

Confidence and Efficiency Improvements in Medical Student Notes After Implementation of a Standardized Note Template

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ABSTRACT

Introduction: Writing a clinical note is an essential skill that students learn during clinical rotations, but the skill is highly stylized and can be difficult to teach.

Methods: We developed standardized note templates with embedded help text for students to use when writing inpatient admission and daily progress notes. The templates were designed to provide guidance on key features of a note and to build students' self-perceived confidence and efficiency in note-writing. Pre- and post-intervention surveys and note length measurements were used to evaluate the intervention.

Results: Students' self-rated confidence in writing an assessment and plan increased from 17.4% before the intervention to 83.3% after. Their self-rated ability to write admission and progress notes described as "efficient or very efficient" increased from 23.9% to 58.3% and 67.3% to 91.7%, respectively. A substantial majority of students used the templates and found them very or somewhat helpful in organizing an assessment and plan and for distinguishing important from unnecessary information. During this intervention, average progress note length decreased by 13.8% (95% CI, 5792.8 – 4882.65, $P < .001$), while average admission note length increased by 19.3%.

Conclusions: Implementing a standardized note template was well received by medical students and improved their confidence and perceived efficiency. Template use reduced progress note length but increased admission note length.

INTRODUCTION

Teaching students to write succinct and efficient notes in the electronic health record is challenging. The Association of American Medical Colleges (AAMC) states that the ability to "document a clinical encounter in the patient record" is a Core Entrustable Professional Activity for Entering Residency. When composing

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well-written notes, students learn how to think like physicians and, according to the AAMC, "understand the evolution of the patient's problems, diagnostic work-up, and impact of therapeutic interventions."¹ When students learn note-writing skills from residents and attending physicians during clinical rotations, the feedback they receive is often limited and highly subjective; making it difficult to apply more broadly.² Third-year medical students on our inpatient general medicine service historically have not used a standard, customized note template; instead they either copy a template from a resident or start from scratch. Both options are suboptimal, as they may provide either too much or too little detail and do not teach learners how to write a concise and individualized note. We believe that faculty who teach clinical skills can benefit from having a common,

shared model that defines a succinct and efficient note written by a medical student.

Medical students also frequently use large amounts of copy-and-paste text in their inpatient progress notes, contributing to redundant documentation and reducing the educational value of their notes. Monahan et al found that during the medicine clerkship, the assessment and plan section of student notes became more redundant over a patient's hospital course and as students gained clinical experience.³ In another study, 86% of surveyed medical students observed most residents and attending physicians copying data from other providers' notes; 22% reported copying from residents themselves, and only 10% indicated that copying from other providers was acceptable.⁴

An electronic medical record (EMR) workshop for senior

medical students at one medical school was well received and increased students' confidence in EMR skills, such as data gathering, documentation, and handling unsolicited information.⁵ McRae et al showed that implementing and orienting students to a standardized note template can improve medical student note length and quality in pediatric inpatient rotations, as graded by attending physicians.⁶ However, similar research has not evaluated students' perceptions of their own notes or been conducted in inpatient internal medicine settings.

Partnering with an informatics department to create note templates that model good note-writing habits—by providing prompts as well as rationale for content and format—may help develop a shared approach. Our goal was to determine whether using standardized note templates could improve students' confidence in organizing an assessment and plan for presentations, improve self-perceived note-writing efficiency, help students focus on documenting only important and necessary information, and reduce the use of copying and pasting from other notes.

METHODS

This single-site intervention was performed at a large, Midwest academic institution that houses both a medical school and internal medicine residency program. As part of their clinical education, all medical students rotate on the general medicine service in their third year for 2 to 4 weeks. One of their daily responsibilities is evaluating patients and writing notes alongside internal medicine residents, who usually provide informal feedback.

We partnered with our inpatient medicine informatics team to modify standard note templates previously created for hospitalists and medical residents. We created standardized admission and progress note templates for students and embedded help text to guide them in standard note-writing techniques and clinical decision-making. These templates were generated within the EMR and automatically populated when students began writing a note.

For the admission note template (Appendix A), the help text (which is deleted upon signing the note) guided students to include a detailed history of present illness, pertinent review of systems, a brief emergency department (ED) course, and pertinent past medical history. Students were instructed not to simply copy all laboratory and imaging data from the ED, but instead to include only pertinent information with interpretation. The assessment and plan section emphasized developing an impression paragraph that concisely describes the patient's history, reason for hospitalization, differential diagnosis, and plan of care. Students were then guided to outline their plan in a detailed, prioritized, problem-based format.

