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Journal

Applied Clinical Informatics, 15(01)

ISSN

1869-0327

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Publication Date

2024

DOI

10.1055/s-0044-1779021

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Peer reviewed

An Evidence-based Preoperative Evaluation Documentation Template Improves Perioperative Communication

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Appl Clin Inform 2024;15:121–128.

Abstract

Objectives The number of surgeries performed in the United States has increased over the past two decades, with a shift to the ambulatory setting. Perioperative complications and mortality pose significant health care burdens. Inadequate preoperative assessment and documentation contribute to communication failure and poor patient outcomes. The aim of this quality improvement project was to design and implement a preoperative evaluation documentation template that not only improved communication during the perioperative pathway but also enhanced the overall user experience.

Methods We implemented a revamped evidence-based documentation template in the electronic medical records of a health care organization across three internal medicine clinics on the downtown campus and seven satellite family medicine clinics. A pre- and postintervention design was used to assess the template utilization rate and clinician satisfaction.

Results The preoperative template utilization rate increased from 51.2% at baseline to 66.5% after the revamped template “went live” ($p < 0.001$). Clinician satisfaction with the preoperative documentation template also significantly increased (30.6 vs. 80.0%, $p < 0.001$).

Conclusion Adopting a user-friendly, evidence-based documentation template can enhance the standardization of preoperative evaluation documentation and reduce the documentation burden.

Keywords

- ▶ encounter notes
- ▶ documentation burden
- ▶ provider–provider communications
- ▶ workflow and human interactions
- ▶ user acceptance and resistance
- ▶ process improvement

Background and Significance

The number of surgeries performed in the United States has increased consistently over the past two decades, with a shift to the ambulatory setting.¹ Despite a mortality rate below 1% during operations, perioperative complications cause significant morbidity, estimated between 7 and 15%, and contrib-

ute to a considerable health care burden.² Preoperative evaluations can identify and reduce modifiable risks, ultimately improving surgical outcomes.³

According to the Centers for Medicare & Medicaid Services, medical history and physical examination (H&P) must be completed and documented before conducting a procedure requiring anesthesia.⁴ Inadequate preoperative assessment,

received

September 3, 2023

accepted after revision

December 19, 2023

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Georg Thieme Verlag KG,

Rüdigerstraße 14,

70469 Stuttgart, Germany

DOI <https://doi.org/>

10.1055/s-0044-1779021.

ISSN 1869-0327.

management, and omission of critical elements in the preoperative H&P can contribute to communication failures across the perioperative pathway, leading to practice inefficiency, increased staff workloads, and poor patient outcomes.⁵⁻⁸

Although limited studies and quality improvement (QI) projects have focused on the documentation standards of preoperative assessments, the available evidence demonstrates that standardizing documentation is a cost-effective and practical method to improve the quality of preoperative assessments, reduce unnecessary delays and cancellations, and improve patient safety.^{9,10} Studies in different medical specialties showed that well-designed templates could serve as clinical decision support (CDS) tools and evaluation checklists, reduce variability in care delivery, improve care efficiency and effectiveness, and provide guidance for improving chronic disease staging accuracy and achieving process outcomes.¹¹⁻¹⁴

Although our health care organization provided preoperative evaluation documentation templates in Epic electronic health record (EHR), a retrospective chart audit revealed low template utilization rate of 51.2%. The needs assessment showed only 30.6% of respondents were satisfied with the approved templates. The previous documentation template did not include risk assessment tools, preop-focused review of systems (ROS), and required users to manually enter surgical information. The faculty members (physicians, nurse practitioners, and physician assistants) in the internal medicine (IM) and family medicine (FM) departments strongly desired a revamped template.

The technology acceptance model (TAM) was selected as this project's framework to inform the template design and implementation due to its widespread use in understanding and explaining health care professionals' reactions to technology usage.¹⁵ The TAM proposes that the end user's intention to use technology and actual usage behaviors are determined by the end user's attitude toward using the technology.¹⁵ Using this model, we aimed to design and

implement a preoperative documentation template that not only improved communication during the perioperative pathway but also enhanced the overall user experience.

