



Trends in Clinical Informatics:
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Developing an Intensive Care Unit Acuity Tool

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Keywords: Acuity, TISS-28, ICU, Nursing, Intensity, Staffing

Introduction/Background

Patient acuity refers to the physical and psychological complexity of patients. Tools have been developed to assess the complexity of a patient assignment, nursing workload, and plan for future staffing patterns. The Therapeutic Intervention Scoring System 28 (TISS – 28) was a scoring system developed in the 1970s as a means of stratifying patients by severity of illness and then evolved as a measure of nursing workload in relation to the nursing needs of the patient [1]. Data from the electronic medical record can be pulled to identify the TISS – 28 score without the need for nurses to manually enter information. Massachusetts law requires all ICUs to have an acuity tool to assess the level, intensity, and nursing needs of patients in order to provide appropriate staffing levels.

Methods

A modified TISS -28 tool, which was developed for another project at BIDMC, was used as a starting point to assess its accuracy. It was determined that certain technologies were not being addressed in this scoring system as designed and updates were made to reflect this increased acuity and workload. One auditor with specific instructions chose one day and time and scored every patient at that point in time to ensure interrater reliability. Once the tool was validated, a developer in the IS department extracted the data from our documentation system and built a dashboard to display the acuity scores. The modified TISS-28 scores were manually compared to patient assignments on every ICU patient to validate if the most highly acutely ill patients were being scored and singled appropriately.

Results

After validating the modified TISS-28, the scores were added to a capacity dashboard accessible by all staff to assist in making patient assignments. Additionally, the capacity dashboard is used to manage throughput at a meeting twice a day where representatives from each ICU meet and share their census and staffing needs to ensure each unit is staffed appropriately. The scores were stratified into three levels; low 12-25, 26-35 intermediate, and > 36 high giving some guidance as to which patients may require one on one care and which patients may be appropriate for 2:1 care. The scores are only a guide and provide an objective measure to support nursing judgement while making patient assignments.

Discussion/Conclusion

The Massachusetts Department of Public Health certified the use of our tool and accompanying decision algorithm as a guide for nurse/patient assignments in our intensive care units. Along with input from the bedside nursing staff this tool will aid in the process of patient assignment but will not replace sound nursing assessment and judgement of the clinical situation.

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Optimizing the EHR through Experience and the Agile Process

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Keywords: Clinical Documentation, Go-live Process Change, Enhancing EHR, Inpatient and Ambulatory, Agile

Introduction/Background

Boston Children's Hospital underwent a multi-year process in order to optimize the EHR in all ambulatory clinics and locations. More recently, the hospital was tasked with the implementation of many of these same tools into the world of inpatient care but was given the lofty goal of a one-year completion time. This project is expected to alter physician workflow, nursing workflow, all documentation, ED care, ICU care, and the discharge process. The experience gained from the ambulatory portion of the project, mixed with a brand new system of implementation, called Agile, will help to make this massive change a reality and lead to more streamlined patient care and documentation.

Methods

Agile has a much different approach to process change in the hospital as “the agile methodology is based on adaptive planning, early delivery, and continuous improvement with the mindset of responding to change quickly and naturally” [1]. As opposed to the “big bang” approach (where one day things are one way and then next day everything is vastly different), Agile strives for rolling go-lives in set amounts of time, called iterations. Each iteration brings small changes to enhance the product for the end user and gives the clinicians time to work with the product in real time while giving effective feedback on disruptive parts of the documentation process. Because the iterations are rolling, we can make these changes in test areas and then release these changes into the clinician world in just a matter of weeks. This also allows for a more immersive approach to training and learning as the group has the ability to learn one or two things per iteration rather than trying to comprehend hours of classroom material in one sitting.

Results

Though the project is still underway, we have gone live with our pilot group. It took four weeks for the changes to be implemented, staff to be taught, demos to be run, and end users to adopt the product. This is a great improvement from the ambulatory world, where design alone took between 5 and 6 weeks. The lessons learned from the ambulatory group is a factor in the success and adoption of this tool. In the inpatient setting we can foresee issues and difficulties before go-live to ensure we tackle the issues before they arise. The fluid process enhances staff satisfaction with the products as they feel as though they understand the program, and that they have a say in the changes to be made.

Discussion/Conclusion

While the total project go-live will not occur until this summer, the preliminary responses from the pilot group are very positive and the analytics are showing that people are using this product more while spending less time in the chart jumping from one page to another. The application does have some downfalls, but through the beauty of the Agile process these are issues that have been added to our worklist and we are actively working to resolve them. With the changes being noticed and felt every few weeks, the staff feels empowered to use the new tools and feels reassured knowing that both the technical teams and the clinical teams are working cohesively to better patient care. As Lee and Chang noted, “once the system had been revised and redesigned, nurses could benefit from the EHR use and provide constructive comments” [2]. We believe that the ability to redesign and improve the information systems concurrently will help the overall adoption and understanding of the EHR changes.

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Don't Let PICU UP! Get You Down

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Keywords: Clinical Documentation, Electronic Documentation, Actionability of EHR Assessments

Introduction/Background

The early mobilization of intensive care unit patients has contributed to fewer ventilator days, decreased delirium and led to more patients classified as independently functional at the time of discharge [1]. Implementing early mobility interventions in pediatric patients presents additional challenges related to variation in functional status and clinicians' awareness of safe activities and interventions. PICU UP! is an intensive care unit (ICU) early mobility program developed by Johns Hopkins Children's Center. This tool is traditionally used in a paper format. This quality improvement initiative includes a tiered activity plan based on multiple patient-specific clinical factors [2].

Methods

In rolling out PICU UP! at our organization, we strategized to transform this paper tool into a part of our EHR. The tool is in the development phase and will be added to the EHR using unique data elements, single select nomenclature, conditional logic and interpretation tools (Figure 1). The full PICU UP! reference document will also be added as reference text linked to the data element that denotes the PICU UP! prescribed activity level, leading users to specific interventions. Semi-structured interviews will be conducted with end-users when the tool is live regarding the tool's operation, the user's experience and patient care interventions implemented after the electronic assessment.

Figure 1: Electronic PICU UP! Tool

Category	Value
Pain Assessment	
Localized Pain	
Responsiveness Assessment	
Pain Intervention/Followup	
Nausea Assessment	
Controlled Substance Waste	
Glasgow Coma Scale - Infant/Toddler	
PICU Up!	

Field	Value
PICU Up!	<input checked="" type="checkbox"/>
Exclusion Criteria	None
Parameters	Baseline ...
Level Score	2
PICU Up Level	Level 2

Results

The clinical decision support in the tool's design will support end users in assessing patients to determine a decisive level. Results from this work include the EHR tool and qualitative nurse reviews of the tool's functionality.

Discussion/Conclusion

Adding the PICU UP! tool to our EHR will allow for the seamless input of patient data, ensuring a single source of information for clinicians looking for the data output. The electronic PICU UP! tool is structured, captured in real time and allows for electronic data collection. We anticipate that including this tool in the EHR will promote real-time assessment and allow nurses to implement interventions efficiently and effectively.

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Establishing a Process for Reducing Nursing Documentation Burden Through Discrete Data Analysis

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Keywords: Clinical Documentation, Process Change, Reducing documentation burden, nursing documentation

Introduction/Background

Electronic medical record implementation has transformed paper documentation into electronic workflows often adding new documentation but rarely taking away from the process. Documentation must support the high-quality care provided and meet regulatory requirements without causing documentation burden [1]. To reduce documentation burden, nursing admission and discharge forms are optimized and standardized through nursing-led workgroups [2].

Methods

Boston Children's Hospital participated in a multi-center national effort to establish an Admission Pediatric Essential Clinical Data (ECD) set. Nursing admission forms were included in the scope of the project. The group conducted a literature review and established guiding principles for evaluation of forms. Utilization data was extracted per hospital and included form, section, and event code. This data was analyzed using the guiding principles, regulatory requirements and evidence-based practice. A workgroup was formed at Boston Children's Hospital to replicate the Pediatric ECD process with localization to account for state regulations and hospital policies that may differ. The workgroup has enhanced the initial guiding principles to include next steps for fields being removed and to assess impact on other workflows. Nurses were also surveyed to establish satisfaction with admission history documentation.

