Precision Health for Nursing Informatics and Leadership

Robin Austin, DNP, DC, RN-BC
Co-presenter: Judy Pechacek

Abstract

Background: Precision or personalized health is an emerging trend that has implications for nursing and nursing informatics (NI). In 2015, President Obama announced the Precision Medicine Initiative® (PMI), now the All of Us Research Program. This is a participant driven open access program to incorporate a variety of data such as genomic, lifestyle, and environmental data. Precision health is aligned with the Internet of Things (IoT) and consumer engagement to increase the ability to track and monitor personal health data. While there are numerous opportunities, many challenges and barriers exist to operationalize and integrate emerging data from a variety of sources. **Objectives**: The objectives of this presentation are to 1) inform and educate nurse informatists and nurse leaders about the emergence of precision health and "omic sciences"; 2) describe how these relate to IoT and consumer engagement strategies; 3) discuss opportunities in precision health for nursing informatics education, clinical practice, leadership, and research; 4) Explore leadership opportunities to mitigate challenges and barriers of precision health. **Relevance to Practice of Nursing Informatics**: Current and future nurse informaticians should have knowledge and skills to translate and integrate genomic data into usable and shareable information across care settings. Precision health has relevance to NI in the areas of education, clinical practice, leadership, and research. *Education*: The ANA NI: Scope and Standards of Practice (2015) calls for informatics nurses to build genetic/genomics knowledge to best support this expanding practice. Including genomic and precision health content into nursing informatics curricula can equip NI graduates with knowledge and skills to lead emerging interprofessional teams. *Clinical Practice*: With the expansion of data, the clinical practice of NI will continue to evolve and expand. NI has a unique opportunity to capitalize on clinical expertise, knowledge of clinical documentation systems, and data standards to facilitate the use of a variety of data sources such as IoT, patient generated, and genomic data. *Leadership*: The American Organization of Nurse Executives (2015) competencies "Information Management and Technology" require nurse leaders and nurse executives need to effectively use data to inform decision making, formulate and lead informatics initiates and provide direct leadership to adopt emerging technologies. *Research*: The All of Us Research program introduces a new research paradigm and methodologies. The availability of open source genomic data, patient generated health data, and social media data have implications for big data science and analytics research. *Conclusion*: Nurse informaticians are poised to be leaders and take an integral role in the precision health movement. This presentation will synthesize and integrate precision health within the context of nursing informatics. Precision health is at the core of nursing values as it combines a patients' unique response to health and illness with personalized genomic and biometric data to offer holistic, patient-centered care.

Evaluation of the use of the Bar Code Medication Administration(BCMA) Process after the First Decade

Lynne Bittner, MS, RN-BC
Co-presenter: Anne Lara

Abstract

Bar Coded Medication administration (BCMA) has been widely adopted in the United States, with more than 50% percent of acute care hospitals adopting the technology. The use of BCMA is intended to reduce medication errors, but some of the patient safety features of the technology may be reduced if end-user staff members employ workarounds. Our small community hospital is a 122 bed not-for-profit, full-service hospital. BCMA was implemented in our hospital in 2006, beginning in the Emergency Department (ED) as a pilot and subsequently implementing in the inpatient units. In 2014 our hospital underwent an EHR upgrade, expanding our use of BCMA and it is now live in the ED, the inpatient units, the Behavioral Health Unit, the Observation Unit, the Pre- and Post-Surgical Units, and the Infusion Center. Post Go Live reports from nursing services of inefficiencies encountered during BCMA led us to develop a survey to determine contributing factors. A literature search was performed to review existing surveys, many of which examined the transition from paper medication administration documentation to BCMA and were not appropriate for our purpose. We then developed a survey to assess multiple aspects of Medication Administration in a mature BCMA system. The survey consisted of five demographic questions followed by 20 questions with six response choices ranging from Strongly Agree to Strongly Disagree in a Likert Scale design. The study was approved in an expedited review by a university Institutional Review Board (IRB). The target population for the survey was a convenience sample of staff nurses and respiratory therapists who were identified from a list of staff members who had removed medications from the automated medication dispensing system in the previous six months. An email request containing the purpose of the study, an invitation to participate, a consent statement and a link to the survey was sent. Consent from participants was obtained when they accessed and completed the survey. The survey was open for three weeks. Of the 325 staff sent the link, 120 completed the survey, for a response rate of 37%. Survey findings revealed opportunities for improvement in the following areas: pharmacy workflow, medication delivery/administration processes, equipment availability/function, documentation on the medication administration record(MAR), and staff education. Results were shared with the organization executive team and action plans for addressing improvement opportunities were developed. Priority was given to those areas where patient safety was directly impacted.

Analyze This! Building Analytics Capacity in the Department of Veterans Affairs Workforce

Kathleen Brandt, RN-BC, MS, PMP

Abstract

Problem: The Internet of things in health care will generate massive amounts of data requiring a workforce that is engaged, educated, and capable of harnessing data effectively to improve decision-making, learn more about individual patients and groups, and support population health management. Information gathered from three separate workforce assessments at the Department of Veterans Affairs (VA) revealed data analytics as the number one identified learning need in the VA informatics and analytics communities. **Project Scope**: Funded by a grant from the Department of Health and Human Services (HHS), Office of the National Coordinator(ONC) for Health Information Technology, the Department of Veterans Affairs, in collaboration with Bellevue College in Washington State, developed and deployed an 8-week online course, Introduction to Health Care Data Analytics. The goal was to educate 1,000 VA staff within two years. The course was widely publicized to a large, diverse audience and generated much enthusiasm and interest. Participating staff represented all disciplines and levels in the VA organization, including informaticians, data analysts, clinicians, quality managers, and administrative and technical staff. For further incentive, physicians, registered nurses, pharmacists, and psychologists were eligible to receive 31 continuing education credits. The course provided foundational knowledge and skills in health care data analytics. Students learned about the tools and techniques used for data analytics in health care organizations and gained insights into effectively communicating data analysis. The curriculum included interactive hands-on learning activities using real world scenarios. Costs associated with the course delivery were minimized by using resources already available, e.g. an on-line textbook, VA Subject Matter Experts as discussion board moderators, and an open source LMS software (Moodle) to deliver the course. No travel costs were incurred. **Results and Benefits**: Within two days of opening course registration, over 1,700 staff enrolled, with another 362 on the waiting list. The course evaluations are overwhelmingly positive with 95% of the students expressing that the course content was relevant to their job; 94% felt that the skills learned in the training will improve their job performance and 90% would recommend this course to their colleagues/coworkers. As a result of taking this course, students reported that they were more equipped to manage and analyze data, utilize data for decision-making, communicate results with their leadership, and improve customer service overall. Further evaluation of the course is planned to be administered 90 days post course completion(March 2017). This will be a Level 3 Evaluation that looks at how well the course impacted job performance. The project team added sessions starting in February and September 2017. Plans to include staff from the Department of Defense are in the works. Content from the course will be publicly available through HHS at healthit.gov starting June 2017.

How the Internet of Things (IoT) can improve interoperability and clinical workflows in IV medication administration

Francisco Cuesta, BSN
Co-presenter: Aron Weiler

Abstract

Healthcare environments have an abundance of medical devices intended to improve safety by providing real time insights into patient conditions, accuracy in care delivery, and timely and effective actions in support of patient care. The evolution of IoT technology has enabled flexibility, scalability, and portability in nearly every care environment and workflow associated with the patient. Over the past two decades health information technologies and systems have evolved rapidly and become essential to healthcare providers. Most hospitals and IDNs today have an Electronic Medical Record (EMR) system. These systems are implemented to manage patient demographics, clinical history, medication prescriptions, diagnostic imaging, labs, and more. Additionally,some EMR systems offer medical device integration and bi-directional communication capability, enabling interoperability. In an interoperable environment, medical devices share data with EMR systems, and vice versa, to promote safety. For example, a medication order can be automatically populated on an infusion pump, avoiding risks inherent in manual programming. Still, safety requires numerous interactions among patients, providers, and devices. New connectivity features may make workflows simpler and safer. Future systems using proven technologies such as Radio Frequency ID (RFID), Bluetooth Low-Energy (BLE), and Near Field Communication (NFC) will go beyond interactions between the EMR and devices to enable direct communication between patient care devices. This communication will foster data sharing between all medical devices involved in the patient continuum of care and move us forward to the ultimate goal of making medication administration workflows safer and more efficient.