Methods

Context

The QI project was implemented within a large health care system in Minneapolis, United States, which comprised a level 1 trauma center, a 484-bed academic medical center, and primary care and specialty clinics. Preimplementation data were collected from August to October 2021. The template design period was from October 2021 to January 2022. The postimplementation phase and sustainment phase were from April to June and July to October, 2022, respectively (→Fig. 1). Faculty members in the IM and FM departments performed preoperative assessments across three IM clinics on the downtown campus and seven satellite FM clinics. The preoperative evaluations are usually completed by primary care clinicians rather than surgeons or anesthesiologists. An update of any H&P is performed by the anesthesia team after the patient's arrival at the preprocedural area. Commonly performed procedures span a wide array of specialties, including general surgery, vascular, orthopaedic, gynecologic, urologic, etc.

Intervention

A retrospective chart audit was conducted in 2021 to assess preoperative documentation template usage. In September 2021, the QI team conducted an optional and anonymous preimplementation survey via email to assess clinicians' attitudes and satisfaction toward the existing template and solicited open feedback. Based on clinician responses and existing literature, the QI team integrated three major intervention components during the project: template development and documentation enhancement, workflow redesign to simplify template access in the EHR, and clinician education.

QI Project Timeline

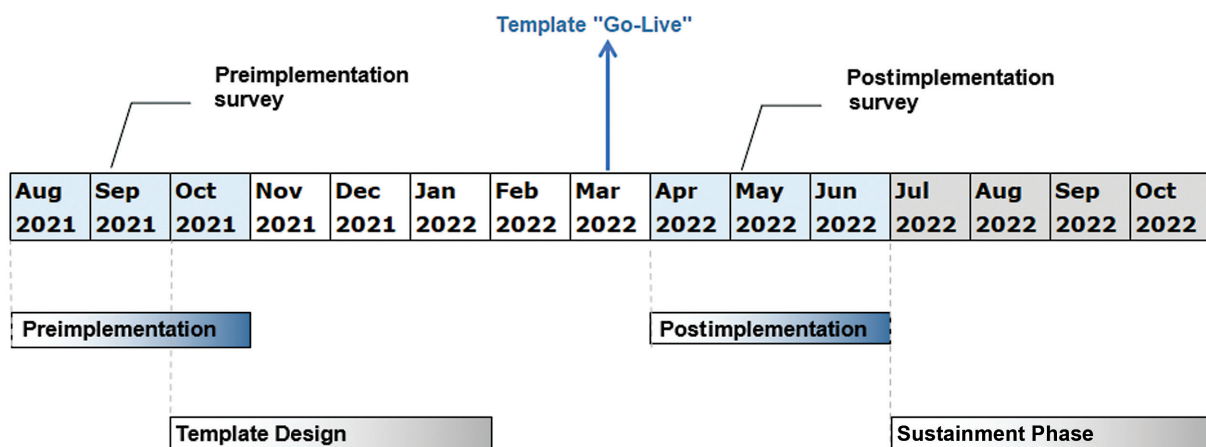


Fig. 1 Quality improvement (QI) project timeline.

Between October 2021 and January 2022, the QI team created a revamped template, designed based on current practice guidelines, clinician feedback, the health care organization's Medical Staff Rules and Regulations, and preoperative templates shared by other health care organizations in the Epic UserWeb Community Library. The revised template comprised changes in crucial elements, such as the expansion of assessment and plan, history of present illness (HPI), the addition of preoperative risk assessment and ROS, functional capacity assessment, and enhancement of anesthesia considerations. Additionally, it included existing elements from the previous template, such as medical and surgical history, current medication list, allergy list, physical examinations, and preoperative diagnostic studies (→Fig. 2).

A cardiac assessment CDS tool based on a stepwise approach to perioperative cardiac assessment from the American College of Cardiology and American Heart Association guidelines was embedded in the NoteWriter template

using Epic's SmartBlock SmartForms features.¹⁶ This tool included the Revised Cardiac Risk Index calculator (→Fig. 3) to estimate the patient's risk of cardiac complications after noncardiac surgery and recommendations for preoperative cardiac assessment based on the patient's estimated risk (→Fig. 4). Using predetermined text-generation templates linked to the SmartForm, appropriate natural language documentation would automatically generate in the H&P when clinicians clicked on buttons in the CDS tool based on patient characteristics.

Other notable enhancements included automation to record the procedure name, date, and surgeon's name in the HPI, and embedded hyperlinks to health care organizations' clinical practice guidelines to provide integrated clinical guidance at the point of care. This template was vetted and approved by the billing, coding, and compliance teams.

