from 4583.80 to 3839.69, or by 744 characters, after the implementation of the templates, and was statistically significant with a p-value of 0.006. (Figure 1) Analysis of this data also showed a reduction in the time spent by hospitalists reviewing a patient's chart per day, from 14.89 to 12.08 minutes, a decrease of 2.81 minutes with a statistically significant p-value of 0.002 following template adoption. (Figure 2)

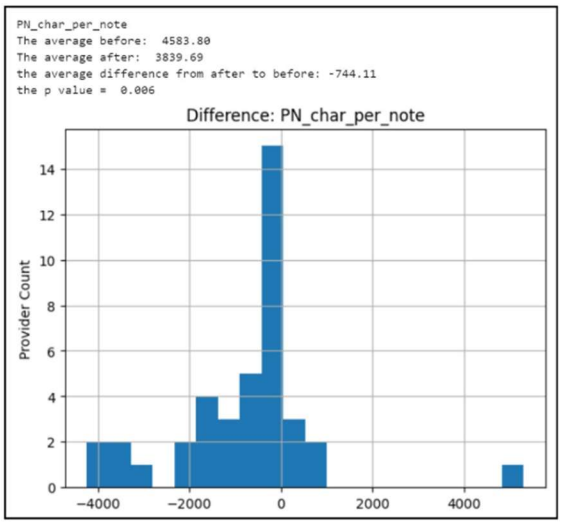

Figure 1: Pre- vs. Post- post-implementation of revised templates for the MultiCare Inland Northwest Hospitalist showing a decrease in the number of characters per note.

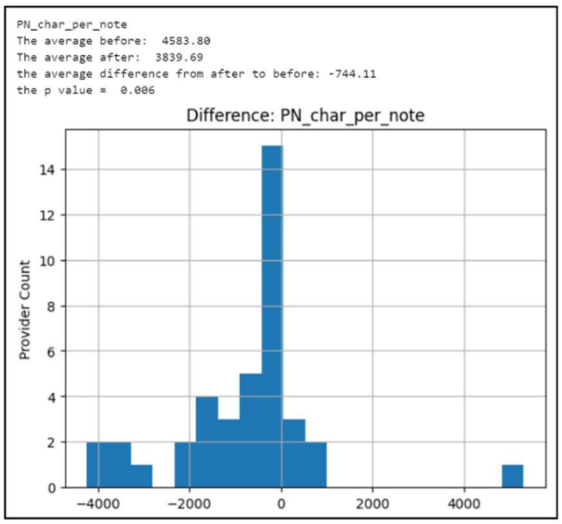

Figure 2: Pre- vs. Post- implementation of revised templates for the MultiCare Inland Northwest Hospitalist showing a decrease in the amount of time in a patient's chart per day.

Similar-sized hospitals within the MultiCare system were used as controls to ensure that upgrades and technological variances did not affect the acquired data. The controls utilized were physician groups at Tacoma General Hospital and Good Samaritan Hospital, as well as Mary Bridge Hospital. Their hospitalist groups did not appear to have any statistically significant changes in the number of characters in their notes or the time in patient charts per day.

