Trends in Clinical Informatics: Poster Presentations 21st Annual Symposium May 30, 2025

	Poster Title	Primary Author	Organization
1.	LDAs Away! A Project to Standardize Documentation	Cailin Arthur	Boston Medical Center
2.	Electronic Insulin Calculator Implementation: Collaborative Journey	Ann Bane	Brigham and Women's Hospital
3.	Advancing Post Lower Limb Fracture Care Progress for a Clinical Decision Support System in Skilled Nursing Facilities	Veysel Baris	Brigham and Women's Hospital
4.	Factors Associated with Timely Delayed and Missed VTE Diagnoses An Electronic Clinical Quality Measure Based Study	Veysel Baris	Brigham and Women's Hospital
5.	Recommendations Derived from the Qualitative Phase of a Study of Diagnostic Delay of VTE (DOVE) to Improve Care of Persons with Venous Thromboembolism	Alexandra Frost	Brigham and Women's Hospital
6.	Crafting Motivation: Developing Encouraging Content for the Osteoporotic Prevention Fracture System (OPTIONS) Intervention	Rosa Recio García	Brigham and Women's Hospital
7.	Optimizing Training with Concurrent System Go-Lives: Strategies to Support Health IT Implementation	Shannon Haworth	Boston Children's Hospital
8.	Automating the Path to Improve Cardiac Rehabilitation Referral Rates	Leslie Hutchins	Yale New Haven Health
9.	Addressing Challenges of Nursing Electronic Admission Documentation with Shortened Length of Stays	Theresa Jasset	Beth Israel Lahey Health
10.	Utilizing Device Integration to Improve Nursing Documentation Efficiency	Sara Kalbko	Boston Children's Hospital
11.	User-Centered Mobile Application Prototype for Lower-Limb Fracture Care	Min-Jeoung Kang	Brigham and Women's Hospital
12.	Operational Readiness Strategies: Implementing a New Mobile Health Solution that Includes Care Role Integration, Messaging, Alerts and Alarming for Enhanced Patient Care	Anna Giselle Lacuata	Boston Children's Hospital
13.	Use of Mobile Technology to Improve Documentation Efficiency in the Adult Emergency Department	Ruth Merenguelli	Yale New Haven Health
14.	Streamlining the Management of Controlled Substances in the CICU	Princewill Oruma	Boston Children's Hospital
15.	Improving Inpatient Social Determinants of Health Screening at Newton-Wellesley Hospital	Shalina Patel	Mass General Brigham
16.	Critical Care Review Tools: Using PDSA Pre- and Post- an EHR Go-Live	Danielle Perley	Boston Children's Hospital
17.	Evaluating Patient Safety Events Related to the Electronic Health Record	Christine Suchecki	Mass General Brigham
18.	PumpIQ: The Interactive Smart Pump Library and Critical Care Companion	Kimberly Whalen	Massachusetts General Hospital

LDAs Away! A Project to Standardize Documentation

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Keywords: Standardized Documentation, Flowsheets, Consolidation, Burden, Nursing Informatics

Introduction/Background

One of the annual goals for our Nursing Informatics Council (NIC) at Boston Medical Center (BMC) was choosing a project that would reduce documentation burden in the EHR. Previous studies have shown that documentation standardization reduces errors and enhances workflow efficiency.[1, 2] The council identified the Lines, Drains, and Airways (LDAs) activity in nursing documentation for that project. Therefore, in an effort to streamline nursing workflows, NIC agreed to review all LDAs with the intention of standardizing documentation.

Methods

In June 2024, the group set out to review all 117 LDAs, resulting in several months of meetings including collaboration with individual specialty departments, Clinical Educators and, Nurse Practice and Quality Council. All of the meetings and requests were tracked in project management software. The council reviewed each LDA individually, assessing for naming convention, synonyms, properties and flowsheet assessments. We reviewed policies related to LDAs and considered specific workflows including perioperative, ED and hospice transitions. We excluded wound LDAs as we are actively exploring a separate wound module. We explored consolidating multi-lumen IVs under a single LDA to reduce redundancy.

Results

Initially created 41 change requests with an additional 10 added, bringing the total to 51 related to the project. We deleted 40,000+ old active LDAs from patient charts going back 10 years. The total number of individual LDAs was reduced from 117 to 97 by removing active but unused LDAs. A list of 52 LDAs was programmed to auto-complete on discharge using EHR logic. The team agreed to consolidate 10 individual flowsheet row questions related to Universal Protocol into one Yes/No attestation. We confirmed LDAs missing appropriate location mapping were updated to reduce unnecessary clicks. The project consolidated and standardized flowsheet rows across all care areas including assessment rows and removal reasons. Nurses were granted access to all available LDAs regardless of location by removing security filters. Duplicate documentation was removed for surgical airway LDAs and wound rows from procedural areas. A banner was added to the discharge documentation to alert nurses to active LDAs that needed review before discharge.

Discussion/Conclusion

By reviewing and revising all LDAs, the project goal was achieved. Additionally, by removing redundant flowsheet rows, we ensured LDA documentation is not able to be duplicated over multiple rows. We established a process for reviewing future changes related to LDAs to ensure standard documentation is maintained. Overall, the nurses reported an appreciation in participating in the decision making that created a noticeable decrease in redundant documentation.

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Electronic Insulin Calculator Implementation: Collaborative Journey

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Keywords: Insulin, Insulin Calculator

Introduction/Background

Insulin is a high-risk medication requiring frequent titration based on blood glucose values when administered as a continuous infusion. Previously, nurses used paper algorithms for dosing calculations. To improve accuracy and efficiency, Mass General Brigham (MGB) sites transitioned from using paper protocols to an electronic calculator within the electronic health record (EHR), using an Insulin Sensitivity Coefficient (ISC) based algorithm. Standardization through the EHR allows for building orders and incorporating clinical decision support (CDS) for providers, nurses, and pharmacist. The ISC algorithm provides several benefits:

- Dynamically adjusts insulin dosing using blood sugar values and rate of change.
- Adapts to critically ill patients with fluctuating insulin sensitivities better than column-based protocols.
- Proven to be safe and effective, with documented use in commercial software.

