

**Trends in Clinical Informatics:
A Nursing Perspective – Poster Presentation**

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Leveraging Standards to Support Patient-Centric Interdisciplinary Plans of Care

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As health care systems and providers move towards meaningful use of electronic health records, the once distant vision of collaborative patient-centric, interdisciplinary plans of care generated and updated across organizations and levels of care, may soon become a reality. Effective care planning is included in the proposed Stages 2-3 Meaningful Use quality measures. To facilitate interoperability, standardization of plan of care messaging, content, information and terminology models are needed. This degree of standardization requires local and national coordination. The purpose of this poster is to review existing standards that may be leveraged to support development of interdisciplinary patient-centric plans of care. Standards are then applied to a use case to demonstrate one method for achieving patient-centric and interoperable interdisciplinary plan of care documentation. Our pilot work suggests that existing standards provide a foundation for adoption and implementation of patient-centric plans of care that are consistent with federal requirements.

Standardizing Initial Nursing Assessment Across Two Academic Medical Centers

Brenda Griffin, RN, MBA, Patricia Dykes, RN, DNSc, FAAN,
Denise Goldsmith, RN, MS, MPH

Introduction: The primary purpose of the initial nursing patient assessment is to gather data and information necessary to support nursing judgment and care planning. In preparation for moving to electronic nursing documentation two Academic Medical Centers (AMCs) within the Partners HealthCare System chose to standardize their current nursing assessment content. Brigham and Women's Hospital (BWH) and Massachusetts General Hospital (MGH) will implement the MetaVision (MV) documentation system to electronically enter nursing assessment information.

Methods: In order to successfully standardize the Initial Nursing Assessment (INA) across two AMCs we first set out to reach agreement, based on best practice, on what should constitute the initial patient assessment. Following this work we developed a set of principles that would guide design and development decisions for the electronic assessment. To achieve our objective we followed the following steps:

1. Accelerated Design Sessions (AD): to identify the assessment content ' Clinicians from both MGH and BWH came together to review and reach consensus on the list of potential assessment data elements ' The sessions were structured to drive consensus around defined topics
2. Joint Nursing Assessment Task Force: to determine which data elements to include in the INA ' Reviewed best practice of nursing admission assessment ' Established guiding principles to inform the 'build' of the electronic INA ' Tested/validated the guiding principles against AD assessment content.
3. Electronic Initial Nursing Assessment build sessions ' Using the established guiding principles, subject matter experts (SMEs) were convened to determine which of the AD content would be included or excluded from the INA.

Results: The guiding principles which were developed in the Joint Nursing Assessment Task Force were applied to the 'build' process. There was overwhelming consensus that these guidelines helped the build team to make more informed decisions regarding the inclusion/exclusion of assessment content. Feedback from the SMEs who participated on the build team reported that by using the 'guidelines' they were much less likely to make decisions based on tradition/habits/old ways. As a result a multi-site, standardized, electronic initial patient assessment was built and approved for use.

Discussion: We engaged in a very successful initiative to standardize the Initial Nursing Assessment across two AMCs. Integral to this success was the strategic pre-planning that was done to identify:

1. The right process: A project charter with a clearly defined scope, Specific goals for each meeting with structured discussions, Each meeting built upon the consensus achieved from previous meeting, A structured process which valued participation and input from bedside nurses
2. The right people: Nursing leadership, Novice and expert clinical nurses, Skilled nursing leadership facilitators
3. The right goals: Task force members were able to focus on the on the goals and objectives of the work and were able to leave behind 'the way we have always done it' for the sake of a successful improvement initiative. As a result, the task force believed that the end product was even better than they had expected.

Development of an Electronic Patient Risk Communication Board (ePRCB)

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BACKGROUND: Communication failures have been identified as the root cause of the majority of medical malpractice claims and patient safety violations. To date, communication breakdown of patient risk's and safety interventions to reduce risk have been identified in the literature. We believe it is essential to share key patient risk information with healthcare team members at the patient's bedside. In this study, we developed an electronic Patient Risk Communication Board (ePRCB) to assist in bridging the communication gap between professionals, paraprofessionals, and all members of the healthcare team. The goal of the ePRCB is to effectively communicate the patient's key risk factors and safety interventions, such as a fall risk or an NPO order, to the healthcare team and to reduce medical errors caused by communication failures that impact patient safety.

METHODS: Qualitative (focus group) and quantitative (survey) methods and rapid prototype development were employed to develop an ePRCB prototype. By applying the same methods used to develop icons for patient fall risks in a previous research, icons were developed with an illustrator to depict other patient risk status/intervention icons. The preliminary ePRCB prototype was developed based to address barriers identified in data collection/analysis. Developed icons related to patient risk status (including existing fall prevention icons), patient restriction, and interventions were employed on the system screen. The ePRCB transmits patient risk information and tailored interventions with easy-to-understand icons on an LCD screen in the patient's room.