For the progress note templates (Appendix B), the help text instructed students to only include history, physical examination findings, and laboratory or imaging results pertinent to the prior 24 hours. Recommendations for the assessment and plan

Table. Results From Surveys Completed by Medical Students Before and After implementation of the Standardized Note Template

Variable	Pre (N=46) n (%)	Post (N=24) n (%)	P value
What is your confidence level in organizing an assessment and plan for presentations?			
Confident	8 (17.4)	20 (83.3)	<.001 ^a
Neutral	32 (69.6)	4 (16.7)	
Not confident	6 (13.0)	0 (0)	
Rate your efficiency in writing an admission note			
Very efficient	0 (0)	3 (12.5)	<.001 ^a
Efficient	11 (23.9)	11 (45.8)	
Neutral	15 (32.6)	8 (33.3)	
Inefficient	20 (43.5)	1 (4.2)	
Very inefficient	0 (0)	1 (4.2)	
Rate your efficiency in writing a daily progress note			
Very efficient	2 (4.3)	9 (37.5)	.001 ^a
Efficient	29 (63.0)	13 (54.2)	
Neutral	11 (23.9)	2 (8.3)	
Inefficient	4 (8.7)	0 (0)	
Very Inefficient	0 (0)	0 (0)	
Estimate the percent of your notes that contains unnecessary information			
<25%	12 (26.1)	16 (66.7)	.007 ^a
25%–49%	29 (63.0)	8 (33.3)	
50%–75%	2 (4.3)	0 (0)	
>75%	2 (4.3)	0 (0)	
How often do you use or refer to parts of someone else's note to help organize the assessment and plan in your note?			
Always	14 (30.4)	2 (8.3)	.002 ^a
Often	27 (58.7)	10 (41.7)	
Sometimes	5 (10.9)	11 (45.8)	
Rarely	0 (0)	1 (4.2)	
How often did you use the general medicine medical student note template for admission and daily progress notes while on your inpatient general medicine rotation?			
Always		23 (95.8)	–
Often		1 (4.2)	
Do you feel the note template was helpful in organizing an assessment and plan for presentations?			
Very helpful		18 (75.0)	–
Somewhat helpful		5 (20.8)	
Neutral		1 (4.2)	
Do you feel the note template was helpful in distinguishing between important and unnecessary information in your notes?			
Very helpful		7 (29.2)	
Somewhat helpful		12 (50.0)	
Neutral		5 (20.8)	

^aStatistically significant at $P \leq .05$.

were similar to the admission note template. For the impression paragraph, students were strongly encouraged to narrow the differential diagnosis and succinctly summarize the plan for that day.

We developed a survey aligned with our aims: to assess students' self-perceived (1) note-writing efficiency, (2) confidence in organizing an assessment and plan for daily rounds presentations, (3) focus on important and necessary information, and (4) reduction in copying and pasting from other notes. Anonymous surveys were

created with input from rotation leadership to meet project goals and protect student privacy.

Before beginning the inpatient general medicine service, all students were oriented to the note templates. These learners had previously received instruction on how to write SOAP (Subjective, Objective, Assessment, and Plan) notes and had prior inpatient clinical experience but had no prior exposure to writing notes specifically for inpatients on a general medicine rotation. At the orientation session and before writing any notes, students completed an anonymous pre-intervention survey. After the rotation, they received an anonymous post-intervention survey. Survey data were summarized as counts and frequencies; pre- and post-intervention comparisons were made using Fisher exact tests.

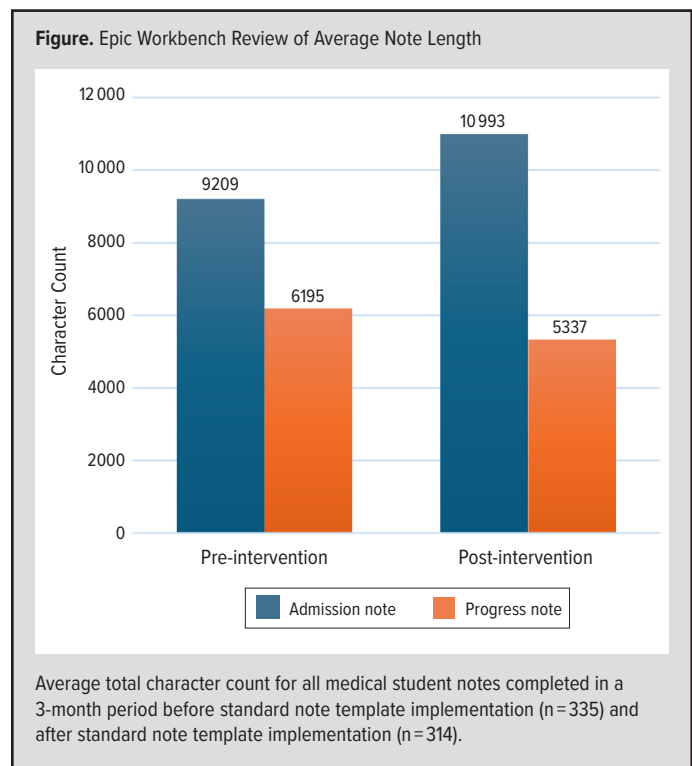
We additionally obtained discrete data using Epic's Workbench Review (Epic Systems), a data exploration and reporting tool within the EMR that allows for analysis of patient data based on specified criteria. We analyzed all notes written by medical students on the general medicine service during two 3-month time intervals: one period before implementation of the standardized note templates ($n=335$) and one period after ($n=314$). These intervals were selected during consistent times of the year to control for student expertise. Reviewing each medical student note allowed us to evaluate overall template uptake, serving as a proxy for implementation success. We also obtained the average character count for admission and progress notes as a surrogate measure of note-writing efficiency and the presence of unnecessary information.