The QI team simplified the workflow and encouraged clinicians to create a single-click button giving them easy

Cardiac Assessment Physical Exam

Summary:

Arial 11 B I U A [Rich Text Editor Icons]

Insert SmartText [Icons]

PREOPERATIVE HISTORY & PHYSICAL EVALUATION

Clinic & Specialty Center Internal Medicine Clinics

Recommendations and Plans for Optimization Prior to Surgery

1. The patient **IS/IS NOT** medically optimized for the scheduled procedure.
2. Cardiac Assessment ***

Assess/Plan List (Optional)

Include Patient Instructions? (Optional)

Chief Complaint and History of Present Illness

Is this surgery Internal (HHS) or External?

Preoperative Risk Assessment and ROS

General

- Recent fevers, chills, upper respiratory symptoms, or acute changes in energy level: **No, Yes, NA**
- Chest pain or dyspnea with exertion: **No, Yes, NA**
- Recent swelling of feet or ankles: **No, Yes, NA**
- Recent exposure to systemic steroid: **Systemic steroid exposure**
- Dental appliance or recent dental problems: **No, Yes, NA**
- Open wound with/without infection: **No, Yes, NA**

Anesthesia Considerations

- Patient **DENIES** family history of anesthesia reactions.
- **Personal Anesthesia History**

Functional Capacity Assessment

- **Functional Capacity SmartList**

Fig. 2 Partial screen capture of the evidence-based preoperative evaluation documentation template (©2023 Epic Systems Corporation). ROS, review of systems.

Cardiac Assessment	Physical Exam
Revised Cardiac Risk Index	
This Revised Cardiac Risk Index Calculator estimates the perioperative risk of major adverse cardiac event (such as MI, pulmonary edema, V-fib, primary cardiac arrest, or complete heart block) in patients undergoing noncardiac surgery.	
High-risk surgery	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>High-risk surgery includes any open intrathoracic or intra-abdominal procedures, or suprainguinal vascular surgery.</i>	
History of ischemic heart disease	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Characterized by history of myocardial infarction or positive stress test, current complaint of chest pain considered to be secondary to myocardial ischemia, use of nitrate therapy, or ECG with pathological Q waves.</i>	
History of congestive heart failure	<input type="checkbox"/> Yes <input type="checkbox"/> No
History of cerebrovascular disease	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Prior transient ischemic attack (TIA) or stroke</i>	
Diabetes mellitus requiring treatment with insulin	<input type="checkbox"/> Yes <input type="checkbox"/> No
Pre-operative serum creatinine >2.0 mg/dL (177 micromol/L)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Revised Cardiac Risk Index Score	<input type="text" value=""/>
<p>Score 0 - This score belongs to Class I of risk for major adverse cardiac event (MACE) with a risk percentage of 0.4%</p> <p>Score 1 - This score belongs to Class II of risk for major adverse cardiac event (MACE) with a risk percentage of 0.9%</p> <p>Score 2 - This score belongs to Class III of risk for major adverse cardiac event (MACE) with a risk percentage of 6.6%</p> <p>Score 3 to 6 - This score belongs to Class IV of risk for major adverse cardiac event (MACE) with a risk percentage of 11%</p>	

Fig. 3 Screen capture of the Reverse Cardiac Risk Index calculator in the cardiac assessment CDS tool (©2023 Epic Systems Corporation). CDS, clinical decision support.

access to the preoperative H&P note type and documentation template, reducing the time required to open the note activity. The preoperative H&P note type allowed the surgical team to quickly locate the preoperative evaluation in the EHR.

To maximize template utilization, the Informatics Education team created an educational in-service video, template tip sheet, and designed practice cases. QI team leaders also demonstrated template usage during staff meetings in March 2022. The documentation template and updated workflow went live on March 15, 2022, with ongoing support during implementation. The TAM framework was used to

ensure the template design was user-friendly and perceived as useful by clinicians in the implementation process. In May 2022, an optional and anonymous postimplementation survey was distributed via email to faculty members.