RESULTS: A set of patient risk and intervention reminder icons were developed and validated by focus group participants, mostly nurses. The evaluation of the ePRCB system itself was viewed positively and the use of icons was favorable. However, some cautioned that if there are too many icons displayed, this may cause confusion or information fatigue. Therefore, the staff emphasized the importance of categorizing the icons to facilitate the recognition of each patient's risks.

CONCLUSION: In this study, we created a communication board that aims to transmit patient risk information and tailored interventions with easy-to-understand icons on an LCD screen in the patient's room. We developed the system requirements based on providers' needs. Through an iterative process of refining patient risk alert icons, a set of patient risk icons were developed for the ePRCB. The ePRCB has great potential to bridge the communication gap between professional, paraprofessional, and other members of the healthcare team by displaying key patient risk information and actionable reminders available at the patient's bedside. We used the results of the evaluation to refine and finalize the icons for the ePRCB.

Building Electronic Access Line Documentation

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Introduction: Brigham and Women's Hospital (BWH) and Massachusetts General Hospital (MGH) recently purchased the MetaVision (MV) documentation system from vendor iMDsoft. MV is a computer application that enables clinicians to electronically enter data on flow sheets and capture note content. All components of MV's data specific flow sheets were individually designed by teams from each institution. This abstract will describe the development of the Access Lines documentation within the MV application.

Methods: Each flow sheet tab was designed and built by a selected team consisting of a Clinical Lead Nurse, a Knowledge Management (KM) representative and an Information Technology analyst/builder. Each team was given access to Subject Matter Experts (SME's) comprised of expert clinicians from both institutions. Our design process began with the exploration of current state IV workflow at BWH and MGH. We conducted extensive design sessions, including SME input, to identify the majority of related content, documentation and work flow, including all lines in use and their associated data. Content collected from our design sessions was reviewed by the Clinical leads to determine how the content should be implemented and designed within the application, i.e., formatted as a single or multi-select checkbox, a drop-down list or free text. KM built these structured parameters into the MV database, allowing the team to create forms to capture the documentation of lines by the nurse. These forms were created in a test environment to ensure that the design will needs of the nurses based upon their current workflow. Using the communication tool eRoom, the build team would collaborate and communicate with the SME's to validate iterations of the build and post edits. SMEs would use eRoom to respond to questionnaires, comments and screen shots.

Results: One of MV's key features is the use of a Gantt line that auto-calculates duration of a line's placement once initiated by a clinician. This is an integral piece of data related to managing infection risk associated with central lines. To document a line assessment the nurse will right click off this Gantt line and a form containing specific assessment data will open. We fashioned two types of assessment forms (general and discontinuation), that will allow the users to quickly enter comprehensive assessment data related to their lines. Once data is entered on the forms, it will be visible on the same screen as the Gantt lines. We decided on a Tabular view that most resembled a paper flow sheet, providing the most expedient method of utilizing and visualizing current information against data entered earlier.

Discussion: Creating electronic access line documentation that captures large amounts of content, accurate nurse work flow, fast data entry and utilization of data for plan of care, proved to be a challenge. While we have not yet gone live, initial usability evaluations indicates that our Access Line build is comprehensive, usable and consistent with our hospital's commitment and initiatives to decrease central line infections.

Testing a Clinical Documentation System for Nursing Data Capture Using De-identified Patient Charts

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Abstract: Between the build and testing phases of a multidisciplinary clinical documentation system, de-identified patient charts were used as a framework to walk through the nursing work day. This exercise revealed gaps in data capture, usability concerns, and training issues for the team to address prior to formal system testing.

Introduction: Ensuring data quality in an electronic clinical documentation system requires the ability for comprehensive, accurate data capture. This project was conducted toward the end of the build phase but prior to formal system testing of a multidisciplinary clinical documentation system that is being built by and for Brigham and Women's Hospital and Massachusetts General Hospital. The nursing documentation portion of this system was developed with extensive input from clinicians and with iterative usability testing of individual documentation sections. The purpose of this project was to identify data elements not be captured in the system as built so that modifications could be made. Usability and training issues that were identified during the process were also documented for the build team.

Method: Five de-identified patient charts, representing future pilot testing units, were used as a framework to recreate the nursing workday on a variety of patient care units. Patient data was entered into the clinical documentation system, beginning with the initial nursing assessment, and systematically progressing with daily nursing documentation. The tester, an experienced clinician and informatics student, kept a running narrative of problems encountered during the process of documenting nursing data. After analyzing each chart, the narrative was reviewed, and problems were entered into a spreadsheet. This gave the build team specific feedback regarding gaps in data capture, system usability, and potential system training issues.