Scheduled Medication Administration Times- "Giving Nurses the Gift of Time"

J. Vickie Elliott, BSN,CCRN-CSC
Co-presenter: Roxie Shortt-Lewis

Abstract

Our team utilized Lean/DMAIC tools to identify the reason nurses spend an excessive amount of time administering medications. Baseline data collection showed that a nurse spends 18 minutes per medication pass and 15% of all mediation passes are unnecessary. The average medical patient had 4.2 scheduled medication passes on day shift (SD= 2.48) and 2.1 medication passes on night shift (SD= 1.4). The Standard Medication Administration Time policy was revised and approved by the PNT committee. To facilitate pharmacy and nursing education, a learning packet was created to provide guidance on medication scheduling and rescheduling. Education began with department directors, managers and clinical supervisors and then expanded to nursing staff meetings and department meetings. As a result of this project, 90% of unnecessary medication passes were removed. In addition, 83% of unnecessary medication passes were removed from the hours of 2200-0600. Baseline data showed an average of 0.86 unnecessary medication passes per patient day. A calculation of savings utilizing an average census and the average nursing hourly wage resulted in a daily savings of $1,454 and an annual savings of $530,000.

Program transformation from paper documentation to proactive data transfer: Use of an app in outpatient pediatric cardiology home monitoring program

Lori Erickson, MSN, CPNP-PC

Abstract

Background: Single ventricle cardiac infants are a rare and high risk population with 10-15% inter-stage mortality and frequent morbidities including frequent readmissions in the first 6 months of life. Traditional home monitoring uses inter-professional clinical teams to evaluate data documented on paper by parents for symptom management. To predict change in hemodynamic status, nurse coordinators and advanced practice nurses use weekly phone or email communications to review these data (weights, oxygen saturations, and feeding logs). Since 2014, we have monitored interstage infants with single ventricle (SV) at home with CHAMP, a tablet PC with cloud-based instant analytic algorithms.Thus nurses can review and intervene on home monitoring data instantly instead of weekly. Nursing coordinators are a front line for care during the week and APRN's are on call 24 hours a day for this high risk population. **Methods**: From May 2014 to June 2015, SV infants were enrolled in a crossover study comparing CHAMP to traditional paper documentation kept in a binder. All were discharged with the binder; they were randomized to receive CHAMP instead of the binder 1 or 2 months after discharge. One month after randomization, caregivers chose either the binder or CHAMP for the remainder of the interstage. Charts were reviewed for neonatal characteristics, readmission data including events prior to readmission, length of stay (LOS), ICU LOS and charges. High resource utilization (HRU) was defined as the 25% of readmissions that were associated with the greatest ICU LOS. HRU patients were compared to all others, who were defined as Low resource utilization (LRU) patients. **Results:** 31 infants were monitored for 4911 interstage days. There was 80% adherence with data transfer while using CHAMP. There were no interstage deaths and 73 inter-stage readmissions. HRU patients did not differ from LRU patients in neonatal characteristics. HRU babies were significantly more likely to be unplanned and born to younger mothers. The time from clinical change to communication with the clinical team was nearly 4 hours longer in HRU admissions ($p=0.009$). HRU babies had higher charges ($105,925 v. $34,669 median, $p=0.003$), LOS (12.5 v. 1.2 days $p<0.001$), and more cardiac ($p=0.011$) and general surgeries ($p=0.037$). The association of CHAMP with LRU was trending but did not reach statistical significance, likely due to sample size ($p=0.071$). **Conclusion:** Interstage SV infants are at high risk for readmissions. Delays in care are associated with HRU. Using CHAMP to transfer data to nursing coordinators may help decrease delays. Further study may provide the basis for predictive analytic algorithms.

Creation and Evaluation of a Preoperative Education Website for Hip and Knee Replacement Patients - A Pilot Study

L. Andrea French, JD, RN, MSN
Co-presenter: Amelia Dayucos

Abstract

Problem Statement: The use of websites to provide patient education is becoming more common, but the usability and quality of the information must be evaluated and ensured. Because patients undergoing hip and/or knee replacements are usually older adults, this population may have more difficulty with the technology of online education. The benefits of a properly executed and effective preoperative patient educational intervention have been shown to result in improved psychological and physical well-being for patients undergoing surgery, leading to better outcomes. Web-based preoperative teaching can also better incorporate evidence-based research into this important aspect of patient education. The goals of this pilot study are to determine the usability and feasibility of a website created to increase patient engagement in their own preoperative education, assess their access to online education, and improve the quality of the education patients receive in preparation for hip or knee surgery. **Methods**: Following expedited IRB approval of this quality improvement project, the study team used a convenience sample of two patient cohorts from a Preoperative Ambulatory Surgery Services (P.A.S.S.) department of a medium-sized community hospital. One group received the usual care (education via paper form) and the other group received the paper documents plus a link to the website. The patients were directed to complete anonymous Survey Monkey surveys. The design of the website was intentionally made to be simple, with evidence-based "menu-driven" drop-downs and other features to make the screens age-appropriate to the patient population. The website content was supported with video and PDFs of pamphlets containing educational and illustrative topics, materials the same as or similar to the usual educational classes and paper documentation provided to patients by the P.A.S.S. nurses. There was an option for the patient to contact a P.A.S.S. nurse with questions, and the clinical study nurse would monitor the email daily, to ensure timely response. Links were provided on the education website for further information about the study and the Survey Monkey questionnaire. The team used the Perceived Health Website Usability Questionnaire (PHWSUQ) in drafting survey questions. A website header and both surveys provided for passive informed consent. The clinical nurse student researcher polled the P.A.S.S. nursing staff to obtain preliminary qualitative feasibility results. **Data Analysis and Results**: Descriptive statistics and paired t-tests were used for comparative analysis of the cohorts. We hypothesize that the findings will show that patients who received web-based education in addition to the printed materials will opine that they are more knowledgeable about their procedure, have less anxiety, and experience greater satisfaction with their preoperative education. We further expect to find that the website preserved the nurses' time and that there was some cost savings for the unit in using less supply chain allocations. **Significance:** If our hypotheses are supported, nurses will save time otherwise spent on education and may have more opportunity to identify clinical issues in patients preparing for knee and hip replacements. We hope to show that evidence-based online education is effective and feasible for this population.

Realizing Continuity of Care Through Oncology Navigation Nurses' Use of Electronic Documentation

Rosella Ganoudis, MSN,MBA, RN

Abstract

Background: It is the role of oncology navigation nurses to link cancer patients and their families and caregivers to the appropriate resources to overcome barriers to healthcare (Oncology Nurses Society, 2017). Because providers in our setting found it difficult to locate documentation by navigation nurses, we formed a task force to evaluate options for improvement. Members included research nurses, medical records staff, informatics staff, and oncology staff from inpatient, outpatient, and breast health settings. During the course of a year the team performed real-time and retrospective workflow analyses, conducted team building exercises, developed a process improvement plan, developed documentation standards and templates, conducted a pilot, implemented revisions and then rolled out the new processes and materials house wide. **Aim:** The main focus of this project was to have the oncology navigators work collaboratively with other team members to create an electronic document that was detailed, met the ONS standards, and could easily be located in the electronic medical record (EMR) by all health care providers, with the goal of ensuring continuity of care. **Methods:** Real-time work flow analyses revealed that the oncology navigators were scattered throughout the hospital working in their own silos. There was no uniformity in how the navigation assessments were conducted. In addition, there was no standard on what information was gathered nor how it was documented. Moreover, the real-time work flow analyses showed a lack of team cohesiveness that needed to be addressed before defining the documentation needs. A retrospective chart analysis of the current electronic documentation was conducted to get a better understanding of the magnitude of the problem. Having come to understand the needs for improvement, the task force created documentation guidelines. These became the foundation for the development of a uniform Oncology Navigation Report that included all the ONS standards for navigation. **Results:** 1) Oncology Navigation Nurses are now a cohesive team who are still meeting once a week. They continue to work on oncology issues and discuss cases to ensure all resources available are being utilized to provide excellent care to cancer patients. 2) Physicians are able to locate the Oncology Navigation Report, allowing for continuity in care across disciplines. 3) The Oncology Navigation Report is a comprehensive document that follows ONS standards for Oncology Navigation. **Conclusion:** Collaboratively developed, standards-based electronic documentation by oncology nurse navigators has enhanced communications through all disciplines caring for the patient who has cancer. The patients are receiving the services they need to support them through a difficult diagnosis. The development of electronic documentation resulted in an oncology navigation team's becoming a cohesive group promoting continuity of care. **References**: Oncology Nursing Society, (2017). Oncology nursing society oncology nurse navigator core competencies. Retrieved from: https://www.ons.org Kannampallil, T.G., Amraham, J., & Patel, V. L. (2016). "Methodological framework for evaluating clinical processes: A cognitive informatics perspective". Journal of Biomedical Informatics, 64, 342-351

Phone Note: Capturing Patient Care Outside the Hospital Based Clinics

Oscar Glorioso, MSN
Co-presenter: Kristin Kammrath

Abstract

Problem Statement: Informatics and Practice Administrators discovered that there was not a streamlined way to capture patient encounters /communication outside of the clinic visit. Staff uses paper documents, email, and other clinical systems (Teleresults). Non-clinical staffs were also found to handle medical issues. It became apparent that the existing processes for managing communications were not robust enough to ensure effective and efficient care of patients. **Methods** 1) Designed and implemented a phone note document on the main EHR with the functionality to save on a Pre-Visit or Discharged account. 2) Implemented new workflows that capture communications on the phone note. **Results**: 1) Increased efficiency of physicians and clinic staff issue identification and response. 2) Increased accuracy of communication. 3) Improved collaboration among physician and clinic staff. 4) Communication between patient and staff is part of the legal medical record. **Significance**: Electronic Health Record (EHR) systems are widely used tools for clinicians to manage patient care. Despite the implementation of EHRs, there are still clinical areas with disparate systems or components that are documented on paper. In these situations, clinic staff can be faced with the challenge of capturing patient communication and clearly seeing the clinical picture without negatively impacting patient safety or continuity of care. At Baylor Scott & White Health, we leveraged change management to streamline processes and placed importance in developing standard data sets (documentation template) to capture patient interaction with staff in all types of clinic setting.