Methods

The project focused on developing an insulin calculator to improve the accuracy of IV insulin administration and improve patient safety. It involved collaboration across teams to create a reliable, user-friendly tool, transitioning from paper protocols to electronic calculator while incorporating user feedback. The insulin calculator algorithm was developed to include provider orders, pharmacy order verification, nursing medication administration (MAR) documentation. Two intrusive clinical decision support advisories (CDSs) were introduced to guide workflows: Dose Transcription Discrepancy in the MAR and Timely Documentation of the Calculator Use. Implementation preparation included: Online training modules, EHR practice environment, Communication tools, Usage guidelines, including during EHR downtime.

Results

The insulin calculator was implemented across eight MGB sites, standardizing continuous IV insulin administration. Previously, paper algorithms were not incorporated in the EHR, making it difficult to monitor accuracy and protocol compliance. Integrating CDS enabled detailed data extraction and analysis of nursing workflows. For one month post implementation, patients utilizing the calculator were monitored for: Dose Transcription Discrepancy in the MAR & Timely Documentation of the Calculator Usage.

Discussion/Conclusion

Collaboration with stakeholders was vital to ensure proper use of the calculator. This structured approach ensured the successful adoption of the insulin calculator. The implementation of the insulin calculator highlighted several valuable insights:

1. Stakeholder Collaboration: Engaging all team – provider, pharmacy, nursing, and informatics – proved essential for developing a practical tool.
2. Training and Preparation: Thorough preparation, including online training and communication tools, ensured smooth adoption.
3. Monitoring: Revealed trends, areas for workflow improvement, and emphasized frequency of glucose monitoring and its associated EHR documentation, and timely discontinuation of orders after achieving stable glucose targets.

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Advancing Post-Lower Limb Fracture Care: Progress for a Clinical Decision Support System in Skilled Nursing Facilities

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Keywords: Clinical Decision Support Systems (CDSS), Clinical Workflow Redesign

Introduction

Osteoporosis affects 17.7% of U.S. adults aged 65+, leading to over 2 million fractures annually.[1] The OPTIONS (OsteoPorotic fracTure preventION System) study aims to improve care through evidence-based interventions in exercise, nutrition, and bone health. It integrates clinical decision support (CDS) and patient education via a mobile app and print materials. Using a design science framework[2], the study will develop an OPTIONS CDS prototype to enhance post-fracture care in Skilled Nursing Facilities (SNFs).

Methods

The team, which included nurses, physicians, dietitians, physical therapists and gerontologists, was divided into five specialized groups: exercise, nutrition, bone health medication, app development, and human factors. Working alongside an EHR company, the team developed the CDS system. The Design Science Framework follows three iterative cycles: **Relevance Cycle**: Identifying real-world problems through focus groups with SNF healthcare professionals and expert consultations; **Rigor Cycle**: Applying scientific knowledge through scoping reviews on exercise, nutrition, and bone health, focusing on fracture prevention, the impact of nutrition on fracture risk, and barriers to medication access;**Design Cycle**: Developing and refining the CDS system by translating findings into requirements, which are being integrated with the EHR company. Ongoing development includes iterative evaluation with pilot studies and end-user feedback.

Results

The scoping reviews identified 82 studies which, along with input from 12 experts and 18 providers (7 nurses, 9 PTs, 2 physicians), guided CDS system design. The CDS system includes four key features: Initial OPTIONS assessment, Order Set, Action Items, and Follow-up assessment. Nurses assess eligibility using fracture ICD codes and provide tailored exercise recommendations based on weight-bearing status. The nutrition section triggers dietitian consultation for malnutrition, while the bone health section ensures medication continuity or initiates new prescriptions. Additional features include flagging eligible patients, displaying interventions in the Care Plan, and embedding the OPTIONS Study Order Set for provider access. A discharge assessment triggers post-discharge interventions, utilizing both low-tech (handouts, booklets) and high-tech tools (mobile app, website).

Discussion/Conclusion

The Design Science Framework provides a structured, iterative approach to developing the OPTIONS CDS prototype, incorporating multidisciplinary input to improve post-fracture care in SNFs. While initial findings have shaped key components, challenges like EHR integration and provider adherence persist. Pilot testing and user feedback will drive ongoing refinements to ensure functionality, effectiveness, and readiness for broader implementation.

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Factors Associated with Timely, Delayed, and Missed VTE Diagnoses: An Electronic Clinical Quality Measure-Based Study

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Keywords: AI and Machine Learning in Predictive Analytics, Electronic Health Record (EHR) Optimization

Introduction

Electronic clinical quality measures (eCQMs) leverage electronic health record (EHR) data to monitor and improve care quality. We expanded a previously developed eCQM for venous thromboembolism (VTE)—a condition with high morbidity and diagnostic challenges—to include missed diagnoses.[1] This study evaluates the eCQM's validity in urgent care and identifies risk factors and symptom clusters linked to delayed or missed diagnoses, demonstrating the potential of eCQMs to enhance diagnostic safety and informatics-driven clinical decision-making.

Methods

We conducted a retrospective cohort study of adults (≥18) diagnosed with VTE at Mass General Brigham (2018–2023) using a validated algorithm. Eligible patients had a VTE diagnosis and documented symptoms at a primary or urgent care visit within 30 days prior. Exclusions included recent palliative/hospice care or prior VTE within six months. Delayed diagnosis was defined as VTE diagnosed 24–72 hours after the initial visit; missed diagnosis as >72 hours. To validate eCQM use in urgent care, two reviewers independently assessed EHRs for 21 delayed, 28 missed, and 57 timely diagnoses. Risk factors were identified via binomial logistic regression with forward selection (AIC). Symptom clusters were analyzed using logistic regression on the 15 most common clusters.