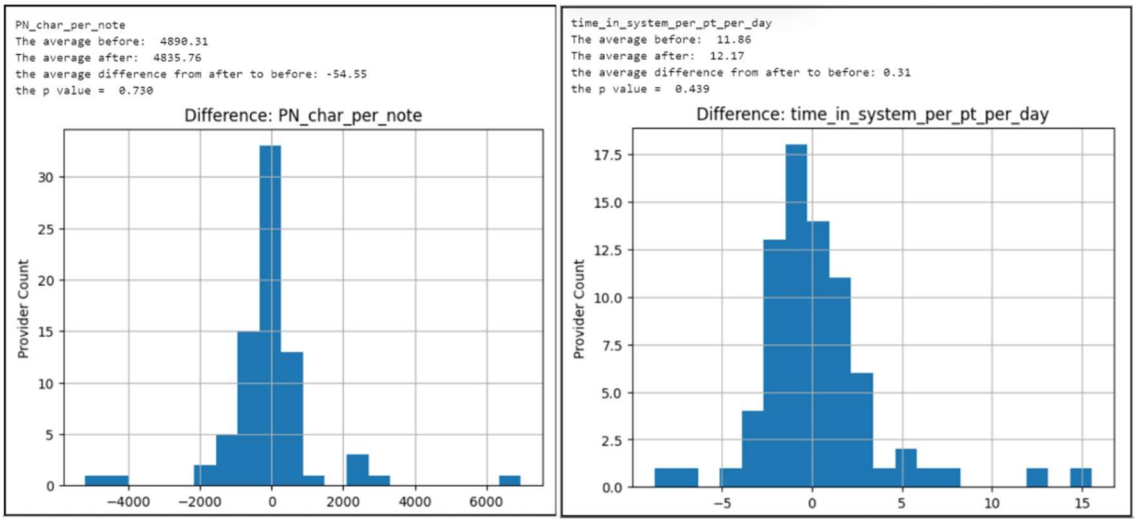

Figure 3 and Figure 4: Control Group #1, Sound Physician Hospitalist Groups at Tacoma General and Good Samaritan Hospitals.

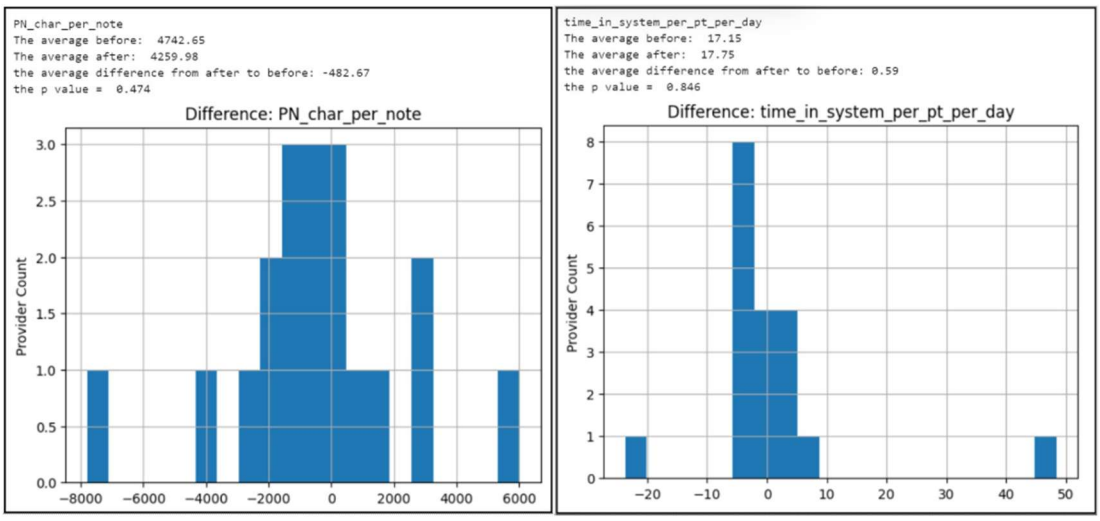

Figure 5 and Figure 6: Control Group 2, Mary Bridge Hospitalist Group

DISCUSSION

Provider documentation is a text record that summarizes interactions between healthcare providers and their patients [12]. To elaborate further, it also specifies a care plan and treatment. However, the responsibilities of patient care documentation have expanded to include secondary aims, including legal, regulatory, quality, and billing requirements in the United States. These extensions, in conjunction with Content Importing Technology (CIT), have led to "note bloat" and EHR redundancy.

Background

Dating back to Imhotep in Ancient Egypt, [13] the purpose of the clinician note was to record an understanding of a patient's condition while serving as a communication tool to others. This has

evolved over the centuries, and in 1968, Dr. Larry Weed created the Problem Oriented Medical Record (POMR), which became adopted as a fundamental documentation platform for medical providers and students,[14] offering a "cognitive framework for clinical reasoning."[15]

The Meaningful Use incentive program and the 2009 HITECH Act incentivized healthcare organizations to adopt electronic health records for financial incentives. The primary aim was to increase accessibility to patient records and modernize our medical system. By storing large amounts of patient care information and data, now accessible remotely, it was thought this would decrease duplicative work. [16]

The 21st Century Cures Act was enacted in 2016, and the *Strategy on Reducing Regulatory and Administrative Burdens Relating to the Use of Health IT and EHRs* was released in 2018 to help alleviate the EHR burden. This was included in the American Medical Association's (AMA) Evaluation and Management guidelines in 2021. The goal was to reduce the time and effort required for provider documentation, enabling them to meet regulatory requirements, while also improving EHR functionality and ease of use. Before this change, the Evaluation and Management (E/M) guidelines had not been updated since 1997. The updates were long overdue as there had been significant changes in medicine, including the formation of the hospitalist role as its specialty in 1996. [17]