Study of the Intervention

This QI project was performed using a pre- and postimplementation design with a convenience sample. A monthly report was created to collect the health care organization's preoperative evaluation data for all patients aged 18 years and older. The intervention impact was evaluated by comparing the template utilization rates before and after the

Cardiac Assessment Recommendations based on ACC/AHA Guidelines —

2014 ACC/AHA Perioperative Guideline, Cardiac Assessment Algorithm on Page e293 ↗

Emergent surgery ---> Proceed with surgery
Risk <1% ---> Proceed with surgery
Risk >1%, ≥ 4 METs ---> Proceed with surgery
Risk >1%, <4 METs ---> Additional testing
Risk >1%, <4 METs, testing likely will not impact decision-making ---> Proceed with surgery
High cardiovascular complication risk ---> Refer to cardiology

*Examples of activities associated with ≥ 4 METs include climbing a flight of stairs or walking up a hill, walking on level ground at 4 mph, and performing heavy work around the house.

*Patients with the following conditions might benefit from cardiology referral for preoperative evaluation: recent MI <60 days, unstable angina, decompensated heart failure, high-grade AV block, hemodynamically significant valvular heart disease, etc.

Fig. 4 Screen capture of the cardiac assessment recommendation section of the CDS tool based on ACC/AHA guideline (©2023 Epic Systems Corporation). CDS, clinical decision support; ACC, American College of Cardiology; AHA, American College of Cardiology.

intervention. The template's impact on clinicians' attitudes and satisfaction was measured by responses from pre- and postimplementation surveys. Data analyses were performed to evaluate whether differences in pre- and postimplementation results were due to chance or the intervention.

Measures

The preoperative evaluation data used in the project were collected via an Health Insurance Portability and Accountability Act (HIPPA)-compliant custom-built report in the SAP Business Objects Enterprise. Template utilization rates were measured by calculating the total number of preoperative encounters documented using the preoperative H&P template divided by the total number of preoperative encounters. Provider attitude and satisfaction toward the template were evaluated based on 5-point Likert scale questions (1 = very unsatisfied to 5 = very satisfied) in the pre- and postimplementation surveys.

Statistical Analysis

The template utilization rate during the preintervention phase was compared with that of the revamped template during the postintervention phase using a chi-square test. Additionally, a chi-square test was performed to compare the pre- and postimplementation clinician satisfaction survey results. All statistical analyses were performed using the IBM SPSS Statistics software (version 29.0).

Results

Between August 2021 and October 2022, approximately 300 preoperative encounters occurred monthly (→ **Table 1**). The baseline utilization rate from August to October 2021, corresponding to the period of preimplementation survey, was 51.2%. The average utilization rate increased to 66.5% during the postintervention phase (April–June 2022). In assessing

Table 1 Preoperative evaluation documentation template utilization data

	Documentation with template	Documentation without template	Total preop encounters
	N (%)	N (%)	N
Preimplementation phase			
August 2021	161 (50.0)	161 (50.0)	322
September 2021	157 (53.2)	138 (46.8)	295
October 2021	127 (50.4)	125 (49.6)	252
Month of implementation			
March 2022	219 (56.9)	166 (43.1)	385
Postimplementation phase			
April 2022	252 (72.8)	94 (27.2)	346
May 2022	256 (61.8)	158 (38.2)	414
June 2022	219 (65.6)	115 (34.4)	334

(Continued)

Table 1 (Continued)

	Documentation with template	Documentation without template	Total preop encounters
	N (%)	N (%)	N
Sustainment phase			
July 2022	225 (73.1)	83 (26.9)	308
August 2022	262 (74.6)	89 (25.4)	351
September 2022	269 (76.2)	84 (23.8)	353
October 2022	361 (90.9)	36 (9.1)	397

the impact of the template redesign on utilization rates, a chi-square test of independence was conducted. The results indicated a statistically significant association between the template version (old vs. revamped) and its utilization (pre- and postimplementation), $\chi^2 (1, N = 1963) = 46.8, p < 0.001$. The template utilization rate continued to increase during the sustainment phase (July–October 2022; **Table 1** and **Fig. 5**).

Within the IM and FM departments' 140 faculty members, preimplementation (September 2021) and postimplementation (May 2022) surveys had 35.0 and 28.6% response rates, respectively. Satisfaction with the template (respondents who selected satisfied or very satisfied on the surveys) rose from 30.6% preimplementation to 80.0% postimplementation (**Table 2**). A chi-square test of independence was performed to examine association between versions of the documentation template (old vs. revamped) and clinician satisfaction, revealing a statistically significant association, $\chi^2 (1, N = 89) = 21.6, p < 0.001$. This suggests that the introduction of the revamped template was correlated with a change in satisfaction among the users.