Results

Preliminary results show that these work efforts have significantly reduced form sections and individual event codes. We expect this will lead to a reduction in documentation burden and increased nursing satisfaction measured by a post implementation survey and utilization data.

Table 1: ECD project results

	Sections	Event codes
Vendor prior to ECD project	35	359
Project participants (average)	27	333
Boston Children's Hospital before project	39	606
Vendor After ECD project (draft)	12	83

Discussion/Conclusion

This project has led to an effective workflow for evaluating and optimizing nursing documentation. While we continue to pilot the process with the admission assessment, we are expanding the work to include additional forms including those within the discharge process. The process will be replicated to streamline and reduce the documentation burden across the different hospital venues and enhance the nursing patient care experience.

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Assessment, Creation and Adoption of a Sepsis Trigger Tool in the EHR

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Keywords: Sepsis Trigger Tool, Workflow incorporation, Multi-disciplinary clinical decision support

Introduction/Background

Identifying and providing quick, appropriate care has been the focus of the Surviving Sepsis Campaign since 2002 with the most recent guidelines published in 2016 [1]. With one million patients diagnosed with sepsis each year [2], the awareness of the diagnosis is increasing. There are many opportunities to increase awareness to the need for quick diagnosis, as well as improve treatment options. With increased awareness there is the opportunity for inappropriate testing and treatments [3].

Methods

Clinical decision support tools must balance increased awareness with the need to protect the patient from unnecessary care. Boston Children's Hospital adopted Sepsis Trigger tools for utilization in the ICUs, general medical inpatient floors and the NICU. The Sepsis Initiative Workgroup at Boston Children's Hospital requested to build an intricate tool within the nurse's current workflow. The request was for a very intricate tool. So as not to create excessive alerting [4], a multidisciplinary task force created a large, conditional-logic-based tool within the nursing flowsheet.

Results

The tool is based on conditional logic and nomenclature-based scoring with background calculations. In addition, the tool supplies interpretation of discrete fields so the nurse can remain within their workflow. This decreases the need to exit it in order to check reference materials.

Discussion/Conclusion

The tool is now monitored to maintain usage in the initial adoption areas. This includes intermittent chart audits and data collection through our data warehouse. The tool has been integrated into policy in order to ensure it is being used to capture early signs of sepsis.

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Use of Data to Identify Impacts That Improve Plan of Care Documentation

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Keywords: Clinical Documentation, Plan of Care, Learning Assessment, Goals, Education, Medical Record

Introduction/Background

Brigham and Women's Hospital (BWH), an academic medical center in Boston, deployed PeC, a Partners Healthcare customized version of an electronic health record using the EPIC electronic healthcare record software in 2015. Since go live, the Nursing Informatics Team has been working on improving Plan of Care (POC) documentation. POC documentation includes; 1. Learning Assessment within 24 hours; 2. Plan of Care Note in last 24 hours; 3. Education Documentation in last 24 hours; and 4. Goals with Expected End Dates. The only required documentation was the Learning Assessment. If the Learning Assessment was not complete the nurse would get a reminder to complete. Additionally, the nurse would get a pop-up if the Goals with Expected End Dates were expiring or expired. Despite the efforts of the Nursing Informatics Team, progress was slow in improving the overall compliance. The purpose of this project is to help identify key interventions to improve implementation of the Plan of Care module. The interventions we studied were general education and sharing of compliance data; instituting required documentation; and unit-based education including timely follow up with staff. We reviewed POC data from an 8-month period to determine the effectiveness of each intervention.

Methods

The Nursing Informatics Team continued staff education efforts and quarterly sharing of the unit-based and service-based data. Metrics were established for each of the POC interventions listed above. Two unit-based teams were established. The post-partum team worked on consistently updating goals with expected end dates. The surgical team worked on individualizing the Plan of Care and insuring education documentation was completed. Both teams provided initial staff education. Reports were run several times per week and immediate feedback was provided to each nurse who had not updated the Plan of Care. Data obtained from the POC Metrics were used to compare the results of the two teams. Additionally, the data was reviewed to determine the impact of required documentation.

Results

The education provided by the Nursing Informatics Team showed some increase in compliance with use of the Care Plan. A much greater gain was yielded by the unit-based efforts. Clearly requiring documentation results in the greatest success. The higher results of the range were obtained since the unit-based efforts began. It will be important to see if the improved results are sustainable over time.

Table 1: Summary of Metrics on Care Planning

POC Component	Intervention	Average	Range over 8 months	Department(s)
Learning Assessment	Required documentation	97%	96 to 98%	Nursing Service
Dates for POC Goals	Nursing Informatics Effort	86%	80% to 90%	Nursing Service
Dates for POC Goals	Unit Based team	82%	75% to 95%	Post-Partum
Education in Last 24 hours	Nursing Informatics Effort	58%	53% to 62%	Nursing Service
Education in Last 24 hours	Unit Based Team	59%	46% to 79%	Surgical

Discussion/Conclusion

Consistent use of Care Planning is a long-standing nursing documentation challenge. Mechanisms to improve use include active unit-based teams to educate and follow up with staff. When possible making POC components required helps to insure compliance.

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Strategies for Overcoming Challenges Related to Converting an NQF Endorsed Measure to an Electronic Clinical Quality Measure (eCQM)

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Keywords: Patient Safety and Quality, Data-Driven Quality Improvement

Introduction/Background

According to the Centers for Medicare & Medicaid Services (CMS), hip and knee replacements are the most common implant surgeries for Medicare beneficiaries [1]. Previous research reported a variation in the complication rates of these surgeries performed across U.S. hospitals, suggesting a need for quality improvement [2]. In order to identify the areas in need of quality improvement and reduce the rate of complications, hospitals and clinicians should measure the complication rate following hip and knee replacements. We are converting the existing NQF endorsed measure, 'Effective Treatment/ Clinical Care THA/TKA NQF 1550: Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)' to an eCQM analyzed at the group and clinician level, using data from the electronic health record (EHR). We have come across some challenges in the measure development process and have used various strategies to overcome them.

Methods

We conducted an environmental scan to identify any similar or competing measures. As part of the initial alpha and beta testing plan, we conducted an in depth analysis of our databases and research data repositories to identify the necessary data elements. Data elements were assessed by availability, accuracy, system source, and type of standardized terminology. As part of eCQM development, we developed a test eCQM leveraging available value sets to capture our patient population. We validated our logic expression using Bonnie, which is a tool for testing eCQMs.

Results

We have developed the first draft of the eCQM and are testing and refining the measure. Table 1 below shows the main challenges we have identified to date related to converting a measure to an eCQM analyzed at the group and clinician level, using data from the electronic health record (EHR).

Table 1. Challenges Related to Conversion of an NQF Endorsed Measure to an eCQM

Challenge	Strategies for overcoming the challenge
Determining the correct value set to use for the measure	Harmonize with other value sets when possible, but if needed, create value sets specific to the parameters of the measure
Identifying steps during care process in data elements	Create a clinical observations workflow and conduct analysis for clinical flowsheet tables in our database
Harmonizing billing codes for procedures and conditions	Identify crosswalks between ICD-10-PCS, ICD-10-CM, CPT, and SNOMED-CT codes

Discussion/Conclusion

Each eCQM comes with its own challenges in development. However, we hope that the strategies we used to overcome the identified challenges will be helpful in future steps of our measure development. Moving forward, we will continue to develop the eCQM and test the measure. Some additional challenges we anticipate include: identifying codes for new potential value sets (e.g. Codes for Procedure Exclusion and Complication) and validating the measure with end users to ensure the measure captures the right data as intended.

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A Factorial Design Survey Software Case Study

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Keywords: Factorial Design, REDCap, Qualtrics, Survey Software, User Preference, Ease of Use

Introduction/Problem

Previous research shows that the effectiveness of clinical decision support (CDS) systems decreases when clinicians are presented with a high frequency of alerts that are not perceived as clinically relevant, leading to overriding or ignoring alerts [1]. A factorial design survey (FDS) is an experimental design that includes multiple iterations of a survey, where the factor content and order change from iteration to iteration to determine which combination of statistically significant factors are perceived as clinically significant, yielding more generalizable conclusions. An appropriate FDS software is needed to reduce the complexity associated with measuring the effect of each factor and its interactions over numerous trials. This case study compares the ability of two popular survey platforms (REDCap and Qualtrics) to efficiently run an FDS trial.

