The Impact of Diagnosis-Specific Plan Templates on Admission Note Writing Time: A Quality Improvement Initiative

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ABSTRACT

Background There are limited objective studies regarding the effectiveness of strategies to alleviate the documentation burden on resident physicians.

Objective To develop and implement diagnosis-specific templates for the plan of care section of inpatient admission notes, aiming to reduce documentation time.

Methods Twelve templates for the plan of care section of admission notes were written by the study authors, reviewed by attending physicians, and shared with the residents through the electronic health record (EHR) on September 23, 2022. EHR audit log data were collected to examine admission note writing times, supplemented by resident feedback on acceptability via an anonymous survey. Feasibility measures included time investment, experience with the EHR, and resident training.

Results Between July 1, 2021 and June 30, 2023, 62 pediatric residents contributed 9840 admission notes. The templates were used in 557 admission notes. The mean total time spent on an admission note decreased from 97.9 minutes pre-intervention to 71.0 minutes post-intervention with the use of a template; an adjusted reduction of 23% (95% CI 16%-30%; $P<.001$). The mean attending time spent editing an admission note was unchanged. The survey results underscored wide acceptability of the templates among the residents. Feasibility data showed that the project required minimal time investment from the health care informatics team and minimal resident training.

Conclusions Using templates in the care plan section of admission notes reduces the time residents spend writing admission notes.

Introduction

The systematic keeping of health records has seen remarkable evolution since the mid-19th century,[1,2] particularly with the rapid adoption of electronic health records (EHRs),[3,4] which introduced numerous tools for optimizing quality and efficiency of clinical documentation. A notable feature of EHRs is their ability to track usage through audit log data, the application of which has recently become central to a variety of health informatics studies.[5,6] Nonetheless, these and other studies mount the evidence that EHR systems also contribute to increased physician burnout, especially among trainees.[7-10] For instance, Lou and colleagues surveyed 75 postgraduate year (PGY) 1 residents for burnout and analyzed the survey results along with over 8 million EHR-based log actions.[11] Among other factors, they found an increase in burnout score to be significantly associated with increased total EHR usage time.[11]

The response to EHR-related burnout has focused on multiple contributing factors, especially documentation time.[8,12] Interventions to optimize documentation efficiency included the use of scribes,[13,14] training programs,[15,16] data entry forms,[17] and note templates.[18] However, no previous studies have utilized audit logs from EHRs to evaluate the effectiveness of utilizing plan templates in pediatrics. In a systematic review of the literature, Rule and colleagues[10] identified 32 articles that used audit logs from EHR systems to characterize "time in notes," none of which utilized the data to evaluate possible solutions. Further, only 6 articles focused on residents,[19-24] underscoring a paucity in studies evaluating interventions to reduce documentation time in general, and in particular, for resident physicians who number almost 150 000 in the United States.[25] While note writing using the EHR is a significant portion of what residents spend their time doing,[21] there is little training on how to improve efficiency in this space using EHR templates.

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Editor's Note: The online supplementary data contains a template example, the surveys used in the study, and further data from the study.

Here, we report the results of the first Plan-Do-Study-Act (PDSA) cycle of a quality improvement (QI) project. The objective of this article is to describe the creation and implementation, as well as the feasibility and acceptability, of 12 diagnosis-specific templates for the plan of care section, aimed at reducing the total time spent on writing admission notes by 20% within 9 months.

KEY POINTS

What Is Known

Documentation burdens on resident physicians are a recognized issue. Few objective studies have evaluated strategies to mitigate these burdens.

What Is New

Diagnosis-specific templates for the plan of care section in inpatient admission notes significantly reduced the mean total time spent on admission notes from 97.9 minutes to 71.0 minutes in a pediatric residency program. Time spent by attending physicians on editing notes was unchanged.

Bottom Line

Program directors looking to decrease resident documentation burden may want to consider this feasible and acceptable innovation.

Methods

Setting

The QI project was conducted at an academic children's hospital with 190 pediatric-serving beds, and which utilizes Epic as its EHR system. Our Accreditation Council for Graduate Medical Education (ACGME)-accredited, 3-year pediatric residency program employed 62 residents over academic year (AY) 2021-2022 and AY 2022-2023. Historically, residents used a generic admission note template which necessitated writing a plan of care de novo for each patient admitted. We observed that when patients were grouped by the reason for admission, their initial plans of care showed similar structures, and hence, premade templates could be utilized to decrease documentation time of admission notes.