Results: Sixty-two data content items were identified that could not be captured correctly in the new electronic system. Examples include: state of anxiety, estimated blood loss from surgery, mucous membrane assessment, fact that a tube is placed to gravity, patient position change (especially in relation to vital sign or respiratory changes), and ventilator abbreviations that match current abbreviations used. Forty-two usability issues and twenty-two training issues were also noted. Results were communicated to appropriate build team members for further consideration and potential system modification.

Conclusion and Lessons Learned: Although a limited number of charts were reviewed, this method proved effective to identify important issues to address prior to finalizing the build phase and moving on to unit and integrated testing of the documentation system.

Meaningful Use Compliance and Electronic Medication Management at Point of Entry

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Introduction: In 2009, Congress passed the American Recovery and Reinvestment Act which provides financial incentives to hospitals who can demonstrate 'meaningful use' of health information technology. As of February 2011 the Miriam Hospital, a Lifespan affiliate, instituted an electronic medication management system. The Miriam is a 247 bed University affiliated teaching facility and four time Magnet Designee. This hospital has successfully implemented many Point of Care technologies including physician order entry (POM), medication administration check system (MAK) a bar code administration (BCMA) and clinical documentation systems. Medication transcription errors have been recognized as a common cause of medical errors. To improve patient safety the electronic entry and reconciliation of home medications at the point of entry is essential to positive patient outcomes as well as patient satisfaction upon discharge. This abstract will describe the implementation of an electronic medication management process at points of entry for surgical and procedural patients admitted to the hospital. Pre-procedure nurses or LIP's collect a home medication list during the pre-admission testing appointment. The home medication list is created and or verified on the day of surgery/procedure.

Method: One year prior to the electronic conversion a progressive training program was provided to the pre-procedural areas responsible for collecting home medication lists. Emphasis was placed on the standardized format for prescribing and dispensing medication according to pharmacy guidelines recommended by the Institute for Safe Medication Practices to reduce error in interpretation and transcription. The primary project goal was to improve medication safety and optimize patient care from point of entry through discharge by

- 1) reducing paper medication transcription
 - 2) providing a streamlined approach to medication reconciliation at time of admission
 - 3) providing consistency during the order entry process and
 - 4) improving the quality of patient medication discharge instructions
- Transitioning to computerized medication management system required workflow analysis/re-design, equipment acquisition, staff training and post implementation evaluation. One of the biggest challenges was addressing nurses concerns regarding the medication management system in their practice areas and revising their current workflow.

Results: Successful implementation of the electronic medication management systems has resulted in the ability to access the home medication list throughout the inpatient and procedural units. We have successfully minimized the use of hand transcribed paper medication lists, improving accuracy from point of entry to discharge. Analysis Information technology support staff continues to work to address workflow and system issues. System enhancements will be disseminated to staff as they are identified. Staff nurse/LIP input is encouraged and vetted via the Clinical Informatics Council venue. Ongoing support and education will continue to be provided by unit resources, online job aides and the informatics staff.

Discussion: Moving forward we will include outpatients units in our current medication safety metrics as well as complete yearly competency verification. As clinical information systems continue to evolve and become more widely accepted, we will strive to demonstrate 'meaningful use' through integration of clinical systems within the organization.

Barcode Medication Administration (BCMA) at Maine Medical Center

Nancy Glover, RN, MS

Maine Medical Center (MMC) is a 637 bed tertiary-care hospital in Portland, Maine with medical/surgical, oncology, cardiac, maternal/child, pediatric, psychiatric and special care inpatient units plus a 64 bed emergency room. VeriScan, Hospira's BCMA application, is part of MMC's strategic plan to improve the safe administration of medications by supporting the five rights of medication administration.

The project began with an upgrade of the wireless network in 2008. Development and testing occurred in 2009. Hospital-wide rollout began in January of 2010 with the Short Stay Unit. Three more units went live in March. Starting in May two units went live every two weeks, ending with the emergency room (ER) in November 2010. Users were trained in two-hour classes that covered operation of the Motorola MC55s (the wireless handheld devices used for BCMA) and BCMA workflow. A team of two RNs and seven nursing students provided 24/7 support and on-unit training during the two weeks following go-live. Reports were developed to track utilization: 95% of all medications are now given via BCMA.

Nurses and respiratory therapists at MMC administer approximately 60,000 medications per week and VeriScan generates about 1100 wrong medication alerts weekly. Audits of the data have revealed that some alerts are due to VeriScan's inflexibility in drug mapping (e.g., two 25-mg metoprolol tablets cannot be scanned when a 50 mg tab has been ordered) but the majority of alerts are valid. Examples of wrong medications scanned include heparin for patients without a current order, incorrect doses of warfarin and wrong forms of insulin (e.g. aspart for glargine).