Results

We identified 4,317 patients with new VTE diagnoses; 1,529 (35.4%) had a primary or urgent care visit with related symptoms within 30 days prior. Their mean age was 66.4 years (SD 16.1), 53.6% were male, and 81.8% were White. Additionally, 92.9% were non-Hispanic, and 92.0% spoke English as their first language. Based on the expanded eCQM, 419 (27%) were classified as timely diagnosis, 189 (12%) as delayed, and 921 (61%) as missed diagnosis. Compared to chart review, the expanded eCQM had high accuracy for identifying delayed (PPV = 0.904, NPV = 1.00) and missed diagnoses (PPV = 0.928, NPV = 1.00) in urgent care. Regression analysis revealed factors associated with delayed and missed diagnoses: *Delayed diagnosis* was most strongly associated with presentation of only cough (OR 6.38). *Missed diagnosis* was most strongly associated with prior VTE (OR 13.20) and presentation with only cough (OR 26.95). A reduced likelihood of *missed diagnosis* was observed in patients presenting to urgent care (OR 0.33).

Conclusion

Our study highlights the high prevalence of delayed and missed VTE diagnoses and validates the expanded eCQM as an effective tool for identifying diagnostic delays. Nonspecific symptoms, such as isolated cough and shortness of breath, were key contributors to missed diagnoses, while sociodemographic factors, including older age and prior VTE history, also played a role. These findings underscore the need for improved clinical decision support and provider awareness to enhance early VTE detection.

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Recommendations Derived from the Qualitative Phase of a Study of Diagnostic Delay of VTE (DOVE) to Improve Care of Persons with Venous Thromboembolism

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Keywords: Qualitative Research, Venous Thromboembolism (VTE), VTE Survivor's Recommendations, Clinical Decision Support (CDS)

Introduction/Background

Venous thromboembolism (VTE) affects up to 600,000 adults in the United States annually. To date our team has defined VTE in a data driven approach, accurately identified incident cases of VTE, and tested an electronic Clinical Quality Measure (eCQM) for Diagnostic Delay of VTE (DOVE) in primary care.[1] Our current study extends that research and includes a qualitative component to incorporate the voices of VTE survivors into a VTE CDS for primary and urgent care providers.

Methods

We adhered to established qualitative research criteria[2] and followed traditional content analysis methods to identify and code relevant text segments and higher ordered categories from group interviews. We:

- Developed a focused interview guide.
- Interviewed 8 VTE survivors.
- Coded and categorized text segments and uploaded data into the qualitative database.

Results

Participants provided rich descriptions of their VTE journeys from questioning that something may be wrong to making recommendations to help others. Participants were articulate, well-educated (all college graduates), mostly female and white (N=7), and geographically diverse. . They made recommendations for patients, providers and health care sites targeted to achieve timely VTE diagnosis and treatment across the patient trajectory from first concern through follow-up care. These VTE survivors told us of their feelings of uncertainty and not receiving helpful information: "*And, you know, your mind wonders. Is that going to happen again?" —* "*There was absolutely nothing, no education or advice or link to resources provided."* Three of the categories of recommendations for providers are: Listen "*And for the provider to really take time to hear you…";* Be Knowledgeable "*I guess doctors should have certain protocols based on providing knowledge of blood clots*"; and Promote Genetic Testing "*If I would have known of my blood clot risk being genetics then, I may have been able to do something with my mom and my sister…"*

Discussion/Conclusions

All the recommendations for providers, patients and the public provide tangible suggestions to improve care, make common sense, do not require expensive equipment or intensive training or extra staff. The recommendations are but one of three sources of data that will inform the DOVE CDS. The VTE literature, results from the electronic health record natural language processing algorithm analysis, and the DOVE qualitative data base will be used to build the CDS and serve as the basis for developing a VTE curriculum for primary care providers.

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Crafting Motivation: Developing Encouraging Content for the Osteoporotic Prevention Fracture System (OPTIONS) Intervention

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Keywords: Motivational Content, Osteoporotic Fracture, Prevention, Exercise, Nutrition, Bone Health Medication.

Introduction/Background
The OPTIONS (OsteoPorotic fracTure preventION System) Project aims to prevent secondary fractures in older patients with a lower limb fragility fracture through use of a set of patient-centered tool designed to promote bone health. These tools will guide patients in developing personalized strategies that incorporate Exercise, Healthy Nutrition, and Bone-health Medications, and empower them to achieve better outcomes. Motivation has emerged as a powerful therapeutic tool in healthcare, with evidence supporting its ability to improve treatment adherence. Research shows that the key factors for change are the importance individuals place on making changes and their confidence in their ability to succeed.[1]

Methods
A set of 15 evidence-based motivational messages was developed and presented to stakeholders at an initial meeting in February 2025. The messages featured a variety of slide styles, motivational quotes, and content aligned with the project's patient handouts, with some images generated using AI. Based on the feedback received, revisions were made, and suggestions were incorporated into the creation of subsequent messages. In weekly meetings with the Core Informatics group of the OPTIONS Project, the latest content was presented, and continuous feedback was gathered to further refine and enhance the materials. In a follow-on study, 47 evidence-based motivational messages were developed, focusing on exercise, nutrition, and bone health medications, to be integrated into the OPTIONS App and other patient engagement tools. These messages were iteratively refined based on feedback from the project team, as well as input gathered during six weekly meetings with the Core Informatics group and two meetings with Patient Stakeholders in February and March 2025.

Results
The final meeting with Patient Stakeholders, held on March 14, 2025, included 26 participants, comprising both patient stakeholders and team members. Participants provided positive feedback, with comments such as, "That message could represent me," while also offering valuable suggestions for improvement. Key recommendations included using larger text, simplifying instructions, and incorporating more engaging visuals to better meet the needs of the target population.

Discussion/Conclusion
The collaborative approach of integrating patient stakeholder feedback throughout the development process enhances the potential for the messages to meet the specific needs of the target population. This iterative process ensures that the content is not only motivational but also practical and user-friendly, increasing the likelihood that patients will interact with the app regularly. The emphasis on accessibility, including larger text and simplified visuals, is particularly relevant for older populations, who are at higher risk for osteoporosis-related fractures. The iterative process, incorporating feedback from both the Core Informatics group and Patient Stakeholders, has resulted in content that resonates with the target population. Moving forward, the project will continue to analyze the effectiveness of these tools in helping prevent future fractures in patients with osteoporosis who have already experienced a fracture. Ongoing feedback and refinements will ensure that the motivational content remains engaging, accessible, and aligned with the needs of this high-risk group.