Direct Messaging: Are We There Yet?

Oscar Glorioso, MSN
Co-presenter: Kristin Kammrath

Abstract

Problem Statement: BSWH implemented C-CDA as CMS requires all eligible hospitals participating in the Medicaid Electronic Health Record (EHR) Incentive Programs to use Direct Messaging technology in transmitting summary of care records when transitioning or referring patient care. **Methods**: *Planning and Analysis* 1) STEEEP Analytics Team provided subject matter expertise in MU regulations 2) CMIO and Clinical Informatics Team provided direction on what clinical data set will be part of the discrete information transmitted through Direct Messaging. *Designing and Building/Testing and Implementing*: 1) EHR Vendor provided BSWH a designated Direct address 2) IS EHR Clinical Documentation configured the C-CDA document 3) IS EHR Security Team configured internal and external addresses in EHR as well as provided access to resources involved with the Inbound and Outbound management of the Direct Messaging workflow 4) IS EHR Report Team developed the MU dashboard, reports and the integration with the provider network 5) IS EHR Education/Training Team delivered new clinician workflows *Evaluating /Maintenance/Supporting*: 1) STEEEP Analytics Team provided validation and ongoing monitoring for problems/issues and MU compliance 2) IS EHR Clinical Documentation Team provided ongoing monitoring of Direct Messaging transmissions 3) HIM-EMPI team match Inbound direct messages to an existing patient account 4) Enterprise Care Coordination team sends out Direct Messages to providers expecting Summary of Care 5) IS EHR Clinical Documentation and Security Teams maintain new/changed internal and external addresses in EHR; provide ongoing support to users with technical issues or new provider partners. **Results**: 1) C-CDA provided outpatient providers a snapshot of key information and the ability to assume care without combing through hundreds of pages of records. 2) Next providers of care were able to quickly identify patients in need of additional intervention to prevent readmissions and other issue.s 3) Providers depend less on faxed documents. 4) No direct benefit for inpatient physician because another health information exchange tool was introduced in their workflow (global viewer). 5) BSWH NTX Region successfully reported for MU1 and MU2. 6) At discharge, patient's summary of care (C-CDA) is available to view in Patient Portal. 7) Direct Messaging was used to send data to a health registry. **Significance**: CMS requires all eligible hospitals participating in the Medicaid Electronic Health Record (EHR) Incentive Programs to use Direct Messaging in transmitting summary of care records when transitioning or referring patient care. Beyond regulatory use, BSWH have leveraged this technology as a means to establish partnership with other healthcare organizations, improve patient care coordination, and benchmark care.

Predictive Analytics: Proactive Integrated Capacity Management

Tamira Harris, PhD, MBA, MSN, CPHQ

Abstract

Despite differences in how healthcare systems are funded and administered worldwide, nursing leaders often face similar challenges and can learn from one another. One challenge consistently facing nurse executives is how to improve clinical outcomes and drive efficiency while reducing labor costs. The answer: creating transparency in a data-driven culture and facilitating a cultural shift from a reactive to proactive culture. In this session, you'll hear executives from three different organizations across the United States. They will share their diverse stories of how they are using data to maximize efficiencies, optimize care delivery and obtain outcomes that help sustain or improve financial margin. These nursing executives will guide you through examples of organizational change, operationalizing efficiency through predicting demand, balancing staffing, delivering high quality care and managing avoidable days while enhancing productivity. The drive to organizational excellence requires new processes and embedding the use of technology into daily operations to create true cultural change. The data obtained along the journey - when employed correctly - can be a strong staff motivator to further the buy-in and effort. Nursing executives and staff created transparency using real-time data to track patients, identify bottlenecks and streamline care coordination, optimizing patient flow to minimize length of acute care stays. Process changes that included creating quality flow rounds with visual displays ensured that clinicians are in sync with patient needs and status. These processes among others support the early identification of patients with complex psychosocial needs or complicated discharges that are likely to miss an expected discharge date and time. Managing quality parameters, such as vaccines delivered prior to discharge, indwelling lines, and consultations, were noted daily in the quality flow rounds, ensuring care team collaboration towards related goals. When clinicians can be proactive, leveraging data across nursing units and departments, and with ease of availability, they are empowered and engaged with optimizing the patient journey. Additional outcomes include using predictive analytics to meet patient demand and effectively manage staffing, enabling the executives to achieve significant financial impact. Staffing efficiently requires forecasting along the continuum to include long-term, monthly, weekly, and daily planning. Executives and staff were able to predict patient and staffing demand, allowing them to proactively optimize staffing and create innovative staffing models, achieve unit agility, and open new units. Creating a data driven culture requires nursing leadership, a commitment to transparency and empowerment, and the ability to understand and use technology as an agent of change. Stepping back to assess the culture, nurture a plan, and engage staff makes optimization attainable. After this session, you, too, can lead the way to change in your organization.

Clinician-Led Practice Design for Value-Based Reimbursement: The Oncology Care Model

Tamira Harris, PhD, MBA, MSN, CPHQ,

Abstract

Learn how physician leaders and clinicians have changed care delivery within 12 practices encompassing over 400 sites and 800 physicians. Technological infrastructure, knowledge, and workflow processes have been redesigned to create improved patient and family experiences and to increase physician and staff satisfaction. This session explores a collaborative physician/executive network -led initiative focused on building a foundation for oncology practices to compete in the healthcare arena today. The session will cover building technological infrastructure for real-time accessand designing processes to meet regulatory guidelines while providing holistic, quality patient care. With so much emphasis on optimizing performance across the care continuum in the transition to value-based care, much work remains in the outpatient care settings. Given how new payment and care delivery models are dramatically effecting current office practices and patient populations, it is urgent to reshape our approaches to drive effective patient care and efficient office throughput. The Centers for Medicaid and Medicare (CMS) Innovation Center has developed a new care delivery and payment model, Oncology Care Model (OCM) designed to improve the effectiveness and efficiency of oncology care. The aim of the program is to provide higher quality and more highly coordinated oncology care at the same or lower cost to the Medicare program. Oncology physician practices have entered into payment arrangements that include financial incentives based on performance accountability for episodes of care surrounding chemotherapy administration to cancer patients. The session will describe methodology for network and practice level development of a team based care model for patient navigation and throughput. Based on leadership, measureable outcomes have included efforts for redesign of key workflows to improve quality of care, enhance efficiencies, and meet CMS guidelines, including full scale Patient Navigation Processes for optimized patient throughput. Additional outcomes include: standardized full scale holistic approaches to meet psychosocial needs including advanced care planning and survivorship programs, 24 hour support, real time technology and dashboards for patient tracking and needs assessments, and practice alignment with organizations and networks to support patient throughput and family needs outside of the office. US Oncology developed a continuous performance improvement program, new methodologies for billing, and standardized care using national guidelines across the network of US Oncology in multiple states and practices. The novel aspects of this presentation include that it is a physician-led initiative incorporating 1) Development of continuous performance improvement in the outpatient arena; 2) Workflow design incorporating cultural and clinical changes; 3) Standardizing care across both large and small scale practices with varying demographics for provision of clinical excellence to all; 4) Real time technological advances for proactive decision making. Adopting strategies described in this session, can help you guide successful change.