The 2021 E/M changes encouraged a reduction in "note bloat" and redundancy by declaring that elements already documented elsewhere in the health record do not need to be re-documented. This included patients' past medical, surgical, and social histories in their entirety; specifically, only relevant patient history, review of systems, and physical examination findings were included. These changes were made to other E/M categories in 2023 by the American Medical

Association (AMA) and the Centers for Medicare & Medicaid Services (CMS). These modifications also allowed providers to bill based on their medical decision-making, rather than the traditional "time spent on patient care." "The goals for these changes were to reduce administrative burden and better align coding with how patient care is delivered (today)."[18]

Current Challenges

The transition to EHR incorporation, although well intended, has also had adverse consequences, likely due to the U.S. documentation requirements. U.S. providers spend 44% of their computer-facing time on documentation and only 24% on patient communication. [19] Despite the widespread use of the EHR and incorporation of computer-aided data entry, the quality of the documentation remains problematic. More specifically, usability and quality are poor. [20]

CIT, including copy and paste functions, templates, macros, and automatic data importing, was introduced in the EHR to enhance efficiency in provider documentation. However, at times, this has had the opposite effect intended. CIT can perpetuate errors, regurgitate unhelpful information, obscure relevant information, and propagate visual overload. It has been demonstrated that free-text fields are associated with increased error rates [21], and the copy-and-paste function can misrepresent the treatment plan and clinical course [22]. Additionally, prepopulated fields have led to medication errors and adverse patient safety events. [23] Finally, CIT has also been shown to have diminished coding quality for administrative databases. [24]

It has been estimated that over the past decade, the length of EHR documentation has increased by 60.1%, and the length of provider notes has increased from 401 to 642 words. [16] Despite

using the same EHR, clinical notes are four times longer in the United States compared to those in other countries. [25] This "EHR burden" and increased documentation are a significant contributor to provider burnout. [3] It is estimated that 49% of providers are meeting burnout criteria and maintain decreased job satisfaction,[26], [27] which is associated with increased medical errors and patient risk. Poor documentation has also been shown to pose barriers to patient care. [28]

Some providers exhibit resistance to change, which can pose barriers to standardization [29],, and there is a strong notion that there is an "artform" to documentation practices. It is felt that the structured note construction and over-standardization can hinder clinician expressivity.12

Shoolin et al. state that documentation needs to promote a "balance between ease of use and thoughtless documentation."[30] However, there is little guidance on how this can be achieved, and unfortunately, most studies and reviews examining documentation practices to identify possible targets for improvement focus on the outpatient setting. This is likely due to variability and a lack of standardization. [6]

Existing EHR Tools, Improvements and Suggestions

Admittedly, there are few recognized suggestions for improving inpatient documentation. However, templates and smart phrases are felt to reduce the amount of manual typing. Additionally, a multicenter, retrospective study demonstrated standardized and structured documentation increased provider efficiency. [4]

Studies have suggested that the APSO format is preferred by 70% of clinicians because it is faster and easier to use than the SOAP format. [31] Not surprisingly, notes with organized and ordered sections were preferred over those with mixed sections, which were negatively perceived. [32] Based on these contentions, organizations may benefit from standardization and ordered sections, using templates in the APSO format. However, there is no evidence to suggest that this implementation improves patient outcomes.6

There are limited scoring tools to assess provider documentation. One available scoring tool is the Physician Documentation Quality Instrument (PDQI-9). Applying this scoring tool to provider notes is relatively time-consuming, which may explain its limited use. [9] The PDQI-9 focuses on nine items, which include Up-to-Date, Accurate, Thorough, Useful, Organized, Comprehensible, Succinct, Synthesized, and Consistent. Each category is given a score of 1-5. Applying this scoring tool to provider notes was relatively time-consuming, which explains its lack of use.

Research and evaluation tools would be helpful in guiding efforts to improve inpatient EHR documentation. Tools such as the Qnote instrument[33] have been developed for use in outpatient settings; however, tools for evaluating inpatient documentation are lacking.