MMC learned a lot about BCMA during this project. Some medications must still be charted in Sunrise Clinical Manager (SCM).

- VeriScan requires an order in SCM. It does not work for situations such as codes where verbal orders are given.
- Medications administered by others, such as meds given in the operating room, must be charted in SCM.
- VeriScan cannot handle the second half of a dose range order, e.g., the second Tylenol when 1 to 2 tablets are ordered.

Drug mapping inflexibility has presented problems for both pharmacy and nursing: users get invalid wrong medication alerts when substitutions must be made due to drug unavailability. Some solutions have created other issues. For example, the pharmacy eliminated morphine carpulets in varying concentrations and went to 10 mg vials of morphine. The vials scan correctly but nurses must perform the extra step of wasting unused morphine. Barcode scanners attached to workstations would have worked better in some cases.

- The MC55 is a mobile computer with a built-in barcode scanner. Dedicated scanners read a wider range of images, such as the tiny barcodes on some medications.
- Infection control has been a challenge, especially when taking the MC55s into drug resistant organism (DRO) rooms.

Keeping the VeriScan database synchronized with SCM is an ongoing activity. An integrated database would have required less maintenance.

Electronic Nursing Documentation and Information Sharing: Driving Homecare Processes

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Donna Bond, RN, MSN

Introduction: Like the majority of clinical environments, nursing documentation and information exchange in the homecare setting is essential for nurses to deliver safe and effective patient care. Especially important in homecare, the interconnectivity and sharing of data is vital to all aspects of the patient's trajectory of care and associated business workflow processes. Partners Healthcare at Home has been using electronic nursing documentation for several years, though most recently, implemented a new EMR system in March 2010, which has the potential to advance information exchange through the use of innovative technology.

Purpose: This poster depicts the processes, both internal and external, that are reliant on electronic data transfer and nursing documentation within the homecare environment. Our integrated electronic medical record (EMR) system not only allows the electronic documentation at the bedside, but also electronic data sharing prior to, within, and after, the course of patient care. Electronic data exchange includes patient referral, insurance verification, scheduling, clinical notes, orders management, billing and payroll, as well as other back end processes.

Benefits: Unlike other clinical domains, nursing documentation drives clinical, regulatory, performance improvement and financial processes. The documentation of an initial and follow-up nursing assessment, using a standard data set, drives the payment associated with that patient episode of care. Likewise, those same data elements are electronically submitted to regulatory and quality organizations to ensure compliance and evaluate patient outcomes. Moreover, electronic nursing documentation provides a means to communicate to other members of the team, the patient's plan of care, response to treatment, and resultant performance improvement initiatives. Because our nurses are not all in one location, the electronic sharing of clinical data is essential as a communication tool.

Challenges: The remoteness of the homecare setting however, is full of inherent challenges to the success of this sharing of clinical information. Our nurses all have individual laptops with remote databases that require frequent data synchronization. Connectivity and data transfer between all of the remote electronic devices is one of the biggest challenges for our nurses when it comes to electronic documentation. Also challenging are the needed security measures used to ensure information privacy. Likewise, the hardware and software maintenance associated to the laptop and security devices are challenging. Computer literacy is an ongoing obstacle.

Upcoming implementations: We are currently working on several initiatives to further advance the sharing of clinical information. Our current initiatives include a Tele-health interface, digital image interface and scanning into the medical record, e-forms, and electronic physician order signature. We are also in the planning and testing stages of using auto-synchronization to optimize data transfer and minimize the impact on nursing productivity.

Nursing Electronic Documentation in the Pediatric Critical Care Setting

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Donna Armstrong, RN, MSM, CCRN, CAGS

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Purpose: To successfully manage the conversion of critical care documentation in the hospital's four intensive care units. The initial implementation of the PowerChart EHR in 2007 proved to be unsuccessful in the ICU setting. This resulted in the use of a hybrid model for documentation and a lengthy redesign and reimplementation process.

Methods: Multidisciplinary and collaborative approach involving nursing, medicine, respiratory therapy, pharmacy, and IT. A staged approach to implementation starting with CPOE and MAR in 2009, and concluding with flowsheet in 2011. Thoughtful flowsheet design by the SME group; focused on meeting the unique charting needs of each ICU while remaining compatible with hospital-wide documentation. Repeated testing, troubleshooting and redesign of the flowsheet. collaboration with the CHAMPS training team to design training content. Support of the training team during super user and end-user training. 24/7 onsite support during implementation phase; including troubleshooting, rapid redesign, and ongoing end user education. Outcomes Over a four year period, the processes surrounding ordering and transcription, medication administration, and clinical documentation have been merged into a fully integrated Electronic Health Record. This allows for enhanced safety, more efficient patient transfers, and ease in sharing and reviewing patient data.