Secure Messaging Application: A Heuristic Evaluation

Amy Hill, BSN, RN-BC, CPN
Co-presenter: Arpad Kelemen

Abstract

Increased availability and prolific use of smartphones and other mobile devices have the potential to render communications in health care settings much more efficient. Many mobile devices, however, may pose a security risk to health care information. Providers require a secure communication solution that maintains HIPAA protections and otherwise safeguards confidential information. Vendors offer mobile application software to allow for HIPAA-compliant, secure messaging within a hospital setting, but usability issues may interfere with the cliniccal workflow. Our aim was to evaluate the usability of one secure messaging mobile application, Akario Backline, for both clinical and non-clinical communications in an inpatient health care setting. Goals for this project were to assess the basic functionality of the mobile application and identify any usability failures using Jakob Nielson's 10 usability heuristics. Three clinical analysts of the implementation team were assigned to perform a heuristic evaluation on three different smart phones: IPhone 6, IPhone 6 plus, and Samsung Galaxy S5. A thirty-question heuristic evaluation was developed and given to the three analysts. Each analyst used all three smart phones and identified whether each device met the heuristic qualifications by responding to each criterion with Yes, No, or N/A, with the ability to add additional comments. If the response was No, the analyst indicated the severity of the failure on a 5-point scale. A response of 0 indicated “I don't agree this is a usability problem.” A response of 1 indicated a cosmetic problem only. A response of 2 indicated a minor usability problem; a response of 3, a major usability problem; and a response of 4, a usability catastrophe. Each device was evaluated independently by all three analysts, and the results were reported to the implementation team for analysis. Results were summarized in a combination of table and graph formats. Results showed that twenty-one characteristics evaluated on the 30-item questionnaire met heuristic qualifications, based on two out of three evaluators answering Yes; six characteristics did not meet qualifications (two or more analysts responded No); and three were marked as N/A. Out of the six items marked No, five were rated a minor usability problem (rating = 2) and one was rated as not being a problem (rating = 0). Overall, then, the secure messaging mobile application was found to be easy to use with very minor usability issues. The implementation team could take the results and work with the vendor to continue to improve the mobile application while moving forward with large scale implementation in the hospital.

Clinical Care Classification (CCC) Usability in EHR using the Healthcare Data Dictionary (HDD)

Rachael Howe, MS, BSN, RN
Co-presenter: Tiffany Harman

Abstract

Introduction/Aims: The Clinical Care Classification (CCC) is a standardized nursing terminology recognized by the American Nurses Association (ANA) for representing nursing practice concepts in Electronic Health Records (EHRs). There are two interrelated terminologies within the CCC - Nursing Diagnoses & Outcomes, and Nursing Interventions & Actions.All of these are mapped to SNOMED CT and Logical Observations Names and Codes (LOINC). SNOMED CT is a collection of healthcare concepts used in clinical documentation and reporting. LOINC is a collection of laboratory and clinical observations used to facilitate information exchange. The Healthcare Data Dictionary (HDD) can be used to utilize the CCC terminology and mappings to standard terminologies and facilitate interoperable exchange of health information between EHRs programmatically. The HDD is a terminology server containing standard terminologies required to document clinical care, including SNOMED CT, LOINC and CCC. **Methods/Process/Procedures**: The CCC is integrated in SNOMED CT and LOINC, with terms and codes from those terminologies anmapped to the correlating CCC concepts. These mappings were evaluated for accuracy by subject matter experts. Then the structure of the terminology itself was analyzed. A design was created to implement the CCC structure and mappings into the HDD. The design was then implemented and tested using real CCC data and use cases. **Results**: To implement the CCC into the HDD so that it could be used programmatically, the terminology had to be split into four sub-terminologies. The CCC terminology has its own OID, and the following four terminologies were created: Clinical Care Classification (CCC) of Diagnoses, CCC of Nursing Interventions/Actions, Clinical Care Classification (CCC) of Actual Outcomes, and Clinical Care Classification (CCC) of Expected Outcomes, each with their own OIDs. Within CCC, outcome codes are used either as expected outcomes (goals) or actual outcomes (evaluation) and they are represented by the same code. For example, 'Stabilize Activity Intolerance' (A.01.1.2 - Expected outcome) and 'Activity Intolerance Stabilized' (A.01.1.2 - Actual outcome) have the same code but mean two different things. This makes it difficult to represent the context of a specific code within a database and requires splitting the two into different sub terminologies for the database to programmatically provide the correct context for the concept. In addition to this, specific CCC mapsets were created between the CCC concept and SNOMED CT and LOINC. This way end users can easily determine the correct SNOMED CT or LOINC term for the CCC concept. **Discussion/Outcomes**: Standardized clinical terminologies require a plan for managing their relationships to other terminolgies. Mapping to standard terminologies within one robust terminology server is a key aspect in achieving interoperability. Continued use and support of standardized nursing terminologies maintains nursing knowledge and supports the documentation of nursing care. Future work is needed to provide custom APIs for specific end user use cases. These are the next steps in supporting the CCC as a nursing terminology and providing a simple solution for implementation.

Is it really Necessary? Using Clinical Decision Support to Decrease Urinary Catheter Device Days and Reduce CAUTI's

Jassette Johnson-Dawes, RN
Co-presenter: Rafiat Adedayo

Abstract

Although EMRs have been used for several decades in acute care hospital settings, only recently have clinical decision support (CDS) tools matured enough to contribute significantly to patient safety and quality outcomes. A 2014 study concluded that catheter-associated urinary tract infection (CAUTI) was the most common device-associated infection in the United States, with 69% considered avoidable. This frequency occurred despite a 2008 Centers for Medicare & Medicaid Services initiative to reduce the incidence of CAUTI by 25%. Grounded on evidence-based best practice, Northwell Health, an integrated healthcare delivery system in New York, developed and implemented a CAUTI electronic documentation 'bundle' in July 2016. This was designed to alert clinicians to assess the necessity of urinary catheter use and to provide reminders for proper catheter care. CAUTI rates and catheter device days were collected prior to implementation of the EMR documentation 'bundle' and compared to the rates and days post implementation. Results thus far, 6 months after implementation, indicate a significant reduction in urinary catheter device days across multiple hospitals. These findings have accelerated an enterprise program to re-educate staff on evidence-based care for patients with urinary catheters.

Evaluation of continuous multi-parameter surveillance monitoring, a wearable medical device, on code blue/treat team events for medical-surgical floor patients.

Tonya Judson, RN
Co-presenter: Ada Holyfield

Abstract

Background: Continuous multi-parameter surveillance monitoring (CMSM) monitors a patient's heart rate, blood pressure, oxygen saturation, respiration and skin temperature. The use of CMSM fosters early recognition of deteriorating vital signs with data trends, prompting clinical intervention to promote patient safety and improve patient outcomes. The CMSM real-time data transmits wirelessly to the electronic health record (EHR) and to a remote viewer display (RVD) at the nurses' station. Vital signs that fall outside safe parameters alert the nursing staff at the RVD and the mobile handheld device, prompting intervention. The CMSM communicates through Wi-Fi, allowing monitoring of a patient while in the room, on the unit, or during transport throughout the hospital. Additionally, the CMSM unit is a wearable medical device, facilitating patient mobility. For this study, a 350+ bed, southeastern metropolitan hospital uses a CMSM device in 25 out of 50 beds on a medical-surgical floor. **Objectives**: The aim of this study is to examine code blue/treat team events for non-CMSM and CMSM medical-surgical patients to determine if CMSM improved patient outcomes. **Methods**: A 259-day retrospective study was conducted by reviewing the hospital's code blue/treat team logs and comparing the data to the patient CMSM device usage on the floor. The EHR was examined to determine CMSM usage. Vital signs that were manually entered into the EHR were labeled "clinician" sourced (non-CMSM patients), while vital signs transmitted wirelessly were labeled "device" sourced (CMSM patients). Outcomes were noted for both non-CMSM and CMSM patients that experienced a code blue or treat team event. The data results were further compared and analyzed. **Results**: Non-CMSM patients had 28 events: 61% were transferred to a higher level of care, 32% remained on the unit post an event, and 7% (2 patients) expired. CMSM patients had 24 events: 42% were transferred to a higher level of care, 50% remained on the unit post an event, and 8% (2 patients) expired. EHR review revealed that the CMSM device was used incorrectly for both expired CMSM patients. Additionally, the study revealed incorrect CMSM device usage in 17% of the CMSM patients that had an event. **Conclusions**: It appears that CMSM of medical-surgical patients had an overall decrease of code blue/treat team events, a decrease in patients being transferred to a higher level of care after an event, and an increase in patients remaining on the unit after an event. Review of the staff's roles and responsibilities, as well as staff re-education of correct CMSM device usage, could continue to improve the positive outcomes and prevent patient harm.