Intervention

Twelve common and unique reasons for admission were identified, and a template for the plan of care was created for each. The templates were reviewed and edited by respective faculty (eg, an acetaminophen overdose plan template was reviewed by a medical toxicology faculty). Each plan template included resources related to the admission reason and EHR tools that prompted the end user to interact with and edit the plan template to be specific for each patient's case. Access to the templates was shared with all pediatric residents on September 23, 2022. Instructions on how to use the templates were distributed via email, and a note was attached to work computer monitors as a reminder. A list of all templates used, as well as a sample of the templates, can be viewed in the online supplementary data, sections A and B. The intervention's feasibility was assessed by estimating the time, expertise, and training requirements to create, implement, and use the templates.

Data Collection

With the help of the health care information system (HCIS) team, EHR reports were generated to export audit log data on all notes created between July 1, 2021 and June 30, 2023 in which a pediatric resident contributed. The primary outcome measure was total time (residents, attendings, students, etc) spent on writing admission notes. The attending time spent on editing and signing the notes was used as a balancing measure and surrogate for quality of the note. Audit log data are EHR logs that include the time in seconds each time a note is opened; if a note is left open without active usage, this inactivity would be included in the recorded time up to 20 minutes, at which point the EHR system would automatically log off. Due to incomplete report data, 687 notes, from a total of 94 567 notes, were excluded. An additional 4369 notes that did not have attending time recorded were excluded from the attending time analysis. Exclusion criteria are detailed in the online supplementary data, section C.

Two anonymous Qualtrics electronic surveys were utilized to assess the acceptability of the intervention. The first was distributed to all PGY-1 residents (N=17 in AY 2022-2023) pre-intervention in August 2022. Given a more generalized use of the survey, the second survey was distributed to all residents (N=48 in AY 2022-2023) post-intervention in April 2023. Both surveys can be found in the online supplementary data, section D.

Statistical Design and Analyses

Statistical analyses and graphing were performed using SAS (version 9.4; SAS/STAT 15.2). The data, initially nonnormal and right-skewed, was normalized using natural log-transformation for analyses. Due to multiple notes with contributions from more than one resident, group mean note times were compared using a generalized linear model with the generalized estimating equations method. This accounted for correlation in notes from the same resident. Only admission notes from services with at least 15 uses of any template were analyzed.

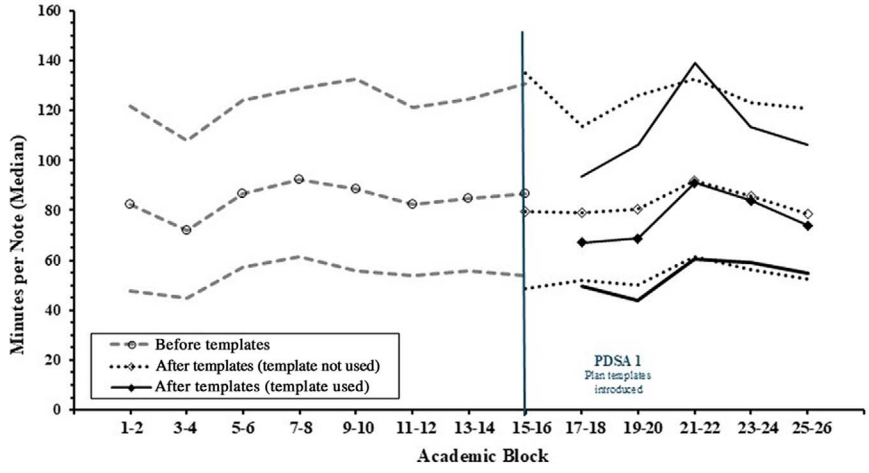

FIGURE 1
Temporal Trend of Admission Notes Writing Times by Academic Block

Note: Line graph tracking the median writing times for admission notes across different time blocks. An academic year is divided into 13 blocks, each 4 weeks in duration (ie, academic year [AY] 2021-2022 begins with block 1 and AY 2022-2023 begins with block 14). The graph displays median times along with lower and upper quartiles.

The analysis included the varying contributions to total note time among individuals and across 3 groups: before template introduction, after template introduction with template use, and after template introduction without template use. Mean estimates were derived from the generalized linear model in log-scale and back-transformed to the original scale, with standard errors calculated using the delta method. Multiple pairwise comparisons were adjusted using Tukey's method. Group differences were expressed as ratio of means with adjusted 95% confidence intervals, where the percentage difference between means is represented by (ratio-1)×100.

Descriptive statistics were used to analyze both surveys, with frequencies reported for categorical variables and means for continuous variables. For questions prompting a time range response, midpoint values were averaged to calculate the mean times (eg, 30 to 45 minutes; the midpoint value is 37.5 minutes).