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Optimizing Training with Concurrent System Go-Lives: Strategies to Support Health IT Implementation

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Keywords: Enteral Feeding Management System, Super User Training, Training Compliance, Best Practices in Health IT Implementation, System Adoption and User Satisfaction

Introduction/Background

The implementation of multiple technology systems, such as an electronic health record, enteral feed management system, and clinical communications system all at once introduces many challenges for healthcare organizations. Coordination of parallel go-lives can put pressure on resource management by hospital leadership as well as work-life balance for nurses navigating competing training assignments. Effective training is critical, directly influencing staff knowledge, competencies, and overall satisfaction with new systems.[1] Appreciating that training is a key precursor for successful system implementation, our team focused on strategic planning and adaptive response to help manage the complex and overlapping demands concurrent go-lives placed on staff time and expertise.

Methods

We used multiple strategic approaches to address resource limitations, including developing a core group of super users to vet workflows and provide at-the-elbow support during go-live. We collaborated with the vendor to streamline the training curriculum to fit time constraints and used our Learning Management System (LMS) to assign staff several course pre-work videos. These videos introduced basic system functionality and allowed us to prioritize in-class time for complex workflows most suitable for hands-on learning. We also incorporated ongoing feedback by creating an LMS-based Critical Care competency, further streamlining in-person training sessions, and providing end-user support via an email distribution list and tip sheets for key workflows.

Results

Of the 154 individuals initially identified as super users, 110 (71%) completed super user training. We identified 2,300 additional staff for end-user training with training sessions offered across multiple locations, accommodating both weekends and shift change. In total, 1,703 end-users were trained prior to go-live, with 1,100 attending in-person training and 603 completing the Critical Care competency. This put overall end-user training completion rate at 74%. Post-implementation survey feedback revealed that nurses felt generally overwhelmed by the concurrent go-lives. However, they appreciated the early involvement by Subject Matter Experts – especially in workflow design. They also acknowledged the tip sheets that were made available. Opinions on in-person training varied, with some nurses feeling additional hands-on time would have been beneficial while others felt virtual training would have sufficed.

Discussion/Conclusion/Lessons Learned

We gained valuable insights around technology implementation in clinical settings. System satisfaction and compliance may have been improved if we had made pre-implementation training mandatory to gain access to the system. In the future, instituting better tracking and accountability around training could increase compliance and thus, increase system satisfaction and utilization. Enteral feed scanning compliance also remains difficult to monitor due to reliance on manual audits. Establishing reporting capabilities prior to go-live could facilitate use of compliance data to identify re-education needs and inform ongoing optimization efforts.

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Automating the Path to Improve Cardiac Rehabilitation Referral Rates

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Keywords: Cardiac Rehabilitation, Automation, Electronic Health Record (EHR) Optimization, Quality Improvement

Introduction and Background

One of the many tasks that nurses perform in preparation for a patient discharge is sending a cardiac rehabilitation referral communication letter electronically for eligible patients to the agency nearest to the patient's address. This was a 2-step process involving a minimum of 15 clicks in the Electronic Health Record (EHR). The workflow increased cognitive burden and workload of the nurse during the discharge process and resulted in reduced cardiac rehabilitation referral rate. The goal of the project was to increase the cardiac rehabilitation referral communication rate by automating the nurse workflow using a rule-based work queue configured in the HER.

Methods

This quality improvement project involved a multidisciplinary team who designed and tested the automation workflow in an iterative process[1]. To decrease the nursing workload, various solutions like robotic workflow were considered, but the team decided to use a work queue to mimic the nurse workflow in placing cardiac rehabilitation referral communication. The automation framework using a rule-based work queue was designed and reviewed with key stakeholders based on diagnosis, procedure and Current Procedural Technology (CPT) codes of eligible cardiac patients. These codes were defined to automatically identify and prioritize patients for the work queue then configured to eliminate the faxing work flow.

Results

The automated workflow initiated in October 2023 resulted in an initial improved cardiac rehabilitation referral rate of 92%. In February 2024, logic was built to capture patients discharged in the last six months for a more accurate monthly referral rate. One hundred percent of patients discharged from August 1st 2023 were included in the data and the 92% referral rate increased to 100%. While individual hospital-level data varied slightly, the 5-hospital health system saw an improvement in cardiac rehabilitation referral rate from 32% to 100% . The solution modeled the nurse workflow to reduce the discharge workload and cognitive burden for the inpatient bedside nurse. The automation eliminated the use of faxing paper and replaced it with a paperless, electronic process of receiving referrals in the agency.

Discussion/Conclusion

This project launched an automation process which not only exceeded the 80% goal but sustained a 100% referral rate. The scalability of automation can be applied to other nursing tasks in the EHR that are administrative in nature[2]. The elimination of these tasks from nursing increases nurse satisfaction with EHR and decreases cognitive burden. The automation process improved patient referral rates and continuum of care by increasing opportunity for cardiac rehab, and access to post-hospitalization resources.

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Addressing Challenges of Nursing Electronic Admission Documentation in Patients with Shortened Length of Stays

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Keywords: Nursing Admission Assessment, Required Documentation, EMR Admission Assessment, Documentation Efficiency, Length of Stay

Introduction/Background

As regulatory and quality reporting requirements increase, nursing documentation demands inevitably increase, often resulting in less available time for direct patient care.[1] Audits of the newly implemented EMR at the **N**ew **E**ngland **B**aptist **H**ospital (NEBH) revealed that required admission data from both a clinical and regulatory perspective are not consistently being documented. Our multi-site EMR is designed for all patient populations, regardless of length of stay, and contains traditional inpatient admission documentation elements which must be completed within 24 hours. NEBH is a surgical specialty hospital where the majority of patients are elective, with most lengths of stays less than 24 hours. RNs who prep patients on the day of surgery have a narrow window within which to document an assessment of their patients. Inpatient RNs receive these patients after they have been medicated with analgesia and sedation. This leads to challenges in conducting a complete and reliable assessment upon arrival to the unit. To address our problem of missing admission data, we formed a working committee of nursing leaders, quality improvement nurses, educators and super users.