Patient Risk Stratification via NEWS: Speaking the Same Language

Marie Kozel, MBA, BSN

Abstract

Early detection, timeliness, and appropriate clinical interventions are all related to improved outcomes in patients who present with acute illness or who are already in acute care and experience deterioration in condition. In an effort to identify and proactively intervene for patients most at risk for deterioration during the acute care encounter, evidence exists to support the use of 'early warning scores' (EWS). A variety of EWS tools exists, each routinely scoring patient risk using physiologic parameters typically collected and monitored by nursing staff during acute care visits. Each tool additionally defines a score that represents the urgency and type of clinical response required. Our facility had no risk tool in place. While planning to implement such a risk stratification tool, the research efforts of a clinical team discovered the National Early Warning Score (NEWS) tool. This tool was developed for use in the United Kingdom by a task force recommendation from the Royal College of Physicians. The tool, published in 2012 and updated in 2015, allows standardized and routine clinical assessment of all adult patients over age 16 using a minimum set of physiologic parameters. This tool advocates standardization in risk scoring across all patient types (excluding pediatrics and obstetrics) using six physiologic parameters, as well as standardization of interventions based upon risk level. Implementation of the NEWS tool in an automated fashion directly in the Electronic Medical Record (EMR) includes presentation of alerts when the patient risk score reaches certain levels, visibility of the parameters that contributing to the score, and the ability to record the interventions put into place or to automate a Rapid Response Team call. The implementation has allowed an evidenced based, standardized early warning risk stratification scoring tool for our organization that has resulted in: 1) Implementation of a tool not previously in place; 2) Improved surveillance of unplanned transfers to the ICU; 3) Improved surveillance of Code Blue calls outside of the ICU; 4) Improved surveillance in the use of Rapid Response Teams for early intervention. Additionally staff can view the patient risk score in a variety of areas in the EMR to observe trends and share the information during staff/shift handoff to further impact patient safety via patient-generated data that contributes to clinical decision making

Exploration of Portal Activation by Patients in a Healthcare System.

Kimberly Krakowski, MSN, RN, CENP, CAHIM
Co-presenters: Season Majors and Patricia Mook

Abstract

A study of patient portal use was conducted at a not-for-profit healthcare system in Northern Virginia. The healthcare system serves more than 2 million people each year. Between July 2014 and June 2015, 461,700 different patients used the portal at least once. Univariate analysis and multivariable logistic regression indicated associations between patient portal activation and predictive factors. Multiple findings emerged: patient portal activation was greater for English speaking patients; differences in portal activation were observed by patient age, and patients who had an identified primary care provider had greater portal activation. The implications were that patients who have limited English skills and have economic challenges may be less engaged. This review demonstrates the importance of understanding the population using a patient portal and provides insight to the future development of how to engage patients to interact with their providers through the portals.

Does DNP Students' Experience with Information Technology Predict Mastery of Informatics Competencies?

Barbara Kupferschmid, PhD, MSN, RN
Co-presenters: Connie Creech and Marsha Lesley

Abstract

Problem Statement: Use of information technology to assist and guide nursing practice has increased in recent years, especially since the adoption of the Health Information Technology for Economic and Clinical Health (HITECH) Act. Students enter the Doctor of Nursing Practice (DNP) program with varying levels of informatics experience and different entrance education requirements including post-Baccalaureate and post-Masters degrees. Thus students can enter programs with differing needs related to their experience and educational backgrounds. Understanding students' previous experience would assist the faculty to tailor informatics course content to meet varying student needs. The aim of this study was to evaluate DNP students' prior experience with information technology and to assess whether that experience predicted their ability to master informatics competencies. **Methods**: A retrospective descriptive design was used with a convenience sample of students enrolled in an online informatics course. Data collected included students' self-assessment of experience with information technology, demographic characteristics, and faculty determination of students' mastery of competencies designed to test Informatics knowledge and skills. Students rated their experience with Meaningful Use, utilization of datasets and databases, clinical support systems, and e-Health. Values based on competency scores were assigned as follows: 1 (mastered), 2 (competent), or 3 (did not master). Students' self-assessments of informatics experience in relation to competency mastery were compared using Pearson Chi-Square. Logistic regression was performed to assess the impact of experience and highest degree obtained on competency mastery. P-values less than 0.05 were considered statistically significant. The Institutional Review Board designated the study as exempt. **Results**: Students held BSN degrees (n=44) or MSN degrees (n=11). 91% were female and 9% were male. Students were in the Family Nurse Practitioner (34.5%), Adult Geriatric Acute Care (20%), Psychiatric (14.5%), and Adult Geriatric Primary Care (18.2%) tracks. Analysis revealed that a greater percentage of students with experience in Meaningful Use (MU) (75.9%) mastered the competency focused on an analysis of MU compared to students without experience (38.5%) (p=.004). The strongest predictor for mastering the MU competency was experience (p = .001), after controlling for highest degree obtained. Experience with datasets did not predict mastery of a competency focused on working with spreadsheets (55.6% vs. 67.9%) (p=.059) or databases (81.5% vs. 82.1%) (p=.16). A greater percentage of students with experience in e-health (75.7%) mastered the competency focused on application of e-health resources to the learning needs of a vulnerable patient compared to students without experience (33.3 %) (p=.02). While more students with experience in clinical support systems (83.3%) mastered a competency focused on an application and analysis of clinical support systems in comparison to those without experience (67.7%), the test was not statistically significant. **Significance**: In some areas where students had prior experience with information technology, students were more likely to master competencies focused on those areas. Informatics course content may need to be designed so that students can choose content that reflects their needs based on their experience level. Faculty should consider tailoring the course modules for novice and experienced learners to improve mastery of informatics competencies.

Medications, Barcodes, and Apps - Oh My!! Implementing BCMA in a Pediatric Facility with a Hand-held Communication Device

Stephanie Lenz-Norman, MSN, RN

Abstract

Nursing is a field of nurture and healing. Nevertheless, even with the best education, skill, and intention, nurses still make errors that harm patients. Errors involving medications can result in extended hospital stays, cause permanent injury, and attribute to death. In fact, over 7,000 of the reported preventable adverse drug events in 2012 resulted in patient death . Nurses are at the sharp end of the medication delivery process, and are often the last barrier to prevent medication errors. However, one estimate suggests that nurses are the cause of over 64% of medication errors . Various technologies have been offered to decrease these medication errors, but the application of these technologies has produced mixed results. Much research has been done to evaluate the effectiveness of Bar-Code Medication Administration (BCMA) on decreasing medication administration errors. Research has investigated nursing work-arounds related to BCMA, but fewer studies have assessed BCMA's impact on nursing workflow. This presentation will provide an overview of implementing BCMA with the use of a hand-held communication device via a mobile application in a pediatric teaching hospital. The project team did much to prevent known work-arounds, including implementing a unique bar-code for the patient armband and evaluating bar-code scanner devices for visibility of BCMA alert screens. Ultimately, the use of the RN's mobile communication device, which has an embedded bar-code reader, was selected for scanning medications for BCMA. The mobile and app technology related to BCMA is not well studied and has unique benefits and risks associated with its implementation. This presentation will be aimed at giving an overview of this complex project and discuss benefits and lessons learned from the project implementation.

The Characteristics of Pressure Injury Photographs from the Electronic Health Record in Clinical Settings

Dan Li, Ph.D, RN
Co-presenter: Carol Mathews

Abstract

Aims: To analyze and understand the characteristics of images of pressure injury (PI) (formerly called pressure ulcer) stored in electronic health records (EHR). **Background**: To improve the quality of PI documentation, photographing PIs and storing the images in the EHR is accepted practice in many hospitals. Clinical decisions regarding the progress and treatment of PI often rely on the information presented in PI images. As new technologies develop, image processing and computer visualizion can make possible the automated measurement of PI size and wound tissue segmentation. However, most research in this area deals with strictly controlled conditions for PI images that are confined to the wound region only. Translating these technologies to PI images taken in clinical environments faces the challenges of controlling the complex photographic conditions and of the lack of standardization of wound photography. In this study, PI images stored in an EHR were reviewed to analyze the characteristics of PI photography in clinical settings. Through better understanding of those characteristics, we expect to help image processing experts shorten the gap between laboratory and clinical environments when translating these new image processing technologies. Moreover, we studied possible approaches to designing a standardized wound photography protocol for clinical environments. **Design**: An observational descriptive study. **Methods**: Copies of a set of 289 PI images were obtained from a western Pennsylvania hospital. The original images were stored in the wound care documentation component of the EHR. The original PI images were taken by the wound care nurses in clinical settings during daily wound care service. In this study, those images were reviewed one by one by researchers to analyze their characteristics, including the relative position of the PI in the images, the shooting angle of the digital camera, inclusion or exclusion of clinical background materials and their colors,and any materials contaminating the wound surface**. Results**: Of all the PI images, only 6% were confined to the wound region only. Clinical background including clothes, bed sheets and gown existed in 94% of the PI images. In 91% of the images, the PI was presented in the central part of image. In 24%, white powder or lotion covered part of the PI surface. The digital camera lens was not oriented parallel to the plane of the PI in 46% of the images. There were no PI images in the sample that met the strictly controlled image conditions required for commercially available image processing tools for PI segmentations. **Conclusions**: The findings of this study indicate that a digital photograph of PI may increase the accuracy of the assessment and documentation. To extract the wealthy information from PI images through novel image processing technologies, developers must consider the characteristics of PI images in clinical settings. Furthermore, clinicians require a standardized PI photography protocol to assure the accuracy and objectivity of PI recording. The standardization of PI photography may increase utilization of new technologies like computer visualization and telemedicine.