Methods

A pilot survey trial was conducted on both REDCap and Qualtrics. REDCap lacks on-platform survey field randomization, so a manual workaround had to be developed. An off-platform block randomizer was used to generate and randomly assign surveys containing four vignettes to participants, and a template survey containing fields with every possible vignette (n=16) hidden from survey view was created on REDCap. To create test surveys, copies of the template were made, and the fields containing the vignettes assigned by the block randomizer were unhidden, leaving only the vignettes (n=4) randomly assigned to each participant in their survey view. The pilot survey on Qualtrics was conducted completely on platform. A master survey was created using Qualtrics' Randomizer element in Survey Flow that would randomly populate embedded fields with one of two levels for each factor (n=5) in every test vignette (n=6) for each survey recipient. Time required to develop the surveys and end-user perceived ease of use² were measured for both platforms. A student T-test was used to test perceived differences in ease of use.

Results

For REDCap, 42 surveys were created and disseminated in approximately three hours (~4.5 minutes/survey). One survey was created and sent to 34 participants in approximately one hour (~1.75 minutes/survey) on Qualtrics. The differences in the ease of use survey results for the software applications were not statistically different (p=0.19).

Conclusion

REDCap's lack of randomization and automation functions are limitations for factorial design. The reliance on a workaround requiring manual input for executing FDS in REDCap introduces increased potential for human error when scaled up, not to mention more time to prepare the survey. Qualtrics, however, possesses the tools necessary to efficiently and automatically run a factorial design survey while showing no significant difference in participant-reported ease of use.

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Measuring the Impact of Changes in EHR Functionality and Education Interventions on Blood Documentation

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Keywords: Clinical Documentation, EHR Education, EHR Training, Clinical Decision Support, Documentation improvement, Dual Verification Scanning.

Introduction/Background

Implementation of our enterprise-wide EHR (Partners eCare, or PeC) required dual-verification of patient and blood bar code scanning using the Blood Product Administration Module (BPAM). Although we had 99% compliance with dual verification scanning of blood administered non-emergently, Brigham and Women's Hospital (BWH) had additional requirements that were not as easily met. We undertook a number of measures to improve in this area.

Methods

Nursing Informatics at BWH worked with report writers on a report to identify non-compliance with blood documentation. The blood compliance report was run at intervals to monitor elements that were required by blood policy. The results of the blood compliance report were shared with the care units for follow up action. As part of that follow-up, documents for best practice and tip sheets for blood administration were developed to assist with the education. Additional educational presentations on the correct documentation procedure were presented at unit-based practice councils, Super User sessions, Department Expert meetings and during unit rounds providing one-on-one support. The following changes were implemented in the BPAM build in PeC Epic for all Partners Entities: 1) Blood volume documentation in BPAM window; 2) Blood Administration Report in the Blood Flowsheet; 3) Blood Running Banner and Nurse Manager Quality Safety Dashboard Report; 4) Interruptive actionable Blood Best Practice Alert; 5) "Blood running" indicator on the patient list

Results

The build changes resulted in improvement in two of the monitored results of the blood compliance report.[1]. The BPAM build changes that had an impact were intuitive and within the user's workflow and required minimal education. Education that was delivered as a reminder to users utilizing tip sheets at departmental meetings was ongoing during the reporting period, but resulted in little impact in improving blood documentation. In the Blood Donor Center, which had a high volume of blood transfusions, we supplied one-on-one at-the-elbow training and support, which resulted in a marked, continued improvement in that area.

Date	Trans Stopped	Volume	
8.3.17	84%	80%	
10.10.17	92%	86%	Blood Banner, Blood PAF Column 10/4/2017
4.30.18	96%	85%	One on one Training for the Blood Donor Center 4/10/2018
1.27.19	99%	90%	Interruptive Actionable Blood BPA 1/16/2019
3.4.19	100%	92%	

Discussion/Conclusion

There have been several changes to the BPAM which improved blood documentation. Trended data from the report over time shows that improvements to the BPAM and focused, directed one-on-one training had significantly more impact than continued follow up with reporting and passive staff education.

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Nursing Flowsheet Elements Across Integrated Health Care System

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Keywords: Electronic Health Records, Nursing Records

Introduction/Background

A nursing flowsheet comprises a large proportion of stored medical records [1]. Contrary to the initial purpose of developing EHR systems to help nurses' work efficiently, flowsheets contain many data elements and may increase nursing workload unnecessarily. This research describes the frequency of flowsheet data documentation and how various flowsheet elements, under the same EHR vendor, are used in different types of medical facilities.

Methods

The analysis was conducted on EHR nursing flowsheet data entries in an integrated health care system located in northeast United States. The inpatient data of three different types of medical facilities were 'academic medical center', 'community hospital', and 'rehabilitation center'. For data analysis, flowsheet elements entered at the different facilities over adult medicine and surgery units among year 2017 were used.

Results

Total encounters and flowsheet entries entered ranged from 1,961 to 35,492 and 729,971 to 136,757,502 respectively across the three different facilities. Seven mostly commonly entered flowsheet elements are in Table 1.

Table 1. Most Frequently Entered Flowsheet Elements from Diverse Medical Facilities

Academic Medical Center			Community Hospital			Rehabilitation Center		
Flowsheet Elements	Frequency*	Median**	Flowsheet Elements	Frequency*	Median**	Flowsheet Elements	Frequency*	Median**
Pulse	71.98	34	Pain Score	21.95	17	Pain Assessment	82.91	62
Pulse Oximetry Outgoing	71.95	34	Pain Assessment	20.68	16	Pain Score	81.56	59
Pulse Oximetry	48.17	22	Dressing Status	17.10	14	Level of Consciousness	56.68	46
SPO2 Outgoing	48.15	22	Line site Assessment	14.82	11	Orientation Level	55.74	44
Pain Assessment	41.73	28	Pulse	14.39	10	Cognition	55.55	44
Pain Score	39.56	27	Pulse Oximetry Outgoing	14.38	10	Speech	53.61	43
Pulse (SPO2)	38.20	19	Dressing Type	13.70	11	Skin Color	53.38	43

*Frequency: Counts of flowsheet entered divided into numbers of average encounters per medical facility; **Median: Median counts of flowsheet entered among their encounters

Discussion/Conclusion

The most frequently recorded flowsheet elements vary by the type of healthcare facility, from acute care to long-term acute care. All facilities primary focused on patient comfort. Nursing activities in academic medical center and community hospital are mostly frequently related with current state of essential body functions. Besides, rehabilitation centers are closely related to patient's mental or physical conditions. These types of systems require highly flexible templates that suit the needs of different settings, flowsheet templates to contain elements that satisfy end users who are performing the different nursing activities.

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Comparing the Data Completeness and Accuracy Between Electronic Health Records (EHR) and Administrative Claims for Quality Measurement

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Keywords: Patient Safety and Quality, Medication Reconciliation, Data-Driven Quality Improvement

Introduction/Background

Quality measurement using electronic clinical quality measures (eCQMs) is becoming a more integral part of healthcare systems. With the emergence of electronic health records (EHRs) as a pervasive healthcare information technology, new opportunities arise for use of EHR data for quality measurement. However, to support the use of EHR data for quality measurements over the use of conventional data sources such as administrative claims, stronger evidence is needed with respect to data accuracy and completeness because these data attributes influence the quality of care measurement [1]. Therefore, through the conversion of an NQF endorsed measure, NQF#2940 'Opioids in high dosage in persons without cancer following total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)' to an eCQM using data from electronic health records, our secondary goal is to compare the accuracy and completeness of EHR medication data to those of administrative claims medication data.