Template Construction at MultiCare

Based on existing research, efforts were made to construct a template that follows the APSO format and has organized and structured sections. Additionally, free-text forms were replaced

with selectable, prefilled list options and statements, aiming to reduce the documentation error rate.

Discussions with medical coders and the professional billing team revealed that the amount of work a provider spends on a patient is typically not reflected in their charting. Selectable statements were added to help providers capture the appropriate level of medical decision-making. For example, a statement attesting to the utilization of a non-oral controlled substance was added to be used by the clinician when medically appropriate. Multiple meetings were held with coders, utilization management, and health information management to ensure a consensus regarding complete documentation. However, despite extensive efforts, a lack of consensus regarding qualifications for medical decision-making and the appropriate phrasing or wording remained.

Aggressive efforts were made to reduce chart bloat and provider visual overload. It was hoped that the 2023 evaluation and management guidelines could be fully utilized; however, due to individual bylaws, certain elements, such as past medical history, past surgical history, family history, and social history, were required despite being documented elsewhere in the patient's chart. As is not uncommon with smaller healthcare systems, the hospital bylaws still require these elements.

FUTURE DOCUMENTATION STRATEGIES AND ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) has the potential to transform the healthcare system by enhancing clinical workflow and mitigating provider burnout in a manner that science fiction has previously

only predicted. [36] There are two main types of AI currently used in an EHR system. This includes AI-enhanced Clinical Decision Support (CDS) and AI-powered note generation or automation.

AI-Enhanced Clinical Decision Support evaluates information and analyzes clinical data to provide care plan suggestions to the provider. It is believed that AI-enhanced CDS can optimize treatment plans and enhance diagnostic accuracy, thereby reducing clinical errors and improving patient outcomes.

AI-Powered Note Generation and Automation includes ambient listening with dictation, transcription, data structuring, and summarization. Ambient AI scribes use Natural Language Processing (NLP) and Machine Learning (ML) to translate the conversations between patients and providers into written, structured documentation. There is also Generative AI that creates content summarization from chart information, patterns, and images. This utilizes a chat-generated, pre-trained transformer, also known as Chat GPT.

Although AI implementation into the EHR is novel, healthcare professional opinion has been generally positive as this is thought to facilitate ease of use of the EHR and promote a reduction in provider task load. [34] Additionally, this AI-powered note generation showed a decrease in mean documentation time for hospital providers, especially with complex cases. [35]

Several studies have demonstrated improvements in clinician documentation practices using AI, but the majority of these studies are conducted in the outpatient setting. Specific concerns include the ability of advanced AI to produce hallucinations or fictitious output, which may be written as fact in a patient's chart. Hallucination rates have been reported to range between 3-28%.[36], [37] Further studies ensuring the reliability and validity of AI methods are imperative,

especially those used within the hospital. There remains a cautious optimism towards AI integration, given these quality concerns.

Currently, MultiCare is considering the addition of Ambient AI to assist providers with documentation. Some outpatient providers have used this, and a trial for inpatient hospitalists is scheduled to begin in summer 2025. Hospitalists are also starting to use AI-generated hospital summaries. Initial MultiCare Hospitalist opinions suggest that although the AI summaries can provide a helpful overview, critical clinical information is often missing, and an independent chart review is still required to ensure accuracy.

CONCLUSION

According to a 2016 study, physicians spend twice as much time in the electronic health record (EHR) as they do with direct patient care. [38] This is most likely due to the multitude of documentation requirements placed on providers, whether legal, billing, quality, or regulatory. As a result, the EHR burden is contributing to decreased provider satisfaction and increased burnout. Content importing technology (CIT) at times offers solutions to these requirements; however, it has also contributed to "note bloat" and EHR redundancy.

Currently, there is limited evidence and subsequent guidance regarding inpatient documentation improvement. Standardization with a structured format, adhering to the 2023 E/M guidelines and minimizing free-form text, may increase note effectiveness.

This structure was incorporated through template standardization for the MultiCare Health System Inland Northwest Hospitalist team. The results demonstrated a decrease in the amount of

time spent on the chart per patient per day and the number of characters in each patient note. This suggests improved efficiency and a decrease in "note bloat," or minimization of visual overload. Although this data is promising, more research is necessary to streamline inpatient charting practices, perhaps in conjunction with AI technology. More specifically, improved criteria and practice delineations, in addition to scoring modalities, could alleviate the documentation burden on inpatient providers, thereby reducing burnout while ensuring the necessary information is communicated for charting requirements without compromising patient care.