Best Practice: Care Alerts in Maryland's Health Information Exchange, Chesapeake Regional Information System for our Patients (CRISP)

Heather McAuliffe, BSN, RN-BC
Co-presenter: Rosella Ganoudis

Abstract

Background and Aim: The Health Services Cost Review Commission (2016) has recommended working with CRISP to "exchange information regarding care coordination resources aimed at reducing duplication of resources, ensuring more person-centered approaches, and bringing additional information to the point of care." To address this initiative we worked with CRISP to implement care alerts. CRISP (2016) describes care alerts as two to three sentences that are "high priority care coordination information meant for the most complex patients who frequent hospitals and practices. Action-oriented, 'need to know' information that informs decision making and could assist in the prevention of unnecessary admissions and duplicated procedures." CRISP offered flexibility in how care coordinators and providers would receive the care alert information that would display on their site. This allowed us to define the best way for us to send them the information. This presentation outlines that approach. **Method**: Our requirements were for an easy to use, readily accessible documentation method. We desired a straightforward approach, utilizing processes already in place to promote a smooth implementation and increase the likelihood of success. Using existing documentation contained within the Continuity of Care Document, discharge routine, or other care management documents was considered, but ultimately rejected due to additional interface costs and the cumbersome process of isolating the pertinent information. After collaborating with CRISP, a physician champion, and our care management team we created two separate document templates for care manager and physician content. A change was needed to make the care managers' workflow similar to the providers' so that all care alert documents would file in the same location. This meant we could leverage our existing interface that sends transcription reports to CRISP. They could then use the report type value we provide in the message to identify the care alert messages and pull the text to display as care alerts in CRISP. After 3 weeks of defining requirements, developing templates, testing, and demonstrating success CRISP has used our experiences to formulate a best practice approach to care alerts for hospitals using the same EMR. **Lessons Learned**: 1) Leverage existing processes; 2) Create a process that is not burdensome to end users; 3) Focus on requirements. Keeping the purpose of care alerts in mind became increasingly important. We found the content could easily grow as we expanded to a wider group of users. **Implications**: Care alerts have the potential to be a valuable tool in addressing readmissions for high utilization patients and could have a positive impact on our patients. Future opportunities include expanding usage to primary physicians and hospitalists, and increasing the patient population beyond high utilizers. CRISP also has the ability to house more comprehensive documentation such as care plans, for which we can utilize this same process.

Optimization of a Sepsis Screening System

Patricia McCabe, DNP, RN, CCRN
Co-presenter: Janet Thorne

Abstract

Evidenced-based clinical guidelines and new technology can promote meaningful use and improve the quality, safety, and efficiency of patient care. To this end, our team developed an electronic sepsis screening tool and process based on the Surviving Sepsis Campaign's (SSC) International Guidelines for the Management of Patients with Severe Sepsis and Septic Shock. To measure the usability of the sepsis tool and process, compliance with SSC guidelines, and the impact on hospital sepsis rates and mortality, we employed a quantitative correlative study using a survey methodology. The Systems Usability Scale (SUS) survey yielded a usability score for the tool and process of 61.54. Suboptimal usability of the tool and process can be expected to have negative effects on efficiency and patient outcomes. Aggregate quantitative data were collected and analyzed. The aggregated data included 1) response rate of the Rapid Response Team (RRT) to alerts; 2) number of Medical Doctor (MD) Order Sets initiated; 3) number of lactates drawn; and 4) hospital sepsis mortality rates. The aggregated data suggest that patients with an RRT response to their alert have increased number of lactates drawn and MD Sepsis Order Sets initiated. Three months of analyzed data showed a decrease in hospital sepsis mortality rates from 16.27 to 15.6%. A Pearson product-moment correlation coefficient was computed to assess the relationships among hospital sepsis mortality rates, the number of sepsis alerts responded to by the RRT, the number of lactates drawn, and the number of MD protocols implemented. There was a perfect correlation between the number of sepsis alerts responded to by the RRT and lactates drawn [r=1.000]. The number of sepsis alerts responded to by the RRT had a positive correlation [r=.791] with MD protocols ordered and a negative correlation [r= -.950] with the hospital sepsis mortality rate. Using a dedicated team to respond to sepsis alerts immediately and using the Registered Nurse (RN) and MD order sets may decrease sepsis mortality rates. However, more data are needed to assess patient outcomes related to the use of the SSC guidelines.

The Pros and Cons of Collecting Patient-Generated Health Data

Danielle Miller, PhD(c), RNC-OB,C-EFM
Co-presenter: Brianna Zink

Abstract

Providers base their care decisions on information received from the patient, such as vital signs, symptoms, medical allergies, laboratory results, and a variety of other types of data. Traditionally, the information is generated in a clinical setting: during a visit, in a lab, in a diagnostic screening office, etc. Much of these data constitute a one-time snapshot, often gathered infrequently. New technologies, howeve,r can enable patients to generate important data outside of these settings and with greater frequency. The greater depth, breadth, or continuity of data that patients share with their providers may lead to better care and outcomes. Patient-generated health data (PGHD) is health-related data such as health history, symptoms, biometric data, treatment history, lifestyle choices, and other information that are created, recorded, gathered, or inferred by or from patients or their designees to help address a health concern. The incorporation of PGHD can complement current and existing clinical data, potentially fill in the gaps of the clinical information and provide a holistic and comprehensive indication of the patient's health. The use of PGHD offers an opportunity to capture needed information for use during care, with potential cost savings and improvements in quality, care coordination, and patient safety. Some providers may be concerned that incorporating PGHD into clinical processes will increase the burden of reviewing data, subject the providers to unrealistic patient expections, and increase professional liability. Specifically, there are concerns that providers will be held accountable for information they did not receive or reviewe in a timely manner, especially if the information requires an urgent response. Additionally, some providers have expressed concern about the financial impact of PGHD including the use of staff and physician time for reviewing, processing and analyzing the data and potentially integrating it into the EHR. On the other hand, patients may be concerned about their providers failing to use PGHD to meet their health care expectations. Concerns may include whether the information sent was securely received and saved in the patient's chart; whether the information was shared with his or her provider or family members as appropriate; and whether the patient generated data were valued and well-received by their doctor. In a study done by Project Health Design, health care professionals identified three main benefits of PGHD accessibility in clinical settings: 1) deeper insight into a patient's condition; 2) more accurate patient information, particularly when of clinical relevance; and 3) insight into a patient's health between clinic visits, enabling revision of care plans for improved health goal achievement, while avoiding unnecessary clinic visits. Including patient generated clinical data has the ability to impact the care received by the patient. It can be used to improve outcomes and enhance the path of communication between the patient and the provider. Incorporating this potential is not without risk, however; organizations should assess and consider how existing processes, workflows and systems can be impacted by PGHD and how to incorporate these vital data to reap the substantial benefits.

Patient Progression: A Multi-Discinplinary Approach to Moving Patients Safely, Quickly, and Efficiently

Nancia Odom, RN, MSN, BC

Abstract

Background: Duke Regional Hospital (DRH), a part of the Duke University Health System, is an acute care community hospital with 369 licensed beds located in Durham, NC. In 2016 DRH's board of trustees set a strategic priority for fiscal year 2017: to lead in the delivery of highest-quality, patient centered care. **Objectives**: The specific goal for this strategic priority was to improve the emergency department (ED) length of stay for admitted patients. This is to be accomplished by improving patient progression. High ED lengths of stay and ED crowding can negatively impact patient care, patient satisfaction, and patients' leaving without being seen by a medical provider. DRH's goal with improving patient progression was to provide safe, efficient and timely movement of patients from admission to discharge. Our additional goal was to decrease patient wait times at transition points. **Methods**: DRH used a multi-disciplinary approach to improve patient progression. Hospital staff in multiple departments across various disciplines impact the moving of patients during an admission, including Care Management, Environmental Services, and physicians. Our team also included the hospital president and vice-president of operations. We spent several months completing a deep dive into process flow and understanding the barriers to patient throughput at our facility, to achieve a true understanding of all issues. Once issues were identified, our team further divided into four workgroups, each with a specific list of action items to complete. Through our deep dive into the barriers, the action items were noted to be, if completed, the most impactful to improving the hospital's patient progression. The four work groups were: Clinical Staffing; Discharge Process; General Medicine; and Data. **Results**:Some of our results include 1) the creation of a General Medicine unit incorporating our teaching service patients, clinical nurses, and providers; 2) the completion of an Admission and Discharge nurse pilot; and most notably, 3) a 50% reduction in the number of patients waiting greater than 240 minutes (4 hours) for an inpatient bed. Other results include a hospital-wide, unit-level based dashboard that notes metrics and performance over time, redesigned patient throughput processes, and improved communication among multiple disciplines. In addition, the ED length of stay for admitted patients has decreased by 10% since the beginning of the fiscal year. Throughout the length of the project, a core team meets bi-weekly to review metrics and discuss any safety issues with throughput. Issues are also escalated in real time to management for immediate resolution to best meet the needs of the patient. **Significance**: A strategic, multi-disciplinary approach with ongoing leadership oversight and data review is critical to improving patient progression to move patients safely, efficiently and quickly through a healthcare facility.