Methods

During our initial alpha and beta testing phases, we first evaluated the Partners HealthCare System (PHS) Enterprise Data warehouse (EDW) and Research Patient Data Registry (RPDR) to identify the necessary data elements and to assess the data availability, accuracy, system source, and type of standardized terminology. Next, we used available crosswalks in our EDW tables to calculate the positive predictive values of ACO and EPIC to assess for data harmonization. Lastly, we compared the total procedure volumes using ICD-10 codes from the Joint Commission (existing in VSAC) to those from NQF 1550, an existing measure with which we are harmonizing our denominator population.

Results

We are currently in the process of converting NQF2940 measure to an eCQM. We plan to finish measure conversion and testing by the end of July 2019. From our preliminary analysis, the Positive Predictive value of ACO/NDC codes, which analyzes the proportion of EPIC finding medication when ACO finds medication, was determined to be 28%. In comparison, the Positive Predictive value of EPIC codes, the proportion of ACO finding medication when EPIC finds medication, was 21%. Lastly, the total procedure volume at Brigham & Women's Hospital using only NQF1550 codes showed 199 procedures, compared to 2394 procedures using those from the Joint Commission codes.

Discussion

Based on preliminary results, 28% of opioid medications in NDC database do not exist in EPIC while 21% of opioid medications in EPIC database do not exist in NDC database. In the context of the current opioid crisis, these poor positive predictive values are concerning because it suggests non-cancer patients could be receiving more opioid prescriptions in services that are not captured in our data. Possible reasons for these poor results include 1) issues with existing crosswalks for converting in-house grown EPIC codes to NDC codes used in claims data and/or 2) incompleteness of ACO data because Partners Healthcare receives ACO data (both procedure and medications) only for patients who have primary care physicians in the Partners System. Lastly, more analyses are needed to determine why we obtained a large gap in the procedure volume when using two different code sets.

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Standardized Nurse Documentation of the Blood Pressure Check Visit in the Primary Care Clinics

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Keywords: Clinical Documentation, Standardization, Nurse-Only Visit, Blood Pressure Checks

Introduction/Background

Brigham and Women's Hospital continues to grow in the area of Primary Care, offering appointments with care providers of many disciplines, including nurses. With the hospital recently being designated with Magnet Recognition, two goals from Nursing Leadership in Ambulatory Nursing included increasing nurse visits by 10% in the next year and by using the Situation, Background, Assessment, Recommendation (SBAR) format for nursing documentation. Upon reviewing current documentation of nurse visits in various practices, we noted inconsistencies in documentation of the visit notes, particularly with blood pressure (BP) checks. Upon reviewing literature, we discovered the importance of standardized documentation in order to improve efficiency by decreasing nursing documentation times [1] and quality of the visit by creating thorough triggered and relevant assessments and allowing for consistent communication between nurses and the health care team [2]. Our motivation for this project was to improve efficiency and quality of these visits in order to ease in the process of meeting our nursing goals.

Methods

We conducted a review of nurse documentation during nurse-only BP visits as well as a review of the literature for best practices regarding standardized documentation. With this information, a team of nurse leaders, licensed independent providers (LIPs) and Registered Nurses (RNs) provided initial feedback by source of in person meetings and surveys. With this feedback, we developed a standardized documentation note template with auto-populated data, SBAR organization, accepted terminology and language, and triggered assessments and screenings valued by the team. During the implementation phase we also have been distributing patient surveys to ensure the change in workflow did not negatively affect patient experiences. Post-implementation, we plan to distribute follow up surveys to the same cohort to assess satisfaction with the new standardized documentation tool and workflow.

Results

The documentation tool includes standardized selections for reason for visit, medication review, SBAR note template, visit diagnosis and billing charges. In the SBAR note template the situation section includes a selection of reasons for BP check; background section includes last visit/plan/patient data and current BP regimen; assessment section includes selections for review of medications, review of symptoms, review of lifestyle measures; and recommendation section includes selections for lifestyle changes and plan for updating the PCP. See attached results.

Discussion/Conclusion

Standardized documentation offers many benefits in the care setting, including precision, clarity of expression, and efficiency, maximizing the skills of the nurse and decreasing the need for additional administrative tasks [3]. Utilizing the available functions of the EHR in this setting can result in streamlined workflows and improved quality of care in the ambulatory health care setting.

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Use of Mobile Application to Improve Nursing Department Communications

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Keywords: intradepartmental communication, communication, mobile application use in nursing

Introduction/Background

Nursing leadership has struggled with the use of staff meetings as a means to share information. Staff meetings should ideally be used for higher-level nursing communication and to review unit-specific items. Literature searches using OVID and CINAHL databases revealed very little on the effectiveness of various types of communication tools for intradepartmental communication. A subgroup of our Nursing Informatics Committee reviewed potential electronic applications as solutions. The application Workspace was chosen to review and pilot based on familiarity with user interface and cost. Given Brigham Health license access there were no costs incurred for use.

Methods

After the application was chosen a mixed method survey was developed for the application's ease of use and impact on the end user. Members of the Nursing Practice Committee as well as the Nursing Informatics Committee were asked to volunteer to be part of a pilot group to validate this form of communication. All participants were asked to download the application onto their mobile device. A pre-implementation survey was sent to all participants. The application was used to communicate several practice changes or updates on new functionality within the Electronic Health Record (EHR). Surveys were then sent out at two weeks and four weeks post pilot start.

Results

The survey requested demographic characteristics of the participants. In addition, we asked questions related to the application itself in terms of ease of use and user acceptance. There were 13 participants in the pre-implementation survey and a total of 11 participants in survey 2 (7 participants) and 3 (4 participants). Attrition is more likely to occur in longitudinal studies and that could account for the decreased response rate with each survey. The general themes found in the survey were these: 1) Staff found the application easy to load onto their device; 2) They appreciated the ability to review at their own leisure; 3) They liked push notifications of new content; 4) Participants stated that opening attachments was easy; and 5) The majority stated that the application was an improved way to get updates. One participant stated that email would still be a better way to get communication. The application allowed the administrator to see how many viewed each post. The average was 17-22 viewers of a possible 24.

Discussion/Conclusion

The use of a mobile application to send updates on nursing practice and committee communication was found to be beneficial to most participants as only one participant preferred email. The pilot was considered a success even with a small data set. There continues to be a small subset of staff that prefers their communication via email, which points to the need for continued use of email. Next steps would include operationalizing the use of the application. All nursing staff will have the option to use email and not download the application. One discovery during this process was that many staff have an email address that is not BWH-specific and the need to resolve is ongoing.

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Use of An Audit Report to Improve Business Continuity Access Testing

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Keywords: BCA, Failsafe, Downtime Device Testing

Introduction/Background

With the introduction of fully integrated Electronic Medical Record (EMR) systems, reliance on paper documentation has diminished. The digital divide has closed, revealing a generation of staff that have never documented in a paper-based format. The ability to know that the Business Continuity Access (BCA) device is being tested and performs as expected is essential. In 2018, the clinical informatics group and an enterprise report writer set out to validate that these devices were being used correctly.

Methods

Informatics defined the workflow for testing a device and what outcome should be produced from testing. The report writer has access to data warehouse information that shows when staff entered the device and what tasks they performed. This helped to shape the development of an audit report. After going through Enterprise prioritization, report requirements were developed. Once a determination was made that the information could be retrieved, a report based on facility, unit and user was developed. Validation occurred manually over several months and then released to production. With review of the output of the report those areas that were non-compliant with testing received remedial education. Ongoing monitoring is performed monthly with operational oversight by department leaders. The report reveals when a user logs on, if they had login failures, what was viewed and what was printed.

Results

The report has successfully shown whether or not BCA devices are tested across the institution. It revealed less than best practices in some areas. These areas were offered remedial education. Users in some areas were found to be logging into the device and then logging out without viewing or printing a single element. Users in other areas were printing everything. Some areas were completely missing from the report revealing no testing at all. The report continues to be refined to be user friendly for all operational leaders.