Methods

We compiled a list of all the admission documentation data elements. Nursing informaticians developed a crosswalk to note our findings. Super users presented their admission documentation patterns field by field. Because the lengthy documentation tools and reminders in the EMR were considered overly burdensome, nurses charted only what they deemed necessary. The quality improvement nurses identified the required regulatory data points and nurse leaders identified the data required for clinical decision-making. Notations were made of fields that were missing, being omitted by staff or not necessary for our patient population.

Results

The crosswalk revealed the biggest data capture gaps were in the Preoperative and Inpatient areas. One example: The Nutrition Assessment trigger is set to fire as "required" only after 24 hours of admission yet many NEBH patients are discharged well before then. Travel screening is a moot point after a patient is admitted, yet still required by the EMR. Since the EMR is not appropriately guiding NEBH nursing documentation, we decided it was necessary to develop our paper resources. For each area, we created tip sheets with screenshots using graphics to highlight the required elements with descriptive guidelines outlining the necessary documentation.

Discussion/Conclusion

Once approved by nursing executive leadership, we plan to educate RNs on using these tip sheets and monitor for impacts and effectiveness. Our desired outcome is no missing required documentation in these areas.

EMR assessments should be streamlined so RNs can capture required regulatory and clinically relevant information in a reasonable timeframe. In the interim, nursing informaticians will need to assist nursing leadership to determine the necessary documentation for their patient population. We recommend hospitals develop their own resources following a similar process to ours. The standard EMR chart completion checks and balances cannot be utilized until this is rectified. Nursing informaticists are the ideal catalysts and change agents to partner with EMR vendors to remedy these issues.

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Utilizing Device Integration to Improve Nursing Documentation Efficiency

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Keywords: Documentation Burden, Nursing Workflow, Device Automation, Electronic Health Record

Introduction/Background

In acute care settings, nurses are constantly interacting with the patient's Electronic Heath Record (EHR) both inputting and extracting information. Documentation burden is characterized by increased stress and work effort not aligned with patient care delivery.[1] This represents "…an imbalance between the usability and satisfaction of systems of health records…"[2] Device integration and automated processes present opportunities to decrease nursing documentation time and effort.

Methods

Several months after the transition to a new EHR, four intensive care units (ICU) at a free-standing, 400 bed, pediatric hospital adopted device data auto-filing. Auto-filing is when device (e.g., bedside monitor, ventilator) data is automatically input and saved into a patient's EHR. In high acuity care environments, rapid and temporal availability of filed device data can inform consistent EHR calculations and subsequent clinical decision making by providers. In this implementation, the default auto-file interval was set to every hour, though this could be disabled or changed by RNs as driven by the patient's needs. Nurses were alerted by email that this change was taking place. Although auto-filing is an available tool that can decrease manual nursing documentation time and effort, nurses must continue to review the data for accuracy and edit as needed. The aim of this quality improvement work is to understand nurses' adoption and perspectives of this new process.

Results

A survey was sent to ICU nurses three weeks post auto-file implementation. Respondents (n=59) agreed that the hourly auto-file interval was appropriate for most of the ICU patients (n=53; 93%). From a policy and regulatory perspective, 97% agreed that the bedside nurse is responsible for reviewing all auto-filed data. The survey data was unclear on whether nurses subjectively perceived any effect of auto-filing on documentation time. Less time was spent entering device data into patient charts but more time was spent correcting data in patient charts. A third of respondents disagreed that there was a clear process to provide feedback regarding this change. Increased education, unit-based resource contacts, and review of standard documentation requirements is needed. The open-ended feedback from the survey, provided by 26 respondents, contextualizes challenges with the transition to auto-filing of device data. Comments highlight concern over erroneous values being auto-filed and the time spent adjusting auto-filed data. For example, when manually documented, a nurse may choose to document vital signs when a patient is calm and at baseline versus while crying.

Discussion/Conclusion

Since the adoption of auto-filing in the ICUs, opportunity exists to better understand nurses' knowledge around the change and effects on nursing workflow. As is true with any voluntary survey, it is possible that nurses who had negative experiences with auto-filing may have been more likely to respond. The team plans to review available EHR documentation metrics to objectively assess time spent documenting and/or reviewing device data. Furthermore, the team will work with the EHR vendor to understand experiences from other hospitals who have transitioned to auto-filing of device data.

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User-Centered Mobile Application Prototype for Lower-Limb Fracture Care

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Keywords: User Centered Design, Osteoporotic Fractures, Transitional Care, Mobile Applications

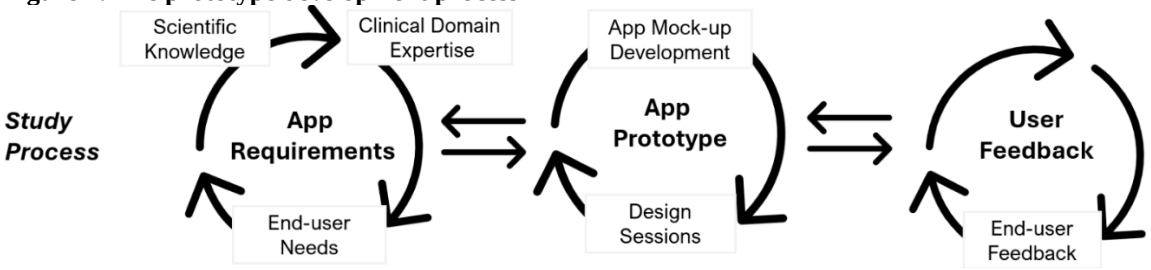
Introduction/Background

Osteoporosis is a leading cause of fragility fractures in older adults with increasing cases. However, care gaps persist during care transitions from skilled nursing facilities (SNFs) back to the community, and SNF care standards vary. The OPTIONS study (OsteoPorotic fracTure preventION System) develops an evidence-based trimodal intervention- exercise, nutrition, and bone health medication- to support older adults transitioning from SNF back to the community after lower limb fractures. This study aims to develop an OPTIONS mobile app prototype to support ongoing care.