Software Quality Assurance and Control for the Age of the Internet of Things in Healthcare: Standards and Guidelines

Ketan Patil, MS
Co-presenters: Ankita Kakalasaria, Battulle Prashansa Rao, and Gunes Koru

Abstract

Problem Statement: As the implementation and utilization of internet of things (IoT) in healthcare increases, the quality of software plays a critical role in system reliability, usefulness, and safety. Software quality also directly impacts the return-on-investment expected from these systems. However, the number of manufacturers and standards involved in the development of healthcare IoT makes software quality assurance (QA) and quality control (QC) a significant challenge. This study focused on the problems of (1) assessing the existing and established software quality standards and guidelines applicable to healthcare IoT systems; (2) applying the relevant processes and standards to assess the quality of an IoT healthcare system. **Methods**: This study conducted a literature review to identify the established standards and practices to ensure software quality. The study then focused on customizing, extending, and adopting the identified standards and best practices based on the interconnectivity of the system. The processes and best practices were applied on a healthcare IoT system. A prioritized quality improvement plan was developed and applied based on the operational profile, business importance, and static code measures. This experience resulted in a set of recommendations for quality assessment and improvement. **Results**: The literature review found out the current QA and QC standards such as Capability Maturity Model Integration (CMMI), Institute of Electrical and Electronics Engineers (IEEE) standards (e.g., IEEE 730), and International Standards Organization and the International Electrotechnical Commission (ISO/IEC) standards (e.g., ISO/IEC 12207 and 9001). However, there were not sufficient standards and guidance available to test the IoT system as it included interfaces to external systems. The process standards used during system implementation were not followed and documented efficiently. Prioritized testing found various broken functionalities and implementation flaws in the interconnected IoT system which resulted in multiple failures. Testing resulted in developing a regression test suite that should be utilized during further system enhancements and as the interfaces connected to external system are modified or updated. Additionally, the execution of SCA tools identified large portions of dead code (nonexecutable) and unreachable code. SCA tools identified around 1,800 bugs and warnings related to system quality. The QA and QC recommendation list is prepared from the reports of static code analysis and analyzed standards. **Significance**: This study provides a systematic approach and its application to assess and improve the quality of healthcare IoT systems. In the examined system, the use of standards and guidelines in the implementation and adoption was inadequate. Significantly, our testing process identified a large number of bugs and implementation flaws. The recommendations made from this guided study will help project managers to asses and monitor progress while implementing quality healthcare systems. Nursing educators can also consider using the identified standards and guidelines to inform the future generations of nurses about software quality improvement approaches applicable to the healthcare IoT systems.

Care Team Communication: Enhancing the delivery and collaboration of patient care with a mobile technology

Cindy Phipps, BSN, RN
Co-presenter: Millicent Johnson

Abstract

Objective: The Care Team Communication (CTC) project is designed to improve patient-nurse communication, reduce response times to patient call lights, and improve communication between care team members. Communication modalities included the nurse call system (NCS), the ADT system, and smartphone technology. The mobile application on the smartphone is used as the point of integration and provides a HIPAA-compliant platform for secure texting, direct calling, and broadcast messaging. It also provides a hospital directory to facilitate communication with other application users and ancillary departments. These features are designed to enhance the efficiency and effectiveness of patient care. **Method/Implementation**: Using a phased approach, implementations began in October 2016 and were completed in January 2017 in a 700-bed magnet-designated academic medical center adult hospital. Using a hybrid of the super user (SU) model (i.e. not out of staffing), end-user training consisted of instructor-led SU classes and web-based learning modules. Completion of the modules was required for all clinical staff and the one-hour instructor-led sessions, required for all SUs, was optional for all other staff. Initial login sessions on the shared mobile devices were conducted with each staff member prior to implementation to ensure they had appropriate access in the system. A brief hands-on demonstration of the application's functionality to reinforce education and answer users' questions was included. Patients were provided with verbal and written information about the use of the smartphone and its purposes in supporting communication. During the first phase of the implementation, SSS representatives along with unit SUs provided at-the-elbow support and identified workflow and technical issues. Phase two of the implementation includes provider adoption of the technology for CTC. Providers will download a version of the application onto their personal devices. **Results**: A total of thirty adult units were implemented. Nurses have reported greater satisfaction with this new communication tool. It has also improved responsiveness to patient needs and patient satisfaction. However, some staff members changed phone settings, with negative effects on application functionality, call quality, and connectivity. In addition, the CTC application was unable to interface with some other communication systems, requiring some nursing groups to carry multiple devices. Other unanticipated issues with CTC application functionality resulted from inadequate training for the new NCS. **Conclusion**: CTC has overall been a great success. Patient safety and satisfaction data are pending but will be reported during the presentation. We have learned some valuable lessons through this implementation. For example, the impact of the new NCS may have been underestimated. The implementations of both the new NCS and the CTC mobile application may have been too close in time, creating a burden on staff to adequately learn both systems. Consequently, these issues highlighted where additional educational efforts should be focused for future planned implementations of these two complementary systems.

Nurse Leader Clinical Dashboard of Nursing Care Omissions

Ronald Piscotty, PhD, RN-BC

Abstract

Purpose: To examine the impact of a clinical dashboard that will be populated with unit level bundled nursing care omissions (i.e., omitted nursing interventions and nursing care activities) that are related to adverse events such as Hospital Acquired Infections (HAIs). The unit data will be synthesized (bundled) and presented using Tableau data visualization software. **Study design**: A quasi experimental pre/post test time series design will be used to evaluate the effectiveness of the LCD. **Intervention**: Development and implementation of a prototype LCD of nursing care omissions using missed nursing documentation in the electronic health record (EHR) as a proxy of nursing care omissions (missed nursing care). **Setting & sample**: The project will take place at a large urban academic medical center in Baltimore, MD. The medical center is composed of 33 inpatient nursing units managed by 5 nursing directors. The sample will consist of registered nurses from five high-volume medical and/or surgical units or intermediate care units. **Data sources**: Data will be obtained from the EPIC EHR, other clinical data systems, and administrative systems. The identification of all data sources will occur in the data acquisition phase of the dashboard development. **Procedures**: Procedures will occur in three phases. The first is the validity testing of the data retrieved from the EHR. The second phase is the development and testing of the prototype dashboard. The third phase is the implementation and measurement of the effectiveness of the LCD. **Results**: Results will be analyzed and presented for the first 2 phases of the study. Preliminary results from phase 3 may be available prior to the presentation. **Conclusions**: Discovering innovative interventions to decrease nursing care omissions related to adverse events is necessary to improve patient safety and quality of care. Additionally, accurately measuring nursing care omissions in real time is necessary to determine the effectiveness of interventions to decrease the rate of these adverse events.