Discussion/Conclusion

The need to be continually prepared for an unexpected downtime is essential in this era of complete integration with electronic medical records. Dependency on clinical information in a system downtime is essential in the healthcare environment today. The most effective way to attain this information is through Business Continuity Access. To ensure that this information is always available these devices must be tested regularly to ensure that they are receiving reports and can print as needed. This information is also informing some of the enterprise work on developing downtime drills and areas that require particular focus. We plan further refinement for the ability to extract and convert data into usable tables and graphs for operational leaders. The Enterprise is interested in this report for across-the-board viewing of the state of downtime readiness.

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Utilizing the Electronic Health Record in the Perioperative Arena in the Prevention of Pressure Injuries

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Keywords: Clinical Documentation, Patient Care, Data-Driven Quality Improvement, Innovative informatics, Clinical communication tool

Introduction/Background

Hospital-acquired pressure injuries (HAPI) cause devastating physical and emotional impact for patients. Research demonstrates that many hospital-acquired injuries originate in the operating room (OR). The incidence rate ranges from 12% to 66% [1-4]. Most importantly, the length of surgery is a significant factor; research indicates that 23% of pressure injuries are acquired during a procedure lasting longer than 3 hours. We received feedback from nurses managing post-surgical patients that there was a need to develop a communication method to highlight potential areas of pressure injury (PI) due to positioning in the OR. Our informatics team chose to leverage our existing electronic health record functionality, specifically a feature known as the "Annotated Image," and crafted additional unique enhancements. The result is a shared drive with files of structured images of patient positions with arrows highlighting areas of potential pressure injury. This shared drive was approved by all Partners entities and is accessible for them to use.

Methods

This project involves the entire MGH OR staff (250 RN's) entering the annotated image for all surgical patients and procedures, seven days a week. Baseline PI prevalence rate from the OR was collected from the hospital-wide PI prevalence survey. There was no pre-survey to determine baseline use of the annotated image functionality, since it was not being used by nursing or other healthcare professionals at MGH. Prior to implementation, education included staff meeting demonstrations and tip sheet development for OR and inpatient staff. To encourage project compliance, members of the Skin Injury Prevention committee were recruited to provide at-the-elbow support. A post-implementation survey was sent to the OR staff to determine clinician satisfaction and the ease of use. Data is currently being collected via daily random audits of ten procedures a day along with run chart trend analysis performed every two weeks, to determine OR nurse percentage of use of the annotated image.

Results

The compliance rate of OR RNs entering the annotated image for their patients now ranges from 80-90% weekly and continues on an upward trend. The survey sent to OR staff showed that the annotated image was easy to add and worked well within their workflow. We will be sending a survey to the inpatient nursing staff for their feedback on the use of the Annotated Image in their daily practice in the very near future.

Discussion/Conclusion

This quality improvement project provides nurses with an image which communicates potential skin areas that may be at risk for pressure injury due to length of surgery and intraoperative positioning. Implementing evidence-based nursing interventions (for example, turning and repositioning post-operatively), will help prevent skin breakdown and potentially avoid a pressure injury.

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Improving Consistency and Accuracy in Pressure Injury Documentation

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Keywords: Pressure injuries, Pressure ulcer, HAPI, POA, LDA, staging, location, documentation

Introduction/Background

Hospital-wide chart reviews revealed difficulty in accurately determining the condition of a patient's pressure injury or injuries through available documentation. Information was inconsistent among various areas in the Epic electronic health record (EHR), including clinician notes and flowsheets. Staff focus groups identified human factors, variation in practice, and Epic functionality as contributing to this lack of consistency. In addition, no clear definition or guidance for where, how and when to document in Epic has been established. This inadequate or inaccurate documentation of pressure injury (PI) leads to confusion, impacting both treatment and reporting of PI, negatively impacting care delivery for the individual patient and resulting in missed opportunities for staff education. Regulatory reporting requirements and payor reimbursement are affected.

Methods

Meetings with staff nurses revealed that they considered Pressure Injury descriptors in the Epic "Lines/Drains/Airways" (LDA) to be the "source of truth" for PI identification and assessment. Chart reviews and consultation with Case Management Clinical Documentation Specialists and staff on two pilot units informed our decision to define (1) present on admission (POA), (2) staging, and (3) location of PI as three elements necessary to establish accurate documentation in the PI LDA. We measured the number of PI LDAs containing accurate data in all three elements compared to the total number of PI LDAs, on our pilot units. Brainstorming sessions with bedside nurses and nurse leaders led to development of interventions that might improve the measure. Staff nurses began to incorporate discussions of Pressure Injury into daily multidisciplinary rounds to focus the attention of the entire patient care team on PI treatment and documentation. After one month, the intervention was enhanced to include the addition of the Attending RN and/or Resource Nurse as guides for the discussion of PI during these rounds.

Results

At baseline, documentation in the PI LDA that included all three elements was only 45%. After both interventions, documentation in the PI LDA that included all three elements increased to 63%. POA was the element most often found to be inaccurate or missing in documentation (32%). When POA was excluded from the measure, accuracy of documentation for staging and location of PI reached 91%. Discussion with bedside nurses revealed that their awareness of PI documentation increased; they also expressed increased confidence related to staging of PI.

Discussion/Conclusion

Accurate documentation of PI in the EHR was improved on two inpatient units by incorporating daily discussion of PI into rounds and standardizing documentation requirements. Established guidelines, and increased focus on PI documentation during rounds, enabled staff to improve documentation. Barriers to accurate completion of the POA element have been identified and potential system changes are being evaluated. Next steps include identifying champions for a hospital-wide effort to leverage these interventions and implement the documentation recommendations into standard practice. Once adequate compliance is achieved, responding clinicians will be encouraged to incorporate the PI LDA in their progress notes to achieve consistent documentation across role groups and establish basis for reimbursement.

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Analysis of a Clinical Decision Support Advisory and the Influence on Nurses During Medication Administration

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Keywords: Clinical decision support systems, alert fatigue, medication /patient safety, nursing

Introduction/Background

This project evaluated the best practice advisory (BPA) “Med Admin Too Close” (which is used in the Epic electronic health record) to determine how it works in different hospital inpatient settings. The BPA is a pop-up that tells the clinician *that the medication administration is close to another one and a review is needed to assess the appropriateness of the administration*. Analysis of alert data demonstrated that the alert is not effectively causing the nurse to evaluate and relate the timing of the medication administration with similar administrations. An investigation of the alert functionality, nursing behaviors when alerted, clinical relevance, and the impact on medication errors was conducted.

Methods

Various methods were used for this study. A manual review of current data for the alert was completed using a three-month history. Trends were identified and related to the clinical workflow at the time of the alert. Modifications were made to the BPA behavior based on the initial trends. The alert was tested in a support environment, using various order types, frequencies, and routes. Orders for “as needed” (PRN), scheduled, one-time, and one-step medication administrations were each ordered and administered to determine timing of the alert, both on inpatient units and across procedural departments. Nurses were surveyed and interviewed to discern clinical judgement. An analysis of medication safety events was completed and related to the BPA behavior.

Results

The alert is acknowledged with no action taken more than 90% of the time. Nurses seemed to have limited understanding of why the alert occurs. The trends identified determined recommendations for refinement of the alert functionality. The alert did not provide meaningful clinical decision support to promote patient safety during medication administration. The alert was variable depending on the order type, frequency, and the care area where administration occurred. Frequent alerts contributed to alert fatigue during a single medication pass. The variability and over-alerting contributed to desensitization, mistrust and a knowledge deficit of alert behavior by nurses. Incidences when medications were administered too close together when the alert did not prevent the error, and alerting gaps were uncovered.

Table 1: Best Practice Advisory Alerts

	October	November	December	January	February
Total Alerts	50,199	36,404	32,950	37,295	16,695
Alerts per Day	1,619	1,174	1,062	1,203	618

Discussion/Conclusion

Clinicians rely on the electronic health record to guide clinical decisions even when clinical knowledge should dispute the system. Human factors, poor communication, distraction, fatigue, and complex workflows contribute to medication errors. The *Med Admin Too Close BPA* is meant to alert the nurse when a medication administration is too close to another administration. An alert should cause the nurse to pause and consider the clinical implications of proceeding. Refinement is necessary to improve accuracy, meaning, and trust. Gaps in alerting and alert fatigue can all contribute to medication errors and influence patient safety.