All pre- and post-comparisons were made using paired t tests. All P values $\leq .05$ were considered statistically significant. All analyses were conducted using STATA version 17 (StataCorp). This study was exempt from institutional review board approval under the quality improvement and program evaluation exemption.

RESULTS

Survey results are shown in the Table. Forty-six students completed the pre-intervention survey and 26 completed the post-intervention survey. After the intervention, the percentage of students who rated their ability to organize an assessment and plan as "confident" increased from 17.4% (8/46) to 83.3% (20/24). Similarly, the percentage of students who rated their ability to write admission and progress notes as "efficient or very efficient" increased from 23.94% (11/46) to 58.3% (14/24) for admission notes and from 67.3% (31/46) to 91.7% (22/24) for progress notes. The percentage of students who included less than 25% unnecessary information increased from 26.1% (12/46) to 66.7% (16/24). Self-reported use of copying and pasting another provider's note to organize the assessment and plan also decreased, with those selecting "always" decreasing from 30.4% (14/46) to 8.3% (2/24).

In Epic Workbench Review (Figure), the average progress note length decreased from 6195.39 characters pre-intervention to



5337.13 characters post-intervention, a 13.8% reduction (95% CI, 5792.8 – 4882.65; $P<.001$). Average admission note length increased from 9208.50 characters pre-intervention to 10992.87 post-intervention, a 19.3% increase (95% CI, 10512.97 – 11471.50; $P<.001$). These templates were used in 97% of all student notes during the implementation period. While 72% of student notes used the standardized templates correctly, 25% used the copy-forward function rather than starting the template de novo. Prior to implementation, 35% of student notes used the copy-forward function.

DISCUSSION

Our survey data showed that after implementation of a standardized note template, students reported a significant increase in their self-perceived confidence level in organizing an assessment and plan for presentations, an increase in subjective note-writing efficiency, and a reduction in unnecessary information included in notes. These findings suggest that standardized note templates can help orient learners to effective note writing and enhance their confidence in this skill.

There are several limitations to this project. First, our survey evaluated only students' subjective perceptions and did not include feedback from evaluators (ie, residents, attending physicians) regarding whether the intervention improved confidence or efficiency in practice. In addition, we used a pre-post cohort design rather than a randomized controlled trial, which could have strengthened the conclusions. Because the surveys were anonymous, we were unable to control for individual student

factors that may influence note-writing efficiency. Students may also experience increased confidence and efficiency over the course of any clinical rotation, independent of template use; however, we aimed to focus their reflections primarily on the templates. Another limitation is the decreased response rate for the post-intervention survey. Pre-intervention surveys were completed anonymously at an in-person orientation, whereas post-intervention surveys were anonymous but completed via email, likely contributing to the lower response rate. Although this may introduce bias, the magnitude and consistency of observed changes support our hypotheses. Finally, because this project was conducted at a single academic center, generalizability may be limited; however, we believe this intervention is easily adaptable at other sites.

Although students' self-perception reflected clear improvements in confidence and efficiency with use of a note template, objective metrics from our Epic database review demonstrated a significant increase in admission note length and a significant decrease in progress note length. We believe the increase in admission note character count is likely attributable to automatic inclusion of nonessential information within the template (eg, past medical history, medications, and problem list). We are currently revising the admission template to remove auto-generated content to support more concise notes.

While we cannot draw conclusions regarding the correlation between self-perceived efficiency and character count, the findings suggest that students have reduced the length of their documentation overall, given that most notes written were progress notes. Some debate exists regarding whether note length is an appropriate surrogate for efficiency in medical student notes, and further study on correlations between character count and efficiency is warranted.

Our evaluation also indicated strong adoption of the standardized note template, with 97% of all post-intervention notes using the template. However, approximately 25% of students used this function incorrectly—copying forward from the previous day's note, which may lead to copy-and-paste errors, as auto-templated values such as vital signs would not be updated for the current day. Notably, this is less than the number of students (35%) who used the copy forward function before template implementation. We believe this reduction reflects the effectiveness of the orientation session. Nonetheless, we have re-engaged students to reinforce proper template use and minimize potential documentation errors.

CONCLUSIONS

This intervention demonstrated that implementing a standardized note template for medical students can be beneficial in orienting students to proper note writing, improving their efficiency, and enhancing their confidence. Incorporating these templates as a standard component of our medical student curriculum created

a common, shared model for what constitutes a succinct and efficient student note, which in turn could help reduce note length and better orient students to effective documentation practices.

Financial disclosures: None declared.

Funding/support: None declared.

Acknowledgements: The authors would like to acknowledge the support of the University of Wisconsin School of Medicine and Public Health faculty and leadership for their support with implementing the note templates on the general medicine inpatient service, as well as the medical students who participated in the orientation, utilized the note template, and completed the survey.

Appendices: Available at www.wmjonline.org.

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