Methods

The multi-disciplinary study team followed the Design Science framework employing a multi-phase approach to develop user-centered app (Figure 1)[1]. The study began with establishing app requirements and developing an initial mockup, followed by iterative design sessions incorporating end-user feedback-to refine the prototype. To define app requirements, we conducted a scoping review. Clinical expertise was gathered through focus group interviews with SNF healthcare providers and professional stakeholders. Additionally, end-user needs were derived from a patient stakeholders' council meeting and findings from our previous studies on app development for older adults. We conducted design sessions with a human factors specialist and the app development team to incorporate end-user needs and build an app prototype.

Figure 1: The prototype development process



Results

The app prototype has four core functionalities: (1) **The task management,** enabling users to self-manage the three domains; (2) **Personalization,** providing customized exercise programs, educational content, and messages; (3) **Motivational content,** encouraging user engagement with supportive messages upon task completion; (4) **Progress Tracking**, allowing users to monitor their progress and trends through visualizations. The exercise section offers tailored exercise programs based on users' health conditions. The nutrition section helps users track weight-loss trends and assess their nutritional status and eating habits. For bone health medications, the app includes a medication reminder and multi-format video education sessions.

Discussion/Conclusion

A user-centered design approach is essential to improving accessibility and effectiveness for older adults using the app. We actively incorporated patient feedback from the initial app requirements stage through the design phase to develop an app prototype. Our next step is to conduct a usability test with older adults to evaluate the app's practicality and user satisfaction.

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Operational Readiness Strategies: Implementing a New Mobile Health Solution that Includes Care Role Integration, Messaging, Alerts and Alarming for Enhanced Patient Care

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Keywords: Mobile Health Communication, Operational Readiness, Implementation

Introduction/Background

Mobile health (mHealth) is one area of technological innovation in healthcare that can promote cost reductions, enhance access to health care, and improve the overall quality of patient care.[1]The goal of operational readiness is to prepare the institution to adopt a newly introduced technology or device.[2]As with any new implementation, there will always be a level of resistance to its adoption. Effective training is one key area that could increase clinicians' intention to use mHealth tools, and it plays a central role in its success.[1]

Methods/Strategies

According to Zadvinskis et al, nurses' expectations of health information that can influence adoption can be divided into five categories: ease of use, workflow and task performance, collaboration within the unit, communication across disciplines and departments, and effects on quality of care, which includes patient safety and satisfaction[3] We utilized six main operational readiness strategies to ensure that the mHealth application aligned with the institutional goals of refined workflows, enhanced communication, and improved patient safety. First, Start Stop Continue documents were developed to prepare our clinicians for new workflows. Second, Solutions Validation sessions were held with subject matter experts and super users to ensure they were able to validate the appropriateness of the application features with their respective area's workflows. Third, we deployed Computer-Based Learning modules that were provided by the vendor. Fourth, we conducted Super User Training using visual and hands on demonstration to help teach experts to be the first line of assistance during implementation. Lastly, we brought training to end users via strategically scheduled Roadshows and Cafes in various units and shifts to accommodate as many different clinicians as possible. Roadshows are traveling show-and-tell information sessions, while Cafes are stationary sessions.

Results

Through data insights, feedback, and surveys, our team was able to measure the impact of implementation on our clinicians. During go-live, data analysis showed clinicians were claiming the correct role, but a gap in the application build staff assists alerting was discovered, prompting immediate remediation. Users found the process of finding a contact to be too complicated and lengthy. Therefore, we decided to keep the legacy extensions of key clinicians for quicker connection and to help our users transition to the new system. The new escalation pathway caused confusion with the nurse calls causing nursing units to request adjustments to avoid delays in patient care. After a less-than-ideal implementation, a six-month survey showed a neutral response from end users about the mHealth application performance and usability.

Discussion/Conclusion

We are continuing to support and optimize care role workflows for improved patient care. Post implementation support continues with unit rounding, creation of tip sheets, ad hoc in-services, and help desk support. Standardization efforts are being developed to optimize alert and alarming workflows. We continue to collaborate with our vendors on solutions to improve functionalities and continue our efforts towards network reliability.

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Use of Mobile Technology to Improve Documentation Efficiency in the Adult Emergency Department

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Keywords: Mobile Applications for Nurses, Documentation Efficiency, Mobile Technology

Introduction/Background

The Emergency Department (ED) at two campuses of Yale New Haven Hospital has experienced an increased surge of patient volume and acuity that has led to an increased workload for nurses. With patients and equipment located in crowded hallways, efficient movement of computer Workstations on Wheels (WOWs) was challenging. In addition, the limited number of lab label printers was a barrier to the Positive Patient ID (PPID) process for specimen collection, which contributed to the risk of mislabeled specimens. The goal of our project was to increase deployment and utilization of mobile devices to decrease both the unnecessary burden on nursing documentation, as well as the risk of mislabeled specimens. This project was guided by Unified Theory of Acceptance and Use of Technology (UTAUT).[1]

Methods

A technological solution was implemented to help alleviate barriers to safe patient care. First, education through the creation of an e-learning module and tools such as QR codes and printed handouts, was provided to bedside nurses on the use of the implemented EHR application. The informatics nurses and nurse educator rounded to provide real-time support. Surveys were conducted before and after the implementation of the EHR application to assess the need and evaluate the implementation, respectively. Additionally, there was a total of 135 new mobile phones and 14 mobile printers distributed to the two campuses of the ED.

Results

In January 2023, the average minutes spent by RN documenting in EHR per shift was 166 minutes at YSC and 175 minutes at SRC. Six months post-implementation, the average minutes per RN per shift was 159 at YSC and 169 minutes at SRC. An average of 6.5-minute decrease from baseline translated to more time for essential patient care. The number of specimens collected through the mobile EHR application increased from 16 to 13,998 at SRC and from 321 to 23,246 at YSC. The incidents of mislabeled specimen decreased from 19 pre-implementation to 6 post-implementation.