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Nursing Practices and Perceptions in Code Documentation in the Electronic Health Record

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Keywords: Patient Care, Clinical Documentation, Patient Safety and Quality, Professional Education and Training, Simulation, Data-Driven Quality Improvement

Introduction/Background

Accurate documentation of medical codes (i.e., cardiopulmonary arrest events) in real time contributes to appropriate delivery of life-saving interventions in the moment and provides a detailed record for later review to identify opportunities for quality improvement and to serve as legal documentation when medicolegal questions arise. Documentation that is clear, concise, honest, accurate, readable, and timely is essential if liability and cost are to be contained [1]. Few studies have examined nurses' knowledge, skill and attitudes towards code documentation [2]. To better understand the current perceptions and practices related to code documentation in the Electronic Health Record (EHR), we surveyed inpatient nurses across the hospital.

Methods

A 20-question, anonymous survey was distributed via email to 3,406 inpatient nurses employed at a single 900-bed, academic hospital. Voluntary completion of the survey served as implied consent.

Results

A total of 402 surveys were completed. 47% of the respondents had documented a real code in the Code Narrator. 74 % of these respondents had documented a code in real time using the Code Narrator. 64% of respondents did not feel comfortable using the Code Narrator. 25% had participated in a code not documented in the Code Narrator and 28% had participated in a code where the details of the event were not accurately recorded. Also, 91.5% nurses felt that more practice using the Code Narrator in a simulated environment would help them become more facile. All responders provided suggestions to improve Code Narrator functionality.

Conclusions

These findings suggest although most nurses feel comfortable using computers and the new EHR, few feel comfortable using the Code Narrator for code documentation in real time. Lack of practice navigating the Code Narrator and poor functionality significantly contribute to this discomfort. Future educational and technological interventions may provide nurses with the support needed to harness the power of real time code documentation in the EHR.

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Implementation of Digital Whiteboard and Interactive Patient Education and Care Application

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Keywords: communication, health information technology, patient engagement, nursing informatics, whiteboard.

Introduction/Background

With the recent completion of a new hospital, Nantucket Cottage Hospital (NCH) evaluated the advantages to utilizing new digital technology to replace the standard dry erase whiteboard in the patient rooms. The standard board was historically updated manually with patient demographics, key vitals, and care team information and would often lag behind with up-to-date information. NCH chose to implement a hardware and software solution in 14 patient rooms. The goal of the project was to digitize patient information from the whiteboard and integrate it with the electronic health record (EHR). The application selected brought with it the ability to assign patient education on various topics in both English and Spanish. In this poster, we describe the decisions, challenges, successes, and future scope of the digital whiteboard project at NCH.

Methods

NCH used a standard healthcare information technology project management approach to the implementation of this new software. NCH had on-site demos from the vendor, workflow observations/discussions as well as user interface design sessions and patient education video selection. Based on initial findings and discussions, we scheduled meetings with clinical management, information technology, and NCH senior leadership to reach final user interface design sign-off. The NCH Nurse Educator was a key decision maker in selecting the patient education videos that we would offer to the staff for assignment to patients. Selection was prioritized and based on our most frequent diagnoses as well as specific prioritization for our labor and delivery patients.

Results

The digital whiteboard was live the moment we moved our first patients into the new hospital on Feb 20, 2019. The patients were welcomed into their new rooms with the date, their name, the names of their care team, their room number, room phone number, identified support person and a short NCH focused informational video on a 49 inch Smart TV. All of this content was integrated so that updates made in the EHR would, in real time, update the information in the patient room. This was made possible by a live ADT (Admission, Discharge, Transfer) HL7 unidirectional interface with the EHR. The patient pillow speaker was fully integrated with the TV controls, as well as the nurse call system. Through the use of the pillow speaker, the patient can easily investigate the multiple options for viewing cable TV, free movies, health related videos, as well as relaxation content. The nurses can work with each patient to “bookmark” health focused videos specifically addressing individualized education needs.

Discussion/Conclusion:

The feedback from patients and staff has been very positive and a set of key performance metrics is scheduled to be evaluated to more discretely capture project success. There were also several technical challenges such a server configuration, network connectivity, and hardware setup that will be presented. The NCH Clinical Business & Technology team continues to work closely with the Partners eCare EHR clinical team to identify patient specific information that will be mapped for display. With an additional DocFlowsheet HL7 interface, clinical information such as goals for the day, last pain scores, fall precaution icons, activity limitations, and newborn weights and feedings will be pulled in real time from the EHR to our patient screen. There are also operational plans to map available videos to commonly chosen Plan of Care patient education interventions.

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Preparing Nursing Staff for Electronic Health Record Downtime

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Keywords: Downtime Forms, Downtime Preparation

Introduction/Background

Preparing for conversion from legacy to enterprise electronic health record (EHR) in late 2016, the North Shore Medical Center (NSMC) Nursing Informatics team identified gaps between downtime processes for the organization and available resources for patient care services. In response, the nursing informatics team developed downtime forms and a downtime webpage to address the gaps. Debriefing after the 12-hour downtime associated with the implementation, we identified additional needs for maintaining a safe clinical practice in the midst of downtime, including: additional forms, instructions for using paper forms for blood and medication administration, and standardization of the storage of paper downtime forms on patient care units.

Methods

NSMC had the advantage of being the third group to go live with the enterprise EHR. While some forms were generic, other forms were developed to mimic the new system. The Nursing Informatics (NI) team worked with Information Services (IS) to set up a webpage and worked with leaders and front line staff in each department to determine deficits. The website included downtime forms that mirrored the EHR workflow for Admission Assessment, Shift Assessment and Discharge Assessment. This process would streamline downtime recovery for the EHR. After being vetted with nursing practice council and nursing leadership, all forms were placed on the downtime website. The website was also expanded for specialty unit forms.

In addition, the NI team worked with subject matter experts to develop instructions for paper medication order transcription, medication administration record, and blood administration. The team deployed standardized downtime carts across patient care services for the downtime that would occur with the EHR upgrade in October 2018. All carts were identical with bright red hanging files that could be easily identified, even by staff who may be floated to a different unit.

These tools were in addition to the network tools provided. These included select business continuity access (BCA) PCs on each unit that supply a printed medication administration record and clinical summary on all admitted patients, to be used in case of major network outage; and “read only” views of the EHR, available from every workstation.

Results

In December 2018 the full network suffered an unplanned downtime. Although some staff had trouble using the BCA, the majority of staff were able to successfully navigate downtime using the downtime cart with the provided forms. A debriefing session with nursing staff identified the need for folders for nurses to carry the paper medication administration record forms, as well as the need for more education and regular drills on the use of the network-provided tools. This work is ongoing.

Discussion/Conclusion

An interdisciplinary downtime committee has been established across the Partners network recognizing the threat and vulnerability for downtime in healthcare, with the goal of developing more comprehensive enterprise downtime forms and procedures. Our experience with an unplanned downtime showed that preparations were largely successful, though we continue to make improvements.

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Best Practices for Data Visualization: Creating and Evaluating a Report for an Evidence-Based Fall Prevention Program

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Keywords: data visualization, evidence-based, fall prevention, Health-ITUES, usability, implementation science

Introduction/Background

Data visualization experts have identified core principles to follow when creating visual displays of data that facilitate comprehension. Such principles can be applied to creating effective reports for clinicians that display compliance with quality improvement protocols. A basic tenet of implementation science is continuous monitoring and feedback. Applying best practices for data visualization to reports for clinicians can catalyze implementation and sustainment of new protocols. The objective of this study was to apply best practices for data visualization to create reports that clinicians find clear and useful.