Achieving Information Security in the IoT-Based Nursing Information Systems: An Essential Challenge for the Future of Nursing Informatics

Battulle Prashansa Rao, MS
Co-presenters: Ketan Patil and Gunes Akif

Abstract

Problem Statement: Preserving the security of information stored and exchanged over the network is becoming a major challenge for the health information systems based on the Internet of Things (IoT). Therefore, achieving information security for these systems will be an essential topic for the future of nursing informatics. In this study, we tackled a problem of leveraging and improving the existing IT security standards and practices used in IoT-based healthcare information systems that will exchange data extensively over the network. **Methods**: To establish a framework and methodological focus, we carried out an extensive literature review of current information security standards. This framework was used to customize and adapt the security standards and guidelines of IoT information systems to be implemented in nursing informatics. To examine and validate the relevance of this framework, the identified standards and practices (e.g., static code analysis) were applied to a real life IoT-based healthcare information system. The identified security problems were used to prepare a prioritized test plan. This prioritization plan was then used to test the system using security testing techniques such as Uniform Resource Locator (URL) manipulation, Structured Query Language (SQL) Injection, Cross-site scripting (XSS), etc. **Results**: Based on our literature review, four major information security standards were identified and used to formulate a security framework. The analysis of the interconnected healthcare system based on this security framework revealed that the system implementation and adoption failed to follow security standards and best practices. Some of the implemented security standards lacked documentation of procedures and policies to be followed in case of emergencies. The overall set of security policies and standards followed were insufficient in protecting the system from attackers and malicious users. It was also found that the code base consists of various possible security vulnerabilities which can be exploited easily. Almost 1,000 security warnings were found using SCA tools which includes warnings of possible malicious code and SQL injection. Around 17% of the code depended on external system, which helps to interact and retrieve data from external repositories. This makes the existing IoT based healthcare information system vulnerable to more attacks. The prioritized security testing revealed that very little effort was applied by the source code vendor to ensure that the system was built securely, thus resulting in leaking of private and confidential data to attackers. During URL manipulation testing, around 1,600 URLs were found to be leaking highly sensitive data and allowed invalid access to the system; these can be considered major information security problems. **Significance**: Security of vital medical information is of utmost importance. Leveraging the existing information security standards and practices of IoT based nursing information systems provides useful and interesting insights to the executives and government officials responsible for implementing and managing these interconnected healthcare systems. This study demonstrates that improvement in established IT security guidelines can help decision makers and experienced professionals in effectively monitoring, identifying, and responding to challenges associated with security breaches in interconnected healthcare systems.

Method for Measuring Nursing Workload and Resources

Virginia Saba, EdD, RN, FACMI, FAAN

Abstract

A method for measuring nursing workload and resource requirements is now possible when documenting a Nursing Plan of Care (NPOC) by using the Clinical Care Classification (CCC) System with its Information Model in a patient's Electronic Health Record (EHR). The CCC System consists of two standardized, coded, nursing terminologies: 176 Nursing Diagnoses with 528 Nursing Outcomes and 804 Nursing Interventions Actions; and its Information Model represents the six steps/standards of the Nursing Process: (Care Component (Assessment), Expected Outcome/ Goal (Outcome Identification), Intervention (Planning), Action Type (Implementation), and Actual Outcome (Evaluation). Together they provide the framework for documenting electronically an individualized NPOC for an episode of illness in a hospital. The NPOC is initiated with the physician admission orders, the admission holistic assessment, and their interpretation by the nurse who develops the NPOC for the specific patient's individualized orders which consist of the nursing diagnoses/problems, the goals to resolve them, the nursing interventions to treat them to achieve their outcomes. However each of the nursing interventions in NPOC is selected based on the interventions selected to address the patient's diagnosis and are combined one of four Action Type Qualifiers: 1) Assess or Monitor, 2) Perform, Provide Care, 3) Teach or Instruct, or 4) Manage or Refer, including its frequency per day. These measures are then used to calculate the proposed NPOC workload using Relative Value Units (RVUs) (actual or estimated) for the specific nursing intervention and then combined with the other interventions required for treating the specific diagnosis to achieve the proposed outcome for that diagnosis. This process is used for all the nursing diagnoses/problems being addressed for the patient and when combined provide the actual workload in time required for that specific patient's care. (NOTE: Relative Value Units have been determined through research). Take for example a patient who has been admitted as an inpatient from the Emergency Room after a Cyst found on the patient's back was incised and removed. The NPOC was developed from both the orders from the physician and assessment by the admitting nurse as follows: 1) Wound Care three times a day, 2) Dressing Change three times a day, 3) Penicillin one time per day for treating the infection, and 4) Pain status checked three times per day. The NPOC may be routine but what is different is the how the RVUs are administered to calculate the workload for the patient services per day. Using the RVU method it was determined that the patient would require 6 ½ hours of nursing care per day. The care cost could also be determined as well. The details for how to calculate workload will be explained in detail during the session.

What factors predict Fitbit adherence in Stroke and Parkinson disease?

Katrina Schrader, MA
Co-presenters: Helena Mentis, Michael Phipps, Ann Gruber-Baldini, Karen Yarbrough, Erik Barr Rainervon, and Coell Lisa Shulman

Abstract

Objective: To investigate predictors of adherence to wearing the Fitbit activity monitor in patients with Parkinson disease (PD) and stroke. **Background**: Exercise and activity improve symptoms of PD and stroke and aid in primary and secondary stroke prevention. However, adherence to physical activity programs is low and little is known about adherence to daily activity monitoring. **Methods**: Patients (n=19, age=58.8+/-11, range 37-83Y) with PD (n=12) and stroke (n=8) participated in a pilot study to investigate feasibility of and adherence to Fitbit monitoring to track activity between clinical office visits. **Results**: Comparing PD and stroke, PD patients were more disabled (Rankin; p= .004) but more likely to be employed (p= .03). Stroke patients were more depressed (PROMIS; p=.045), more cognitively impaired (MoCA; p=.02) and had lower numeracy (Subjective Numeracy Scale; p=.03). Fitbit data were collected for 28-53 days (mean=32.9). Patients used the Fitbit for 86% of days and 13.5 hours/day on average. Average steps/day were 6041+/-2797. The only significant predictor of adherence to the Fitbit (% of days used) was medical co-morbidity (r=-.46, p=.047) such that those with greater comorbidity (Cumulative Illness Rating Scale) wore the Fitbit less. Other high correlations with adherence (but nonsignificant) were: PROMIS Self-Efficacy for Managing Medications (r=.57), Self-Efficacy for Managing Social Interactions (r=.46), greater e-Health Literacy (eHEALs; r=.39), and less pain (r=-.37). Adherence showed low correlation (r<.2) with disease severity, disability, cognition, depression, age, and socioeconomic status**. Conclusions**: The strongest predictor of adherence to daily activity monitoring was level of medical co-morbidity. Other determinants of adherence were self-efficacy for managing conditions, e-Health literacy and pain. Age and level of disability did not affect daily use of small wireless monitors to track activity in stroke and PD.

Toward High-Quality Big Data to Support Population Health: Identifying the Data Quality Problems with Medicaid Datasets

Yili Zhang, MS
Co-presenters: Pratik Tamakuwala and Gunes Koru

Abstract

Problem Statement: Big data analytics hold tremendous potentials to improve health outcomes at the population level by improving care delivery at a reduced cost. However, data quality problems are commonly encountered in research studies leveraging big data. A lack of data quality can result in imprecise, useless, or even misleading results, which detract from the quality of reports produced and decisions made to improve population health. Therefore, it becomes important to develop strategies to help improve the quality of big data in an effective and efficient manner. For this purpose, the investigation, classification and identification of the "data defects" is a necessary first step. Data defect refers to a discrepancy between the actual and expected values held by a data item that requires a corrective change. In this study, we focused on the first step to improve the quality of data stored in the Provider and Procedure Subsystems of a Medicaid Management Information Systems (MMIS). More specifically, we classified and detected the data defects in these MMIS subsystems. **Methods**: The datasets subject to defect detection consist of eleven tables for the Provider Subsystem with more than 1.5 million records, and eight tables for the Procedure Subsystem with more than 700 thousand records. The methodical steps involved reviewing all of the data-related documents, performing a descriptive analysis to better understand the data, conducting a literature review to define a taxonomy of data defects, and developing a data quality toolkit (DQT) to detect the data defects automatically and efficiently. **Results**: The taxonomy for data defects includes four major categories: Syntax violation, semantic violation, missing data, and duplicate data. These major categories are further divided into twelve subcategories. For this defect taxonomy, DQT detected more than three million data defects in the MMIS data. Fifty-nine percent of the data defects fall in to the syntax violation category and thirty-six percent of data defects fall in to the missing-data category. Most of the syntax violation defects were about the invalid values of certain Medicaid codes in the MMIS data, and the semantic violations mostly occurred due to the presence of invalid dates in the dataset. Defects related to invalid syntax should be the focus of future initiatives for data quality improvement. **Significance**: Medicaid data, a type of big data, have been utilized in various healthcare applications and population health analytics for various purposes. Examples of foci include improving the quality of myocardial infarction care, improving prescription drugs outcomes, providing a resource for epidemiologic studies, and estimating the prevalence and medical care costs for various diseases. However, substantial problems with the quality of the existing MMIS data reduce their usefulness for population health analytics purposes. Thus, effective data maintenance and cleaning become crucial to improve the quality and utility of the Medicaid data. So far, there has been no study which created a taxonomy of defects for the MMIS data and detected the data defects automatically. This research takes the first step to make the big Medicaid data an even more useful resource in population health decision making