The local institutional review board determined that the project does not involve human subjects research (#202303347).

Results

Admission Notes and Template Use

Between July 1, 2021 and June 30, 2023, 62 pediatric residents contributed 93 880 notes, including 9840 admission notes for a median resident time of 56.2 (IQR 26.8-94.5) minutes per admission note. After introducing the templates on September 23, 2022, 3871 admission notes were written by residents, and the templates were used in 557 admission notes, including 337 of all 1301 pediatric hospital medicine (PHM) admission notes after introduction of the templates (25.9%), 96 of 250 in pediatric neurology (38.4%), 51 of 836 in pediatric intensive care (6.1%), 36 of 61 in pediatric endocrinology (59.0%), and 18 of 73 in pediatric pulmonology (24.7%). FIGURE 1 shows a run chart of the median total time it took to write an admission note before and after the introduction of the templates.

Time Difference Before and After Templates

Total Time: Mean total time to write an admission note was reduced from 86.6 (95% CI 80.7-92.9) minutes pre-intervention to 75.4 (95% CI 70.3-80.8) minutes post-intervention without a template and to 66.4 (95% CI 60.8-72.7) minutes with a template (FIGURES 2 and 3). With the use of templates, the aim of this first PDSA cycle (ie, 20% reduction in total admission note time) was surpassed, as the mean total admission note time was decreased by 23% (95% CI 16-30; $P<.001$) relative to pre-intervention, and 12% (95% CI 6-18; $P<.001$) shorter compared to post-intervention note time without a template. Controlling for service showed similar overall findings. For PHM the mean total admission note time with use of templates was 71.0 (95% CI 64.6-78.0) minutes, 28% (95% CI 20-35; $P<.001$) less than pre-intervention time of 97.9 minutes, and 16% (95% CI 10-22; $P<.001$) shorter than post-intervention time of 84.8 minutes without template.

Attending Time: There was no significant difference in pre- and post-intervention mean attending time to edit and sign admission notes (2.1 [1.5, 2.8] minutes

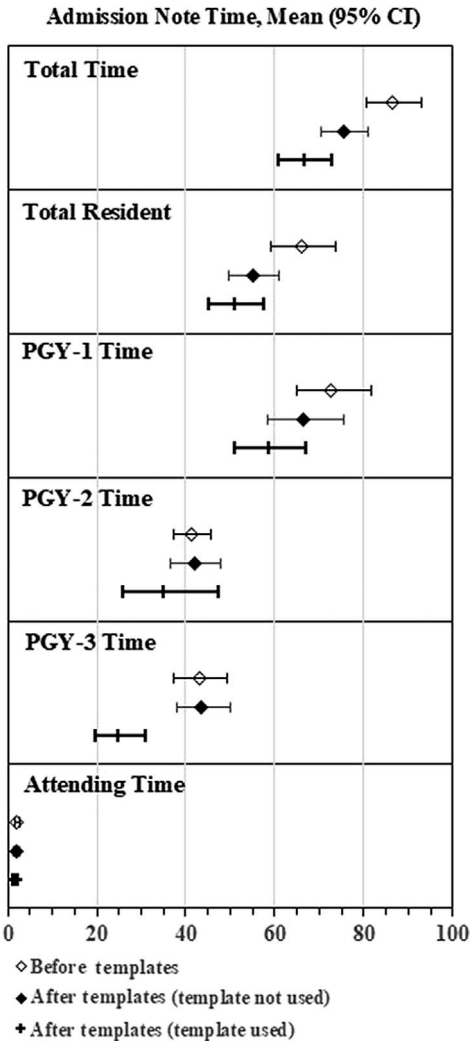

FIGURE 2
Comparison of Mean Admission Note Time With 95% Confidence Limits Pre- and Post-Intervention, With and Without Template Use

Note: Shown are mean admission note total time, resident time, resident time stratified by postgraduate year (PGY), and attending time. For further details on the impact of the templates on resident time overall and at different PGYs, refer to the online supplementary data section E.