Discussion/Conclusion

The use of mobile devices in a high intensity environment such as the ED positively impacted the nurses' clinical workflow and documentation efficiency. Leveraging the nurses' perception and trust in this solution predicts successful integration and adoption[2]. Proper assessment of the current workflow and technology need while including primary end-users was imperative to ensure adoption of this solution. The continuous feedback from users provided a system to identify and evaluate the effectiveness and created an avenue for future enhancements to this mobile EHR application.

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Streamlining the Management of Controlled Substances in the CICU

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Keywords: Controlled Substances, Medication Documentation, Process Improvement, Patient Safety, Regulatory Compliance, Lean Six Sigma, DMAIC, Computerized Medication Management Solution

Introduction and Background

Incomplete and inaccurate documentation of controlled substances in the Cardiac Intensive Care Unit (CICU) presents risks to patient safety and compliance. Issues like end-of-shift signing norms, staff workload, and workflow inefficiencies have led to a documentation accuracy rate of just 77%. Accurate recording of medications removed from the computerized medication management system is essential to prevent discrepancies and potential patient harm. To tackle these challenges, we implemented a medication management solution, which allows for bedside documentation of medication waste.

Methods

This quality improvement project followed the Lean Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) framework:

Define: Key challenges in documentation compliance were identified, including cultural practices and workflow barriers.
Measure: Baseline data on 435 controlled substance transactions from the computerized medication management solution was collected and analyzed for accuracy.
Analyze: A root cause analysis using a Fishbone diagram and 5 Whys identified factors such as time constraints and process inefficiencies.
Improve: Process standardization, staff training, enhanced barcode workflows, and the introduction of a connected medication management solution allowed bedside documentation of medication waste, removing the need to return to the computerized medication management solution.
Control: Ongoing monitoring and feedback loops were implemented to sustain improvements.

Results

Baseline data showed that out of 435 controlled substance transactions, only 335 (77%) were completely and accurately documented. After implementing targeted interventions, including the integration of a connected medication management solution, a post-intervention analysis of 454 transactions revealed a significant improvement. In this analysis, 407 transactions (90%) met the documentation criteria. The project successfully achieved its goal of over 90% complete and accurate documentation, demonstrating measurable improvements in compliance and process efficiency.

Discussion/Conclusion

The project addressed workflow inefficiencies and staff behavior by implementing a connected medication management solution for bedside medication waste documentation, leading to improved compliance with controlled substance standards in the CICU. This increased accuracy enhances regulatory adherence and patient safety and reduces medication mismanagement risks. To sustain these improvements, continuous monitoring, staff education and further optimization of technology and workflows will be essential.

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Improving Inpatient Social Determinants of Health Screening at Newton-Wellesley Hospital

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Keywords: Social determinates of health, epic documentation, resources, case management, social work

Introduction/Background

Social Determinants of Health (SDOH) screening is a regulatory requirement in inpatient settings and is Mass General Brigham's (MGB) strategy to improve patient outcomes.[1] SDOH are non-medical factors i.e. food insecurity that affect patient health outcomes, contribute to health inequities, and are being recognized and prioritized for collection by agencies such as Center for Medicare and Medicaid Services (CMS), Joint Commission, and MassHealth. MGB began screening for SDOH in the inpatient setting February 2024 within the EMR-based nursing assessment modules.[2] Newton-Wellesley Hospital (NWH) was experiencing inconsistent or incomplete SDOH screenings, specifically within one inpatient unit. In this unit, SDOH screening capture was occurring in just 29% of patients in June 2024. The goal was to increase the percentage of completed inpatient SDOH screenings on this one unit from ~ 40% (May-Oct. 2024) to 50% by January 17, 2025.

Methods

A survey of nurses was conducted to explore their field experience, understanding of SDOH, and comfort in asking screening questions. Responses revealed barriers to completing screenings, such as uncertainty about handling positive responses, difficulty finding patient resources, and challenges with documentation. Interventions included reminder cards, tips for EHR documentation, and community resource guides for discharge paperwork, boosting nurses' confidence in conducting screenings and assisting patients.

Results

Reminder cards and tip sheets significantly increased screening completions in the NWH unit. Reminder cards improved survey completion rates, while the tip sheet helped staff add a column to patient lists, ensuring screenings were done prior to discharge. Nurses became more comfortable asking patients screening questions, knowing where to find and attach community resources to discharge paperwork. These interventions led to an increase in completed screenings by ~40% within two months. See poster for additional results.

Discussion/Conclusion

The project identified barriers to completing screening questions during inpatient stays and implemented changes that increased monthly screenings. Ongoing improvement relies on teamwork and emphasizing the importance of data collection. Reminder cards will be maintained and reinforced, tip sheets for SDOH documentation and locating community resources will remain accessible, and charge nurses and educators will continue supporting staff. Future enhancements include conversation guides, admission-triggered SDOH screenings, and QR codes for nurse surveys.

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Critical Care Review Tools: Using PDSA Pre- and Post- an EHR Go-Live

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Keywords: Critical Care, Multidisciplinary Tools, Epic Implementation, PDSA Cycle

Introduction/Background

Transitioning Electronic Health Records (EHRs) to a new vendor poses various obstacles. Institutions changing EHR vendors must maintain the same patient safety, care quality and patient experience ratings from their legacy system.[1] Implementing an EHR which did not provide a critical care tool set required iterations of custom patient care tools, including aspects of legacy programs. The Plan-Do-Study-Act (PDSA) Cycle helped the workgroup make targeted, high-value changes to the EHR from kick-off to optimization.[2]

Methods

Through the creation of a Critical Care Workgroup, with an assist from developers at our vendor, Boston Children's Hospital went live with multiple custom patient care review tools in our critical care floors. These tools include an ICU Glance overview, system specific timeline reports, patient list data columns and a daily rounding checklist. PDSA cycles continued through implementation and optimization address reported issues, planned optimizations and allowed for user feedback. The initial build and system updates spanned small additions within timeline reports to workflow changes requiring policy and leadership sign-off.