Methods

First, we conducted a systematic literature review to identify best practices for data visualization. We applied these findings and feedback collected via a questionnaire to improve the Fall TIPS Monthly Report (FTMR), which shows compliance with an evidence-based fall prevention program, Fall TIPS (Tailoring Interventions for Patient Safety). Fall TIPS demonstrated a 25% reduction in falls in a randomized control trial [1] and has over a decade of evidence to support its use in acute care setting [2]. This questionnaire was based on the requirements for effective data display suggested by expert Stephen Few [3]. We then evaluated usability of the FTMR using a 15-item Health Information Technology Usability Evaluation Scale (Health-ITUES) [4]. Items were rated on a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Results

The results of the systematic literature review emphasized that the ideal data display maximizes the information communicated while minimizing the cognitive efforts involved with data interpretation. Factors to consider include selecting the correct type of display (e.g. line vs bar graph) and creating simplistic reports. The qualitative and quantitative evaluations of the original (n=79) final (n=72) FTMR revealed improved perceptions of the visual display of the reports and their usability. Themes that emerged from the staff interviews emphasized the value of simplified reports, meaningful data, and usefulness to clinicians. The mean (SD) rating on the Health-ITUES scale when evaluating the original FTMR was 3.86 (0.19) and increased to 4.29 (0.11) when evaluating the revised FTMR (Mann Whitney U Test, $z=-12.25$, $P<0.001$).

Discussion/Conclusion

Best practices identified through a systematic review can be applied to create effective reports for clinician use. The lessons learned from evaluating FTMR perceptions and measuring usability can be applied to creating effective reports for clinician use in the context of other implementation science projects.

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Improving User Efficiency with Plan of Care Automation

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Keywords: Usability, Plan of Care, Clinical Documentation, Process Change, Clinical Decision Support, Efficiency

Introduction/Background

Automation of nursing care plans ensures patient problems are addressed appropriately and efficiently. Partners nursing informatics leaders developed a process to prioritize nine automated patient problems that are aligned with National Patient Safety Goals and NDNQI measures.

Methods

Several Enterprise Clinical Content Build-Out (CCBO) sessions were held to review, update and streamline the content of the nine plan of care problems selected for automation. In version one, due to software limitations the user was unable to customize goals and interventions before the problem populated the Plan of Care. Given this limitation, the subject matter experts focused on including the minimum necessary goals and interventions for each problem. The clinical informatics team applied an Agile framework for this effort [1]. User workflows were evaluated to define appropriate decision support inclusion and exclusion criteria logic to automate each problem. Logic for this automation include a specific order, assessment, patient class, and encounter type. The automation of plan of care problems was communicated and educated through creation of tip sheets that outlined the automation criteria for each.

Results

The nine problems are automated for most patients during their hospital encounter. The problem automation count correlates with the patient department as illustrated in the table below. For example, Perioperative departments have higher counts for CLABSI and CAUTI problems due to the number of assessments they enter for urinary and central catheters. Requests for automating additional plans of care continue to be submitted and evaluated.

Table 1: Plan of Care Problem Automation over 1-month period (Jan 1-Jan 31, 2019)

Problem	Count	Department with Highest Count
CLABSI, Infection Risk or Actual	2719	BWH Perioperative (221)
CAUTI, Infection Risk or Actual	4805	MGH Perioperative (986)
Fall Risk	9594 (Adult)	NSM Davenport 9 SH (230)
	171 (Pedi)	MGH Ellison 18 Pedi (42)
Pain, Acute / Chronic	8895	MGH Perioperative (483)
Venous Thromboembolism (VTE) Risk or Actual	2426	BWH Perioperative (232)
Skin/Wound Integrity - Skilled Nursing Facility	79	SRB 1 st Floor (37)
Pressure Injury, Risk or Actual	8055	NSM Davenport 9 SH (222)
Restraint Use	816	MGH Lunder 6 Neuro ICU (53)
Suicide/Self-Harm Risk	94	MGH Ellison 18 Pedi (6)

Discussion/Conclusion

End user feedback is positive. Nurses see evidence that their documentation is used by the system's decision support algorithms to automate building a relevant plan of care while saving clicks and streamlining documentation workflows. However, some have concerns that the automatically generated plans of care lack patient individualization. Currently, design changes are being evaluated to streamline personalization of the plan of care from the Best Practice Advisory alert. Future work includes additional automation based on specific patient criteria. End user feedback and analytics inform iterative adjustments to the decision- support logic.

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Evaluation of Automated Education Reminders for New Medications

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Keywords: Usability, Patient Education, Clinical Documentation, Efficiency

Introduction/Background

The majority of RNs believe it is important to provide patients with information on new medications. A recent Epic electronic health record system upgrade introduced functionality that prompts nurses to educate patients about medications that are considered new to them. First-dose patient education functionality includes an icon on the Medication Administration Record (MAR), and automation of a medication-specific education point to the Patient Education Activity. The intent is to streamline the documentation of medication administration and patient education.

Methods

Three functionality configuration options were considered: enable for all medications, enable for a subset of medications, do not enable. Nursing informatics leaders evaluated the options and the pros and cons of each option. A conference call was organized with another Epic customer who had implemented first-dose patient education functionality for all medications to gather feedback and learn how they applied it. Most agreed on an all-or-nothing approach. The final decision was to implement the functionality for all new medications.

Results

Within a month of implementation, feedback was unfavorable. The negative impact of system configurability limitations and workflow considerations was realized. Patients had many first-dose education points. Most were not accurate or relevant and persisted on the patient record as the patient moved throughout the health system. Staff reported minimal value of the functionality given the new burden of keeping the patient education list meaningful. A month after implementation, the majority of points persisted on patient records with a status of not started. The medications with the highest rates of first-dose education documentation correlated with those ordered most frequently, including IV fluids, and over-the-counter pain and bowel regimens. Two medications that warrant first-dose patient education for successful self-management with high rates of education documentation were Enoxaparin Sodium and Oxycodone.

Table 1: Status of first dose education points documented against at discharge

Status	Percentage
Not Started	74%
Done	21%
In progress	5%

Discussion/Conclusion

Any efficiency gained by automating education points for medications considered new to a patient was outweighed by the burden of documenting against or deleting points that were not relevant. Nursing informatics leadership evaluated the feedback and data and endorsed a proposal to restrict the functionality to a strategic subset of medications, those that a patient will likely be discharged on to self-manage a complex medical condition. The refined list will only result in a few points being automated for each patient. The change will provide meaningful decision support to nurses regarding new medications the patient should be taught about while reducing workload and the need to reconcile first-dose education points that are not appropriate for the patient.

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Classification of Injurious Fall Severity in Hospitalized Patients

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Keywords: NDNQI, falls, adverse events, injurious falls, functional impairment, patient safety

Introduction/Background

Falls are a major problem in hospitals and about 30% of inpatient falls result in injury. The National Database of Nursing Quality Indicators (NDNQI) classification is used to quantify the severity of injurious falls in a third of large hospital systems nationwide. The current NDNQI definition of a Major injury includes a wide range of injuries requiring treatments, from those as minimal as casting to as major as surgery for a subdural hematoma. This dependence on treatment of the injury is subjective and may limit the reliability of the classification system. Our purpose was to increase the specificity of the NDNQI Major injury severity classification to promote more reliable assessment and categorization of the types of inpatient injuries from falls.

Methods

We used a bottom-up approach based on the literature and injurious fall incident reports from a large academic medical center to divide the NDNQI Major category into subcategories. Three distinct clusters of severity emerged from the incident reports: Major A - injuries that caused temporary functional impairment, major facial injury without visual impairment, or disruption of a surgical wound (e.g. ankle fracture, nasal bone fracture); Major B - injuries that caused long term functional impairment or had a slight risk of increased mortality (e.g. vertebral fracture, multiple rib fracture); and Major C - those that had a well-established risk of mortality (e.g. hip fracture, subdural hematoma). Each Major injury subcategory was mapped to the literature for initial validation. We created a REDCap rating form and a training manual documenting the criteria for categorization of Major injuries into our severity subcategories. Ten nurse and two physician co-investigators were trained using de-identified incident reports for serious injurious falls within a large academic medical center between 2010-2015. Rounds of 10 cases were assigned via REDCap for independent classification. Disagreements were discussed after each round until the group reached a consensus on the severity of all injuries. When necessary, we gathered additional literature, expert opinion, and perceptions of patients and families on specific injuries, and iteratively updated the training manual and operational definitions of our subcategories. This process was repeated until we achieved excellent interrater reliability (weighted Kappa >90%). Six pairs of two co-investigators independently rated a set of 40 injurious fall incident reports from three large hospital systems between 2016-2018 (n=240). Interrater disagreements were resolved by an arbiter with expertise in event classification.