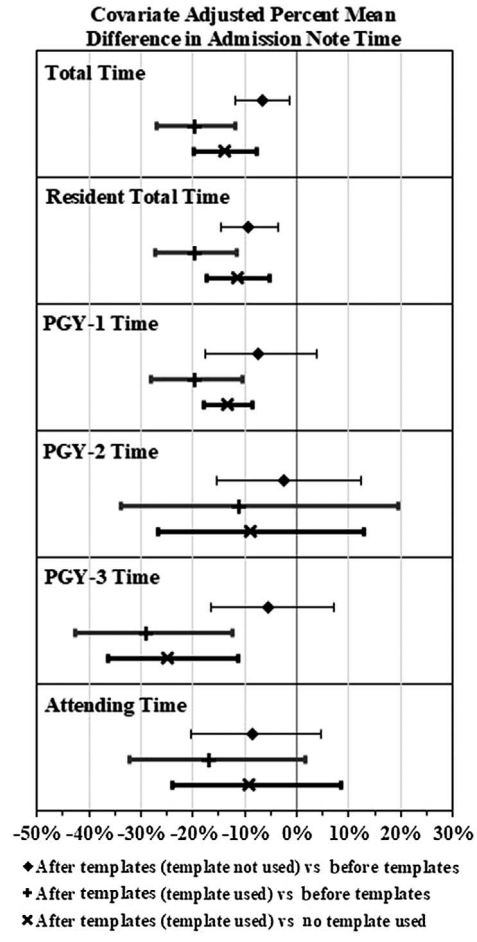

FIGURE 3
Percent Differences in Mean Admission Note Time Pre- and Post-Intervention, With and Without Template Use

Note: The estimate of mean differences has been adjusted to control for service unit, and for percent contribution to total time for resident time and attending time. Mean difference with confidence limits that include zero is not statistically significant.

pre-intervention, 1.9 [1.4, 2.6] minutes post-intervention without template, and 1.6 [1.2, 2.2] minutes post-intervention with use of template) even after adjusting for service and percent contribution to total time (P=.17).

Surveys

Pre-intervention, 11 of 17 responses were collected (65% response rate) from PGY-1 residents. Residents estimated the time to complete a single admission note over the last 2 months to be around 39.8 minutes, with a range of 21 to 74 minutes. A majority (7 out of 11) strongly agreed that "having templates for the plan of care section of [admission] notes would be helpful." Post-intervention, 17 of 48 responses were collected (35% response rate) from 7 PGY-1, 7 PGY-2, and 3 PGY-3 residents. The estimated time to complete a single admission note over the last 6 months was around 36.6 minutes, with a range of 18.2 to 82.1 minutes. Most responders (13 of 16 complete responses) strongly agreed that "having templates for the plan of care section of [admission] notes was helpful," underscoring a broad acceptability of the intervention among the residents. FIGURE 4 details the resident's level of agreement with 4 statements about writing admission notes pre- and post-intervention.

Feasibility

The creation of the templates required an estimated 20 to 30 hours by the study authors. The HCIS team assisted with the technical aspects of implementation