In the postimplementation survey, most respondents agreed or strongly agreed that the revamped template improved patient care (77.5%) and documentation efficiency (75.0%).

Discussion

This QI project improved preoperative evaluation documentation standardization and enhanced the clinician documentation experience. Using TAM as a framework, we successfully reduced the pain points identified on the survey. By increasing the ease of template use and improving clinician satisfaction, we were able to accelerate and sustain adoption. The project's strengths include identifying a common practice problem highly relevant in primary care practice. Project leaders elicited clinician feedback and incorporated recommendations into the intervention design, thereby increasing end-user adoption. Additionally, selecting frontline clinicians with advanced EHR training as project leaders ensured smooth collaboration between clinicians and technical staff involved in the project.

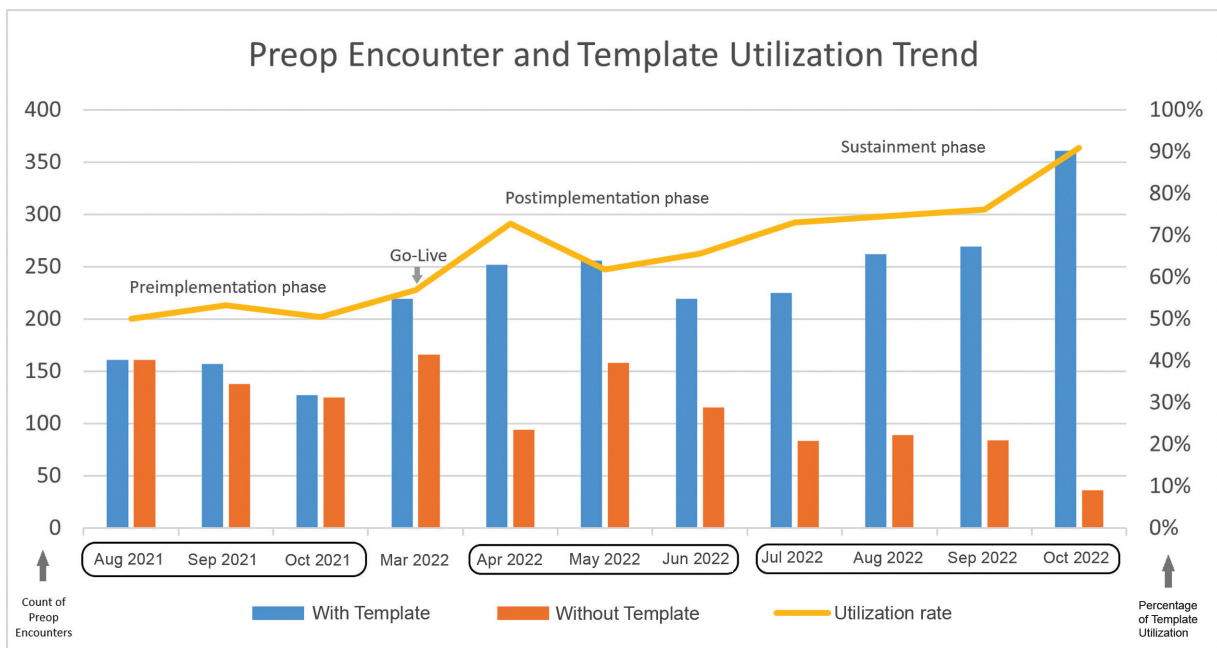


Fig. 5 Preoperative evaluation documentation template utilization trend. The evidence-based documentation template was implemented in mid-March 2022; hence, the March utilization data included a combination of the previous and updated templates.

Table 2 Medical staff pre- and postimplementation survey response summary of clinician satisfaction

Question: Are you satisfied with the current preop template?		
Response	Preimplementation	Postimplementation
	N (%)	N (%)
Very unsatisfied	4 (8.2)	2 (5.0)
Unsatisfied	10 (20.4)	0 (0)
Neutral	20 (40.8)	6 (15.0)
Satisfied	12 (24.5)	14 (35.0)
Very satisfied	3 (6.1)	18 (45.0)
Total	49 (100)	40 (100)