Next Steps/Lessons Learned: Important lessons learned include the benefit of using a staged, gradual approach to implementation. Nursing SME representation from all of the ICUs also proved to be invaluable throughout the design, build, testing, training, and implementation process. Collaboration with all disciplines was critical to the success of the project. The CHAMPS ICU team will continue its work to adopt new functionality and fine-tune Power Chart documentation.

Mother and Baby... Across the Care Continuum

**Tanya Strong, RN, MBA
Karen Wagers, RN, MSN, BC**

The setting of this project was in a Community Hospital in the Labor and Delivery, Nursery and NICU departments. This project was initiated because there was a need for improved consistency in documentation throughout the mother/baby hospital stay. The original scope of the project was limited to electronic charting for Labor and Delivery. Focus groups met with the goal of creating an electronic, reliable, user-friendly documentation system for the staff to enter their triage, labor and delivery notes. Paper forms were brought to these focus groups and, collaboratively, decisions were made for what to include and how to arrange the screens in the new electronic system. This implementation went so well, the decision was made to expand documentation into the postpartum area. The scope of the project was then changed to expand to many unplanned areas including Non Stress Tests (NST), I/O, OB Physician documentation, Nursery documentation, NICU nursing and Neonatologist's documentation and finally the Pediatrician documentation. As each new area was implemented, the software system managers did quality checks on the documentation regularly and addressed any issues found with frontline user input in a timely manner. The product usage extended into other areas as this electronic system continued to yield positive results in consistency with documentation and high satisfaction with front line users. The success of the Mother/Baby documentation across the care continuum can be attributed to many factors. Focus groups have been extremely important in helping to create this product. The expertise of the front line staff and their involvement in the build was crucial. Another essential component of this project's success was that education was done in a group setting and delivered by super user members of the front line staff that were involved with the build.

Medication Safety Through MAK

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Ann Eil, RN, BSN, Margaret Reilly, PharmD, MS
Kathleen Caldera, RN, MSN**

Tufts medical Center nurses are on the forefront of changing healthcare for the better and improving patient safety one click at a time. After three months since completing inpatient implementation of the Medication Administration Check system (MAK), Tufts Medical Center noted that medication administration errors decreased by 70% and medication transcription errors decreased by 66%. Our objective for this project was to determine whether or not MAK had an impact in reducing medication errors in the four steps of the medication process: order writing, transcribing, dispensing and administration. In addition we sought to identify which step in the process would see the biggest impact. The methodology used to provide data for comparing medication error rates per 1000 doses dispensed was to mine Doctor Quality for medication errors. Doctor Quality is the self-reporting error program employed at Tufts Medical Center. Comparing error rate per 1000 doses dispensed allows benchmarking against the industry standards. Medication errors per 1000 doses dispensed from 2008, 2009, and 2010 were reviewed and compared. It is recognized that there are some inherent flaws in using the Doctor Quality system as this is a self-reporting program and therefore some errors or near misses may be under-reported. Our findings demonstrated that the overall error rate decreased dramatically from 2008 through 2010. It is believed that this reduction may have been directly related to the implementation of MAK. Overall there was a 66% reduction in the number of medication errors reported through Doctor Quality. To analyze for statistical significance, a standard Shewhart Individuals Control chart was used, using 2 standard deviations. Values outside the Upper Control Limit (UCL) and Lower Control Limit (LCL) are considered "large shifts" and therefore significant. Eight points on one side of the median indicates a probable shift due to a change in process (MAK for our purposes). Downward shifts in the mean and the UCL and LCL indicate a reduction in the number of medication errors as reported via Dr. Quality. Error rates clustering around the mean (beginning in Feb 10) indicated practice was becoming consistent within the process. To our greatest expectations, the impact of MAK on medication administration based on overall reported errors resulted in a decrease by 70%. Also noted was transcription errors had reduced significantly by 66%. It was anticipated that MAK would have its largest impact on administration. The transcription process has moved from the unit coordinator to the pharmacist. Both of these process changes appear to have contributed to the downward trends illustrated in the control charts. Additionally, the administration and transcription control charts demonstrate a change in the UCL and the LCL which indicate a stabilization of the process around the mean. MAK was not expected to have any impact on medication dispensing errors or order writing errors. While dispensing errors show a significant downward trend the changes are most likely due to other process changes occurring within the pharmacy. As we celebrate our accomplishment we prepare of phase II of MAK implementation. This includes MAK roll-out to interventional areas, infusion centers, the Emergency Department, the OR, and outpatient areas. The authors acknowledge that the successful roll-out of MAK would not have been possible without the collaboration between pharmacists, nurses, respiratory therapists, the Tufts Medical Center IT department, MAK trainers, MAK super-users, Security, and Facilities. The perfect blending of these disciplines combined with staff that upholds the highest standards of professionalism will remain key to the continued success of MAK implementation.