ACKNOWLEDGEMENTS

The author would like to acknowledge Dr. Chris Kelly for his assistance with data analysis and contribution of the figures in this paper.

A tremendous gratitude is also extended to Kelly Fagan, barista, wine steward, personal chef, and pinnacle of support during the many late nights completing the OHSU Master's curriculum.

REFERENCES

[1] Hahn JS, Bernstein JA, McKenzie RB, King BJ, Longhurst CA. Rapid implementation of inpatient electronic physician documentation at an academic hospital. Appl Clin Inform 2012; 3(2): 175-185

[2] Avendano J P, Gallagher D O, Hawes J D, et al. (June 25, 2022) Interfacing with the Electronic Health Record (EHR): A Comparative Review of Modes of Documentation. Cureus 14(6): e26330. DOI 10.7759/cureus.26330

[3] Landi H. Survey: physicians cite EHRs as the biggest contributor to burnout. Healthcare Innovation. July 21, 2018. Accessed May 14, 2020.

[4] Ebbers T, Kool R. The Impact of Structured and Standardize Documentation on Documentation Quality, a Multicenter Retrospective Study. Journal of Medical Systems (2022) 46:46. https://doi.org/10.1007s10916-022-01837-9

[5] Moy AJ, Schwartz JM, Chen R, et al. Measurement of clinical documentation burden among physicians and nurses using electronic health records: a scoping review. J Am Med Inform Assoc 2021;28:998–1008.

[6] Wiebe N, Otero Varela L, Niven DJ, Ronksley PE, Iragorri N, Quan H. Evaluation of interventions to improve inpatient hospital documentation within electronic health records: a systematic review. Journal of the American Medical Informatics Association (JAMIA). 2019;26(11):1389-1400. doi:10.1093/jamia/ocz081

[7] Systems MH. MultiCare > About Us: MultiCare Health Systems; [Available from: https://www.multicare.org/about/ accessed May 20, 2024.

[8] Adams K. 31 Numbers that Show How Big Epic, Cerner, Allscripts & Medotech Are In Healthcare. 2021 April 12. https://www.beckershospitalreview.com/healthcare-information-technology/31-numbers-that-show-how-big-epic-cerner-allscripts-meditech-are-in-healthcare.html.

[9] Stetson PD, Bakken S, Wrenn JO, et al. Assessing election note quality using the physician documentation quality instrument (PDQI-9). Appl Clin Inform 2012;3:164–74

[10] Watt A (2014, August 14). 9. Overview of project planning. Retrieved 5/28/2025, from https://opentextbc.ca/projectmanagement/chapter/chapter-8-overview-of-project-planning-project-management/

[11] Rule A, Bedrick S, Chiang MF, Hribar MR. Length and Redundancy of Outpatient Progress Notes Across a Decade at an Academic Medical Center. JAMA Netw Open. 2021;4(7):e2115334. doi:10.1001/jamanetworkopen.2021.15334

[12] Rosenbloom ST, Denny JC, Xu H. Data from clinical notes: a perspective on the tension between structure and flexible documentation. Journal of the American Medical Informatics Association (JAMIA). 2011;18(2):181-6.

[13] Dunn J. Tour Egypt. Imhotep, Doctor, Architect, High Priest, Scribe, and Vizier to King Djoser. Available

[14] Weed, L. L. (1968-03-14). "Medical records that guide and teach ."The New England Journal of Medicine. 278 (11): 593–600. doi:10.1056/NEJM196803142781105. ISSN 0028-4793. PMID 5637758.

[15] Podder V, Lew V, Ghassemzadeh S. SOAP Notes. [Updated 2022 August 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482263/

[16] Avendano J P, Gallagher D O, Hawes J D, et al. (June 25, 2022) Interfacing with the Electronic Health Record (EHR): A Comparative Review of Modes of Documentation. Cureus 14(6): e26330. DOI 10.7759/cureus.26330

[17] Wachter RM, Goldman L. The Emerging Role of "Hospitalists" in the American Health Care System. The New England journal of medicine. 1996;335(7):514-517. doi:10.1056/NEJM199608153350713

[18] AAPC Thought Leadership Team. April 27, 2023. 2023 E/M Coding Changes. Evaluation and Management (E/M) Code Changes 2023 – AAPC

[19] Arndt BG, Beasley JW, Watkinson MD, et al. Tethered to the EHR: primary care physician workload assessment using EHR event log data and time-motion observations. Ann Fam Med. 2017; 15:419-26. [PMID: 28893811] doi:10.1370/afm.2121

[20] Dhavle AA, Corley ST, Rupp MT. Evaluation of a user guidance reminder to improve the quality of electronic prescription messages. Appl Clin Inform. 2014; 5(3): 699–707.