We observed initial fluctuation in template usage, likely caused by clinicians testing the new template but returning to their previous workflow before gradually adopting the new template. The template utilization rate significantly improved and continued to increase months after implementation. Clinician satisfaction based on the survey confirmed enhanced user experience in the documentation workflow and efficiency. Additionally, standardized documentation templates in EHR can help health care teams find important information in preoperative notes, as organizing essential details in an easily identifiable format was equally important for ensuring sufficient documentation in preoperative H&P.¹⁷ We observed that our clinician survey response rates were lower than an estimated overall online or web survey response rate of 38% among health professionals, which could be attributed to clinicians being busy and under stress during the pandemic.¹⁸

Few studies and QI projects focusing on standardizing preoperative documentation have been published. Our findings provide additional insights into the available data pool. However, this QI project has some limitations. First, it was implemented in a single health care organization and may not be generalizable to other primary care settings. Second, the clinician satisfaction results noted on the survey could be subject to nonresponse bias due to the low response rate. Third, the project's design and evaluation could not demonstrate whether adopting a standardized preoperative evaluation template affected the quality of patient care concerning minimizing surgical cancellation rates or reducing intraoperative or postoperative complications. Fourth, we did not assess how changes in preoperative documentation affected attitudes of anesthesia providers or surgeons toward the perioperative workflow. Future research and QI initiatives are needed to explore documentation templates' impact on patient outcomes, cost of care, and satisfaction of other key stakeholders in the perioperative continuum.

Conclusion

This QI project demonstrated that designing and adopting a user-friendly, evidence-based template can improve docu-

mentation standardization and clinician satisfaction. Incorporating clinician inputs into the template design and selecting clinicians as project leaders ensured end-user adoption. These findings have implications for other health care organizations as this project can be replicated to improve clinician workflow and communication along the perioperative pathway. However, further research is needed to explore whether documentation standardization and deployment of evidence-based templates would lead to a clinically significant reduction in perioperative complications and mortality.

Clinical Relevance Statement

Implementing a user-friendly, evidence-based preoperative evaluation documentation template improves documentation standardization and clinician satisfaction. Health care organizations can design similar QI processes in documentation template redesign to enhance workflow efficiency and communication along the perioperative pathway.

Multiple Choice Questions

Question 1: Based on the information provided, what does the evidence suggest about standardizing documentation in preoperative assessments?

- Standardizing documentation has shown to increase variability in care delivery.
- Standardizing documentation serves no practical purpose in improving the quality of preoperative assessments.
- Well-designed templates improve the quality of preoperative assessments and patient safety.
- The use of standardized documentation in preoperative assessments increases delays and cancellations.

Correct answer: c. Well-designed template is a cost-effective and practical method to decrease variability in care delivery, improve the quality of preoperative assessments, reduce unnecessary delays and cancellations, and improve patient safety.

Question 2: What role did the TAM play in the QI project concerning preoperative documentation?

- TAM was chosen to facilitate a survey about clinician preferences without further implementation.
- TAM guided the design of the preoperative template, enhancing user experience.
- TAM was deemed irrelevant and had no role in the QI project.
- TAM was employed to measure the efficiency of prior existing preoperative templates.

Correct answer: b. TAM was chosen to understand reactions to technology usage, guide the design and implementation to enhance the user experience. It was an integral part of project, and not used to just measure efficiency or facilitate a survey about clinician preferences.

Authors' Contributions

X.P. designed the overall QI project with significant guidance, supervision, and oversight from B.H.I., S.A.S., and D.P., X.P. provided analyses of the data and interpretation of the project result. X.P. wrote the manuscript with input B.H.I., S.A.S., and D.P. All authors read, reviewed, and contributed critical revisions to the manuscript. All authors gave final approval of the version of the article to be published.

Protection of Human and Animal Subjects

This QI project was granted Institutional Review Board (IRB) exemption after its review for human subject protection by the University of Minnesota School of Nursing IRB. Human subjects were not included in the project.

Data Availability

The data underlying this article will be shared on reasonable request to the corresponding author.

Funding

This project received partial funding from the Hennepin Healthcare Department of Medicine (DOM) Seed Grant. DOM had no role in the design, collection, analysis, interpretation, or writing of the project.

Conflict of Interest

None declared.

Acknowledgments

This project was completed with help from Laura Borgerding, Epic Ambulatory Analyst, Holly Rodin, PhD, Senior ACE Data Analyst, and staff members of the Informatics Education Team at Hennepin Healthcare. We would like to thank Editage (www.editage.com) for the English language editing.

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