Improving Patient Safety through Medical Event Reporting

Marie George, RN, MSN

Introduction: In 2009, thirteen hospitals in RI selected GE MERS as their Patient Safety Organization (PSO) and have recently implemented the Medical Event Reporting System (MERS) software for recording, tracking and trending safety events. This abstract describes Lifespan's journey in this state-wide initiative.

Background: In response to the 1995 Institute of Medicine report "To Err is Human", Congress passed the Patient Safety Act in 2005 which paved the way for entities to form federally certified PSOs. Non-discoverable data are collected in a Common Format that will allow analysis and trending at the local, state, national and international levels.

Methodology: Within each hospital, project leads gathered information from the content experts to build the different forms and sub-forms used in the MERS application. Guided by GE Healthcare, teams from the thirteen hospitals met with each other over several months to agree on terms associated with different types of patient safety events (for example, medication event, fall, invasive procedure, behavioral, etc.). Feedback from the users was welcomed by the vendor and incorporated into the product before the go-live. Each hospital developed a process to handle event reporting. Lifespan began introducing staff to the new "just culture" of reporting, analyzing and learning from the data. At Lifespan, this represented a shift from event management by Risk Managers, to management and analysis by department-level reviewers. The Quality Management staffs are responsible for coding and closing events before they are sent to the PSO. The application roll-out began in the summer of 2010, with 3 of the 4 Lifespan hospitals going first and the rest of the State continuing through the fall and winter.

Outcomes and Lessons Learned: At Lifespan, there has been an increase in reporting of patient safety events some of which have led to changes in safety-related processes. The shift in event management responsibility from Risk to Operations was a significant change for staff. It presented challenges for first and second-level Management Reviewers who are learning how to categorize and follow up on increasing volume of events and to conduct RCAs if necessary. Although staff are beginning to use the built-in reporting and query tools to trend data, additional education is needed. As early adopters of the PSO software, many lessons were learned by both the hospitals as well as by GE Healthcare and MERS. The routing system is complex and a better understanding earlier in the project would have made for less re-work. Having reports in place to track events movement through the review process would have prevented an initial back-log.

Future of the Initiative: As the data accumulate, trends and patterns will emerge. SAS Analytics is collaborating with GE Healthcare to provide PSO member hospitals with information that can be used to identify risks and improve patient safety. Using de-identified PSO data, hospitals will be able to share information without compromising patient privacy.

MEDICATION SCANNING IN THE PACU. YOU CAN DO IT!

Penny Bertolasio, RN, MSN
Jennifer Stebbins, RN, MS, BC

Background: Over 39% of all medication errors occur during the administration phase. The Institute of Medicine (IOM) estimates that, on average, a hospitalized patient is subject to one medication administration error per day. Positive Patient Identification (PPID)/Medication Barcode Scanning leverages technology to support enabling the five rights of safe medication administration (right drug; right dose; right route; right patient; right time) by scanning the patient wristband to identify all patients, and scanning all medications that have been identified to be in scope, prior to administration. Documentation is improved with the use of this process as medications are charted in the electronic medical record as part of the scanning process.

Implementation: In 2008, Baystate Medical Center implemented PPID for all inpatient areas, including the PACU. A few of the major problems upon initiation of scanning were identified by staff such as RN buy in and frustration with the process, work flow, and medications that did not scan. Our scanning rate in the beginning was a dismal 13 % for medications and 40% for patient identification. There was little improvement over the first year for our department and the staff became very frustrated.

Outcome: When the Department of Health Care Quality made scanning a metric for unit performance, the issues in PACU were escalated. Work groups consisting of IS department, pharmacy and management were set up to discuss the issues with scanning medications and the process began for improvement. Once the RN's saw that their issues were being addressed, their compliance in scanning increased. After over a year of collaboration and persistence the scanning rates for the PACU have risen to 88 % for medication scanning and 97% for patient identification. The department has met the required metrics and is one of the leading units in scanning rates for the hospital.

Development of Tailored Diabetes Education and Hypoglycemia Protocol for Staff Nurses

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Purpose: To standardize Diabetes care and the treatment of hypoglycemic episodes at the bedside for better patient outcomes.

Research Question: How Can Informatics Use Expedite the Development of Tailored Diabetes Education and a Nurse-Driven Hypoglycemia Treatment Protocol?

Design/Methodology: To evaluate nurses' diabetes care knowledge, this research council invited all staff nurses to voluntarily participate in an IRB approved, pre/post-test study. Participants completed the Diabetes Basic Knowledge Test (DBKT) (Cronback's $\mu = .824$) and the Diabetes Self-Report Tool (DSRT) ($\mu = .91$), that had been made accessible and confidential on our hospital intranet's learning site. Performance on the tests was processed for statistical significance. An education module, tailored to the identified weakest knowledge areas, was developed and provided online. After receiving the online education, participants completed post-testing on the same materials. Pre- and post-test responses revealed surprising deficits in the management and care of persons with Diabetes.