Results/Discussion

Twenty-six system updates have been completed, and thirteen more are planned. A high priority change addressed discrepancies and gaps in calculating respiratory acuity scores (OI and OSI) due to vital signs not documented within the calculation rule's set lookback time. The initial respiratory acuity widget utilized different methods for calculation leading them becoming skewed over time. The current acuity score was updated upon loading the ICU Glance page, whereas the most recent value displayed by the trending sparkline updated every 15 minutes in a flowsheet documentation batch job. The workgroup determined a calculated score within 15 minutes was acceptable and moved to take the current score out of the widget. Eliminating the display of gaps in the trending acuity involved implementing auto-filing of vital sign device data. Our vendor's current code does not allow for rules to calculate based on pending data and relying on nursing to file vital signs in near real time was not feasible. Visual examples will be provided within the poster upon abstract selection.

Discussion/Conclusion

Many changes required multiple iterations, but the PDSA cycle helped us review and propose additional system options. We now provide a highly effective multidisciplinary tool in the ICU. Upcoming changes include a new Pain and Sedation widget and an updated nephrotoxic medication review in the daily checklist. As standards of care change for pediatric patients, these tools will continue to evolve to support the exceptional care provided by our critical care areas.

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Evaluating Patient Safety Events Related to the Electronic Health Record

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Keywords: EHR, Patient Safety, SAFER Guide

Introduction/Background

The Electronic Health Record (EHR) is a complex system that undergoes continuous programming changes from both vendors and local teams. Despite thorough testing processes, defects in programming configuration may still enter the live system, leading to unintended consequences that may affect patient care. Establishing a robust framework for addressing suspected EHR induced Patient Safety Events (PSEs) is crucial to minimizing the impacts on patient care delivery supported by the EHR. There is a shift to treating healthcare as a safety-critical industry, with Information Technology (IT) components be treated with the same importance as those of aerospace, nuclear and defense industries, with some countries starting to mandate processes for the safety oversight of health IT.[1]

The Office of the National Coordinator (ONC) has introduced the 2025 Safety Assurance Factors for EHR Resilience (SAFER) Guides to help healthcare organizations enhance EHR safety.[2] The Organizational Responsibilities Self-Assessment guide, focused on the structures, processes and outcomes necessary for ensuring EHR-related patient safety.[2] Specifically, Domain 1- *Structures Required for Safe Health IT, 1.2* emphasizes the importance of having designated staff responsible for testing, implementing, maintaining, and resolving issues within EHR hardware, software, and network components.[2]

Methods

Over the past three years, Mass General Brigham Informatics Leadership has iteratively developed a framework to triage, assess, and mitigate suspected and identified EHR defects impacting the delivery of safe patient care, PSEs. This framework is built on collaboration among clinical informaticists, platform architects, application analysts, vendor support teams, project managers, and informatics and quality and safety leadership. Once a defect, unintended workflow, or a patient safety event is identified that stems from a technology root cause, data is utilized to quantify the safety impact, and additional resources are mobilized to formulate and execute a mitigation strategy. The team uses a high reliability and patient safety informed approach to evaluation, solutioning, and implementation of resolution interventions.

Results

This framework has been applied to nearly 100 reported events over the last three years, facilitating expedited analysis and mitigation while minimizing the impact of defects. Mitigation strategies include communication and education, monitoring, special updates, and configuration changes within the local EHR instance.

Discussion/Conclusion

While this framework primarily addresses the EHR, it can be applied to other healthcare IT applications and products. Healthcare organizations can utilize this PSE framework to evaluate EHR safety when defects are suspected or identified, aligning with the organizational responsibilities outlined in the SAFER Guides. Furthermore, this framework is part of a larger high reliability initiative focused on fostering a culture of safety and continuous learning within the organization.

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PumpIQ: The Interactive Smart Pump Library and Critical Care Companion

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Keywords: Clinical Decision Support Systems (CDSS), Medication Safety, Mobile Health

Introduction/Background

Treating acutely ill patients is complex and error prone. One challenging component is prescribing, compounding, and safely delivering continuously titrated intravenous (IV) medications. The standardization of medication concentrations, a national safety initiative over the last 20 years, presents new challenges. [1, 2] Prior to every medication administration, clinicians must: identify available concentrations; determine the optimal concentration and pump; locate the medication in the pump drug library; and program the infusion. Pediatric patients may be more susceptible to the risks of fluid overload with dilute preparations and flow rates below pump thresholds with concentrated preparations. At the authors' institution, the Pediatric Medication Administration Process Manual ("Blue Book") has been in use since 2006 by front-line pediatric providers as a clinical decision support (CDS) tool. However, as printed media it has limited accessibility and flexibility. The aim is to develop an electronic PumpIQ Clinician Application to provide key stakeholders with real-time CDS necessary to enable safe and efficient titratable IV medication administration to critically ill patients.

Methods

A multidisciplinary team including anesthesiologists, intensivists, nurses, pharmacists was assembled. Key stakeholders were surveyed about the optimal content and format of the manual. For a year there were weekly meetings with end users and an engineer to establish an accurate algorithm based on ASHP guidelines. Seven sessions were conducted with various end users to provide feedback on PumpIQ.

Results

100% (15/15) felt it would be helpful to have an electronic CDS tool, 53% (8/15) preferred a mobile application, 40 % (6/15) preferred both, 6.6 % (1/15) preferred a paper manual. 100% (15/15) felt the information in the "Blue Book" was comprehensive. We developed "PumpIQ," a mobile application for Android and iPhone which assists pharmacists and clinicians to determine the best available concentration and pump device for a particular patient's infusion by considering medication characteristics, dosing ranges, patient weight, pump characteristics, pharmacy drug library, and total fluid tolerance.

Discussion/Conclusion

Based on survey responses, PumpIQ was designed as a mobile application accompanied by a print option available to staff. PumpIQ was officially approved for deployment by our institution. Collection of qualitative and quantitative feedback using the Plan-Do-Study-Act (PDSA) cycle is in progress. The PumpIQ enhances patient safety with real-time, accessible CDS to clinicians who administer life-sustaining medications. PumpIQ is highly scalable to other institutions and would require the institution-specific medication infusion drug library and specifications of pump(s) in use.

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