Preliminary Results/Next steps

Each Major subcategory (A, B, and C) is mutually exclusive and not reliant on treatment of the injury. We achieved excellent interrater reliability with our training cases from 2010-2015 (weighted Kappa of 0.93 [0.89-0.98]). Our final results will include the interrater reliability of the 2016-2018 injurious falls classifications from three large medical centers, the number of serious fall related injuries, and the number of patients classified within each Major injury subcategory. Once we establish that our subcategories are valid and reliable, we will link them with the NDNQI to promote ease of use within existing workflows.

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Legislation Compliance with Your After Visit Summary

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Keywords: Clinical Documentation, Clinical Decision Support, Standardization, Legislation Compliance

Introduction/Background

The Massachusetts Caregiver Advise, Record & Enable (CARE) Act (Chapter 332 of the Acts of 2016), effective November 8, 2017 is intended to allow patients over the age of 18 who have been admitted as an inpatient at an acute care hospital to designate a caregiver and give permission for the hospital to provide medical information to that caregiver. The law features three important provisions 1) The hospital provides a patient with an opportunity to designate a caregiver; 2) The caregiver is notified when the patient is to be discharged to another facility or back home; 3) The hospital provides an explanation and demonstration of the basic medical tasks that the patient should follow at home [1].

Methods

A strategy was developed and designed to ensure compliance without disrupting clinical end users' workflow by leveraging Epic's inpatient documentation, clinical decision support, and patient discharge instruction tools. The workflow designed is as follows: 1) The Caregiver is designated on admission, readdressed and confirmed on discharge by documenting in flowsheets in Epic; 2) The caregiver consent is automatically added to the After Visit Summary (AVS) report with the information documented in the Doc Flowsheets on admission for all patients designated with a caregiver; 3) When the AVS is printed, nurses obtain a signature for the patient's discharge instructions and Caregiver consent; 4) The consent form is then scanned into the patient chart. To help ensure the Caregiver consent was included and signed prior to discharge, the AVS is set up not to print unless the caregiver designation is documented.

Results

The Caregiver documentation process was implemented throughout the inpatient system at South Shore Hospital. Health Information Management (HIM) was able to monitor compliance with the new initiative and give feedback to Clinical Informatics staff, who in turn provided re-education to end users. Since implementation of the Caregiver documentation, the organization has been 100% compliant with the CARE Act. With the new upgrade to our information system (Epic) for 2018, we were also able to incorporate this same workflow design into the 2017 After Visit Summary without any changes to the strategy.

Table 1: Caregiver Compliance Rate 2017-2018

Quarter 2017-2018	Caregiver Assessment
Q 4 2017	98%
Q 1 2018	100%
Q 4 2018	100%

Discussion/Conclusion

Leveraging the available tools in Epic to meet regulations and make documentation needs a seamless part of clinical workflows ensures electronic documentation is meaningful and purposeful to end users, and improves end users' satisfaction with the system [2]. The strategy developed helped to improve clinical workflows that meet regulations and improve compliance without being too cumbersome to follow.

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Bar Coded Medication Administration Overrides: An Alert to Practice and Safety Issues

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Keywords: Bar Coded Medication Administration, Medication Administration Safety

Background:

Automated dispensing cabinets and barcode medication administration (BCMA) are associated with decreases in medication errors. When medication errors do occur, workarounds are often an important factor. Drivers for these workarounds through observation include not scanning, overriding patients with no wristband, incorrect medication, and ignoring alerts [1]. Our evaluation at Tufts Medical Center (TMC) revealed similar findings. Tufts BCMA system uses “MAK” a Soarian application using barcode scanners. The nursing informatics (NI) team was alerted when issues with documentation of narcotics were reported to Nursing Directors. Medication administration reports managed in the pharmacy “MAK” system showed a 1% override rate, considered acceptable by pharmacy safety at TMC. Nurses reported issues with reliability using the BCMA system. Reports of missed documentation, dropped sessions and scanners “not scanning” activated a review of data on medication administration. Workarounds reflect issues with functionality and reliability of the system.

Methods:

The NI team, in collaboration with pharmacy, clinical nursing directors and the Soarian analysts reviewed MAK and Quantros safety reports to understand specific issues with BCMA scanning and to better understand overrides. Communicating the data to unit leaders using weekly data reports provided opportunities for discussions on process improvement and risk assessment. Addressing the type of overrides began with transparency of information to leaders and staff. Pharmacy informatics collaborated to validate and clean the data to support focused improvement. Individual plans were developed through observation of daily work as well as unit-specific barriers to safe medication administration. Utilization of safety huddles, orientation-focused competencies, informatics “did you know” monthly alerts, as well as individual unit elbow-to-elbow support was implemented. Ongoing reporting of data was vital to keep the issue in focus.

Results:

Reporting to individual units with user-specific data had a twofold outcome. The identification of small numbers of users who were overriding patient identification allowed individual counseling by clinical instructors with immediate improvement. Identifying the users revealed that many were novice and less experienced nurses and focusing education on orientation and novice nurse programs proved impactful.

Discussion:

Never take your eye off data was an important take away. NI’s must continue to observe and respond to concerns while using the reporting tools and data available. Encouraging nurses to utilize safety reporting when they have IT issues will help NI’s to recognize problems with user interfaces and allow the ongoing support of clinical practice. Rounding with bedside nurses is an important aspect for nursing informatics which allows open communication and feedback.

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Leveraging the EHR for Medication Reconciliation Process Improvement

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Keywords: Medication Reconciliation, Patient Safety and Quality, Clinical Documentation

Introduction/Background

The Institute for Healthcare Improvement defines Medication Reconciliation as “the process of creating the most accurate list possible of all medications a patient is taking, and comparing that list against the physician’s admission, transfer and/or discharge orders”. This is a complex, time-consuming and challenging process. It is further complicated when the patient/family/caregiver is unable to provide accurate and/or current information. An accurate Prior to Admission (PTA) medication list is the foundation for safe and complete medication reconciliation. Winchester Hospital uses a pharmacy tech (MRT) during the day to update the PTA med list in the Emergency Department (ED). The MRT reviews and corrects the med list using the claims history, information from the primary care provider (PCP), and patient/family/caregiver interviews. Not every patient list is reviewed by the MRT. Once admitted, nurses have the primary responsibility for the integrity of the list.

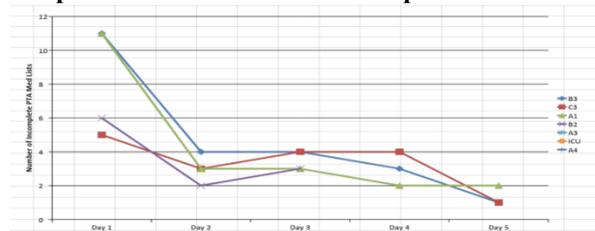
Methods

An interdisciplinary team was created to study the complex process of obtaining an up-to-date PTA med list. Based on data indicating that most medication lists were inaccurate or incomplete, practice alerts were sent to the nursing staff to educate them about how to obtain a complete list. In spite of this education, there was little improvement in practice. A SWAT team (a nurse educator, two nursing informatics specialists and a quality improvement specialist) was created to target med rec and educate nurses about leveraging the Epic system to obtain an accurate medication history. The team rounded for one week on each unit, spending time teaching nurses about PTA medication documentation, and how to use electronic resources to verify current medications. Nurses were shown how to update and maintain the med list, including adding new medications, removing inactive medications, revising dosages and navigating through Epic to validate the information. Epic’s Chart Review and Care Everywhere tabs provide medication lists from other encounters. These are helpful when interviewing the patient to determine if the med list is up-to-date.

Results

SWAT team intervention was successful in reducing the number of incomplete medication lists.

Graph 1: Post Intervention Incomplete PTA Medication Lists



Discussion/Conclusion

Providing the correct medications at all transitions of care is an important patient safety effort. Med Rec is a fluid process, requiring review and confirmation with the patient/family/caregiver over the continuum of care. Used effectively, Epic is a valuable resource in obtaining medication history.

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