Results: The use of informatics facilitated this project in several ways. Over one hundred participants were able to access the knowledge tests and online education. Computerized statistics tools provided results quickly, while guarding against human error or bias. Among our findings, it was learned that 89% of our staff nurse participants incorrectly selected the most appropriate treatment of acute hypoglycemic episodes. The finding spurred discussion and frustrations regarding glycemic control, realizing need for standardization of hypoglycemia treatment at the bedside. This research group consulted interdisciplinary teams to construct a nurse-driven acute hypoglycemia protocol and order set. Online research databases, interdisciplinary teams in-house and among partnering hospitals all contributed to determining best practice standards for our protocol.

Practice Implications: The CDC estimates that there currently are 24 million Americans with Diabetes. This prevalence and associated risks are significant health concerns; especially considering the unexpected sequel of poor diabetes control. Our tailored education and evidence-based treatment protocol guides nurses in decision-making, therefore improving patient safety and quality of care. Further, given this example of a successfully identified and improved a bedside concern, staff nurses are empowered to continue to seek best practice. Our research team was fortunate for quick, accurate statistics relating our staff's knowledge provided by informatics tools. Our online learning site allowed accessibility to education and sharing of bedside experiences in a professional space. The ability to connect instantly with interdisciplinary professionals at multiple locations accelerated our protocol's development. As we proceed with the accepted protocol, we intend to again use online learning tools and efficiently follow-up with the project's impacts.

Meaningful Use: How to Implement Clinical Documentation in 6 Months or Less

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Introduction: In the late fall of 2009, the Lifespan Information Services department, along with nursing informaticists from each affiliate, embarked on a project to implement nursing clinical documentation. This abstract describes the implementation process and outlines the strategies unitized to complete a rapid system wide implementation in just six months.

Background: American Recovery and Reinvestment Act of 2009 and its Title XIII, Health Information Technology for Economic and Clinical Health (ARRA/HITECH) established programs under Medicare and Medicaid to provide incentive payments for the "meaningful use" of certified electronic health records (EHR) technology. The Lifespan health system determined that meeting Stage One meaningful use criteria was within our grasp providing the completion of seven identified projects. Nursing Clinical Documentation was one of those projects.

Methodology: The Care Doc Steering Committee consisting of the CNOs of each affiliate, the Lifespan CIO, the VP of information services, the nursing informaticists from each affiliate (LINC), and a systems manager from the information services department, participated in a kick-off of the Care Doc project on 12/11/09. By 2/28/10, the functional specs were finalized and the build was completed. The final phase of testing, known as integrated testing, was completed by 3/18/10. The first affiliate to go live was Newport Hospital (NH), on 4/27/11, followed rapidly by Rhode Island Hospital (RIH) on 6/8/10 and finally The Miriam Hospital (TMH) on 6/22/10.

Lessons Learned: The following keys to a successful rapid implementation were identified:

- LINC /IS commitment: met minimum of 1 to 2 full days per week during design and testing phases
- Care Doc Steering Committee chaired by RIH CNO
- Lifespan CIO, VP Application Systems, Application Systems Manager, CNOs each affiliate and LINC group
- Gap analysis between Invision flow used at NH and paper forms used at RIH and TMH
- Hardware decisions: moving toward wall mounted PC's due to battery issues with workstations on wheels
- Hard copy medical record: HIS took on the role of printing
- Utilize a Supertrainer checklist during go live coverage
- Ongoing on site support 24/7 for 1 week
- One Supertrainer per unit the first 2 days, then slowly tapered over the week
- Physician communication
- Care Doc Talk- newsletter

Mining Nursing Documentation for Clinical Concerns and Early Recognition of Deterioration

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Background: Nurses alter their monitoring behavior as the clinical condition of a patient deteriorates. Moreover, nurses detect subtle changes and record concerns before trends in physiological measurement are apparent. We hypothesized that the presence of different types of nursing documentation, specifically, optional free-text comments associated with clinical measurements in electronic health record flowsheets, might be useful to predict deterioration and mortality. Methods: Using data-mining methods, we analyzed electronic nursing documentation for cardiac arrest patients in the 48 hours prior to arrest, and for a set of randomly selected control patients in the 48 hours after admission. The frequency of vital sign measurements and the number of comments recorded were compared in the two groups to identify associations between documentation and survival.