[21] 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; 4 (4): 219–25.

[22] Dimick C. Documentation bad habits: shortcuts in electronic records pose risk. J AHIMA 2008; 79 (6): 40–3.

[23] 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.

[24] 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; 16 (2): 101–13.

[25] Downing N, Bates D, Longhurst C, Physician Burnout in the Electronic Health Record Era: Are We Ignoring the Real Cause? Annals of Internal Medicine 2018;169(1):51-53.

[26] Leung J, Rioseco P, Munro P. Stress, satisfaction and burnout amongst Australian and New Zealand radiation oncologists. Journal of Medical Imaging and Radiation Oncology 2015;59(1):115–24.

[27] Klein J, Grosse Frie K, Blum K, von dem Knesebeck O. Burnout and perceived quality of care among German clinicians in surgery. International Journal for Quality in Health Care, 2010; 22(6): 525–30.

[28] Embi PJ, Yackel TR, Logan JR, Bowen JL, Cooney TG, Gorman PN.Impacts of Computerized Physician Documentation in a Teaching Hospital: Perceptions of Faculty and Resident Physicians. J Am Med Inform Assoc 2004; 11(4): 300-309

[29] 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.

[30] Shoolin J, Ozeran L, Hamann C, Bria W 2nd. Association of Medical Directors of Information Systems Consensus on Inpatient Electronic Health Record Documentation. Appl Clin Inform. 2013 Jun 26;4(2):293-303. doi: 10.4338/ACI-2013-02-R-0012. PMID: 23874365; PMCID: PMC3716423.

[31] Sieja A, Pell J. Successful Implementation of APSO Notes Across a Major Health System. March 8, 2017. American Journal of Accountable Care, 2017; 5(1): 29-34.

[32] Hultman GM, Marquard JL, Lindemann E, Arsoniadis E, Pakhomov S, Melton GB. Challenges and Opportunities to Improve the Clinician Experience in Reviewing Electronic Progress Notes. Appl Clin Inform. 2019 May;10(3):446-453. doi: 10.1055/s-0039-1692164. Epub 2019 June 19. PMID: 31216591; PMCID: PMC6584143.

[33] Burke HB, Hoang A, Becher D, Fontelo P, Liu F, Stephens M, Pangaro LN, Sessums LL, O'Malley P, Baxi NS, Bunt CW, Capaldi VF, Chen JM, Cooper BA, Djuric DA, Hodge JA, Kane S, Magee C, Makary ZR, Mallory RM, Miller T, Saperstein A, Servey J, Gimbel RW. QNOTE: an instrument for measuring the quality of EHR clinical notes. J Am Med Inform Assoc. 2014 Sep-Oct;21(5):910-6. doi: 10.1136/amiajnl-2013-002321. Epub 2014 January 2. PMID: 24384231; PMCID: PMC4147610.

[34] Bracken et al. AI-powered documentation systems in healthcare

[35] Barak-Corren Y, Wolf R, Rozenblum R, Creedon JK, Lipsett SC, Lyons TW, et al. Harnessing the Power of Generative AI for Clinical Summaries: Perspectives from Emergency Physicians. Ann Emerg Med. 2024;84(2):128-38.

[36] Chelli M, Descamps J, Lavoue V, Trojani C, Azar M, Deckert M, et al. Hallucination Rates and Reference Accuracy of ChatGPT and Bard for Systematic Reviews: Comparative Analysis. J Med Internet Res. 2024;26:e53164.

[37] Metz C. Chatbots May 'Hallucinate' More Often Than Many Realize.The New York Times. 2023 06/11/2023.

[38] Christine Sinsky, Lacey Colligan, Ling Li, et al. Allocation of Physician Time in Ambulatory Practice: A Time and Motion Study in 4 Specialties. Ann Intern Med.2016;165:753-760. [Epub September 6, 2016]. doi:10.7326/M16-0961