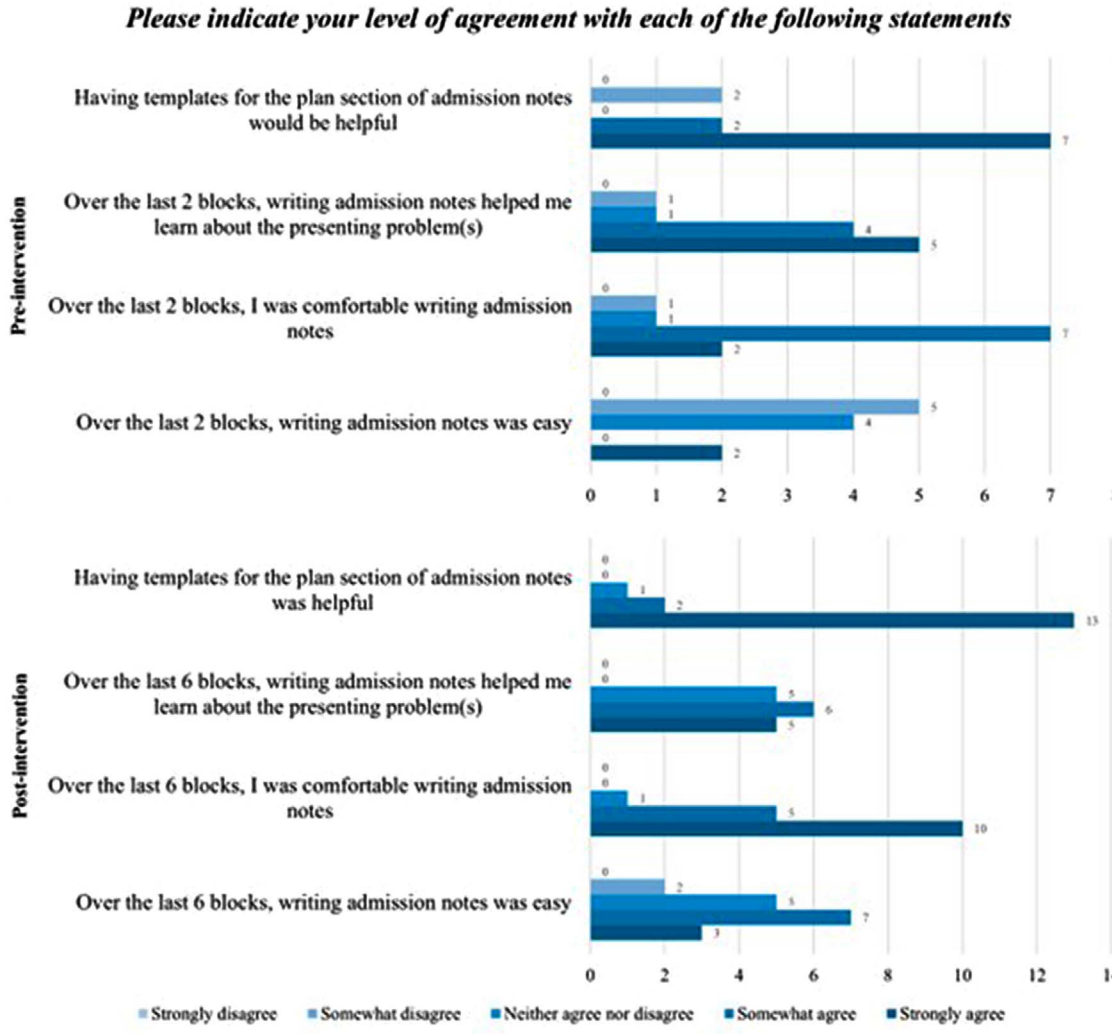

FIGURE 4
Survey Results Pre-Intervention and Post-Intervention

Note: One month before (upper plot), and 6 months following (lower plot) the introduction of the plan templates, residents were asked to indicate their level of agreement with 4 statements regarding the writing of admission notes.

in the EHR without significant time expense. Minimal training was required to ensure residents could easily access and use the templates.

Discussion

The use of the plan templates resulted in a statistically significant reduction in admission note writing times for residents without affecting the time it takes attendings to edit and sign the same notes. The plan templates were broadly acceptable among the residents. Feasibility data indicate that this project is highly feasible and the intervention replicable, given sufficient technical expertise in the EHR.

The attending time was used as a balancing measure to indirectly assess for completeness of the notes; the lack of significant change in the attendings' editing and review time of the notes could indicate a similar quality before and after the intervention. Furthermore, the minimal time spent by attendings editing notes suggests that their role predominantly involves oversight rather than detailed editing.

Research on the use of note templates has demonstrated their potential to streamline clinical documentation across various settings, including inpatient progress notes in internal medicine (IM),[26,27] outpatient notes for IM residents,[28] and progress notes for medical students.[29] Unlike approaches that develop templates for entire notes, our study introduced templates specifically for the plan of care section of admission notes, underscoring a wider usability of strategically employed templates.

The first PDSA cycle for this project focused on using templates for the plan of care section of admission notes in a pediatric residency program. Future work based on these results includes creating templates for the history of present illness section and creating more templates for other diagnoses. The high template use for PHM admissions was likely due to a combination of patient volume (ie, PHM admits the majority of patients) and higher frequency of PHM diagnoses. A similar approach could be applied to other residency programs, those similar to pediatrics (eg, IM) as well as those that primarily admit a narrower spectrum of diagnoses. For the inpatient setting, the first step is identifying common causes of admission that follow a somewhat standardized treatment algorithm (eg, pneumonia, myocardial infarction) and then creating corresponding templates. This process could be applied to the outpatient setting as well for clinic notes.

This study has limitations. Audit logs provide an objective and standardized way to assess documentation time but may inadvertently include periods of inactivity, potentially inflating the actual active time spent on documentation. Moreover, they fail to capture the qualitative aspects such as the thoroughness and complexity of the notes. The study did not evaluate template utilization when the admission diagnosis had a template available. In future PDSA cycles, it will be important to identify why templates were not used and to work on interventions to improve their use. For this cycle, residents had to remember to add the template to the note, which may have limited utilization. The inclusion of the first 3 months of both academic years could potentially have created an experience gap in the groups being compared. However, FIGURE 1, which tracks the median admission note writing time over the study period, does not show a notably longer total time at the beginning of an academic year.

Conclusions

The targeted use of templates in the plan of care section of admission notes significantly decreases the note writing time for residents who used the templates.

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