Results: There were 201 cardiac arrest patients and 15,089 control patients. For arrest patients, comments documented in flowsheets were statistically more likely to be associated with normal measurements of oxygen saturation ($p < 0.0001$, Fisher's exact test) and abnormal measurements of blood pressure ($p < 0.0001$, Fisher's exact test), blood glucose ($p < 0.0001$, Fisher's exact test), heart rate ($p < 0.0001$, Fisher's exact test), and respiratory rate ($p = 0.039$, Fisher's exact test). Increased comment documentation was associated with increased mortality for acute care arrest patients ($p < 0.01$, Fisher's exact test). More frequent vital sign documentation was associated with increased survival of arrest for critical care patients ($p < 0.03$, Fisher's exact test). The distribution of comments for arrest and control populations differed with a higher proportion of arrest patients having more comments ($p < 0.0001$, Kolmogorov-Smirnov test).

Conclusion: Increased frequency of optional documentation by nurses is associated with the abnormality of clinical measurements and survival outcomes in hospital patients. Further analysis of such patterns may be useful for the measurement of nursing knowledge and surveillance activities and the design of interventions to recognize and mitigate patient deterioration.

Pre-Procedural Patient Screening: How to Improve Patient Care

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Pre-Procedural Patient Screening: How to Improve Patient Care Purpose: The development of this telephone tool is to capture important pre procedural data. This tool was developed with assistance of Information Technology Support thru Partners Health Care Systems. The pre Screening tool was developed to target the CDIC (Cardiovascular Diagnostic Interventional Center) patient population. This patient population serves the following areas: Interventional Cardiology, Electrophysiology and Vascular Surgery. Nursing recognized that an improvement in collection of data from a pre-procedural standpoint was important to assisting patients prior to their scheduled procedure. The tool was developed to include the following areas: Health History, Anesthesia and Sedation, Major Co Morbidities, Medications, Allergies, Pre-Procedural Work up, to include required diagnostic testing and labs. Procedure, to address patient's questions and patient education. Day of Procedure Instructions, Important Patient Phone numbers. These sections ensure patients receive important information about their procedure. The questions asked of the patient also address mandated reporting I.E. (JACHO) Joint Commission on Accreditation of Hospitals and meets National Patient Safety Goals. The collection of this data and the dissemination of this information electronically thru LMR (Longitudinal Medical Record) allow the health care team to access this information and to utilize this repository of data to ensure High Quality and Safety to our patients. This electronic component educates our patients on the importance of Medication Compliance and reconciliation. Our nursing practice begins the transition to computerized nursing documentation this electronic nursing tool has been a positive force within the health care continuum. The communication has been clear and concise to all medical and nursing disciplines. The tool is printed and placed in the patient's medical record and is incorporated in the pre procedural nursing note on the day of the scheduled procedure. The electronic tool has been affective repository of information for other departments to utilize. I.E. Pre Admitting Testing Center can access this information prior to the patient's visit for a Cardiac Surgery. Thus providing the advanced practice nurse a synopsis of the patient's health care history. Documentation is critical in helping us to provide the highest quality of patient safety and care.

Use of an Electronic Pre-Admission Medication List to Facilitate Medication Reconciliation for Patients Evaluated in a Pre-Admission Testing Telephone Program

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Medication Reconciliation is essential to the safe care of patients scheduled for surgery and for those admitted post-procedure. The lack of a single, accurate, pre-admission medication list at the time of admission for surgery is unsafe, costly in-terms of delay of surgery and duplication of effort, and may result in harm to the patient and stress for both patient and staff. Massachusetts General Hospital (MGH) is a large academic medical center in Boston, MA. For the past five years, inpatient medication reconciliation has been accomplished using the electronic Pre-Admission Medication List (PAML). Thirty percent of surgical patients are evaluated in the MGH Pre-Admission Testing Area (PATA) where the PAML has been initiated. The majority of the remaining 70% of patients, however, continued to arrive on the day of their procedure, in many cases, with no medication list available, requiring the surgical nursing staff to collect and document a complete and accurate medication list while preparing the patient for the their procedure. Time constraints, distractions, patient anxiety, multiple systems (paper for Surgery and electronic for Anesthesia) and many other factors contributed to incomplete or inaccurate medication lists and potentially to patient harm. MGH's PATA recently developed a Phone Program, staffed by nurses who contact patients who don't require a PATA visit. Incorporating the use of the existing electronic PAML into the workflow of these nurses allows them to build a patient's electronic pre-admission medication list as they speak with them on the phone. As a result, there has been a marked increase in the number of patients admitted through the Same Day Surgical Unit (SDSU) who arrive with a single, complete, and accurate electronic pre-admission medication list that is available to all clinicians caring for them during their surgery and admission. The PAML enhanced thru put for the SDSU nurses, anesthesiologists, and the surgeons who were each responsible for developing their own list of medications in the past; with increased patient safety the most significant outcome.