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Kilograms versus Pounds: Protecting Neonatal and Pediatric Patients against Inaccurate Weights

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Introduction and Background

Having a correct patient's weight documented within the Electronic Health Record (EHR) is crucial because it is used to calculate the appropriate dose of medications. In the pediatric population, all medication doses are weight based. Clinicians caring for pediatric patients need a quick and effective way to see if the documented weight had dramatically changed in a short period of time. Using existing rules and a weight warning that was already established, the weight warning and rule was redesigned to help show the clinicians various changes to the patient's weight.

Method

Some mistakes seen within documentation of weights include; missing decimals, charting pounds versus kilograms and height versus weight. Information throughout the EHR such as growth charts, patient's prior weights along with prior Body Mass Indexes and Z-Scores can help the clinician to determine whether or not the most current documented weight is correct. With clinician feedback, the redesigned warning was created in the EHR based on the child's growth chart, the expected weight and Z-Score. This alert will fire if the documented weight is either documented to be < 3% or >97% for age and sex of the patient. This alert will also fire if the newly documented weight is less than or greater than 20% of the previous weight. This alert is shown over the documentation prior to the end user signing and shows the prior documented weight against the newly documented weight.

Staff was educated on the use of this warning and alert through various venues such as Nursing Informatics Council and the Prescriber Educator Forum.

Results

Over a 3 month period, this rule was fired 2,462 times, while the alert was generated a total of 155 times in one day. Most warnings required a "re-weigh" of the patient for accuracy and confirmation. Some weight alerts were seen even though the newly documented weight was correct. In that case, communication on weight gain or loss was discussed in rounds and a nutrition plan was formed. Having immediate feedback presented to the clinician that the child's weight had dramatically changed, provided a mechanism that called for immediate action from the caretaker. This in turn helped the end user feel that the documentation was being recognized and investigated, which ultimately enhanced the user acceptance of change as they felt they were able to be a part of the solution.

Discussion

This warning is extremely effective. Having accurate weights in the pediatric population accurate weights is a crucial part in caring for a patient. Using backend tracking tools, both the technical teams and clinical teams were notified when the alerts "fired." With the Nursing Informatics team and Unit Educators, clinicians were able to understand the importance and justification of these early warnings and were taught to read and acknowledge these alerts, not just click through.

Communication among all care team members on the patient's accurate weight is needed for care. Keeping the channels of communication open on major weight changes is a priority for effective and safe nursing and clinical care.

Facilitating the Use of Technology/CPRS Instruction Guide for New Nurses, Nurse Residents and Nursing Students

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Introduction and Background

In 1995, the VA launched a major reengineering of its health care system, which included use of information technology. The Computer Patient Records System (CPRS), implemented nationally throughout the Veteran Health Administration began in 1999. The benefits of this system have been transformative, improving communication, providing key information, enhancing clinical documentation, and providing quicker access to test and imaging results. New nurses, nurse residents and nursing students struggle to master this complex system, slowing them down and causing anxiety. Ability to rapidly master and competently navigate CPRS is crucial for all staff and especially important for new nurses, nurse residents and nursing students who have to assimilate into a new challenging and fast-paced atmosphere.

Method

The CPRS pocket guide, developed to orient new nurses, nurse residents and nursing students to the electronic medical record is being implemented at the Providence VA Medical Center. This pocket guide is designed to be utilized within the first two weeks of orientation under the direction of a preceptor. A colorful, laminated guide, the CPRS tool provides a systematic visual guide for the learner to follow. It can be transported to various localities or maintained at the computer of use. The approximate cost of the final revised product was fifty cents. The booklet will be revised and updated yearly.

Evaluation

The pocket guide was initially piloted with a new staff nurse who felt the tool was easy to use. Other staff, who cannot forget their initial experiences with the CPRS system, were receptive to the guide and agreed it will be beneficial and will ease the introduction to this unfamiliar system. Further testing of the CPRS guide is planned with the next rotation of nursing students in August. Additionally, the guide has been utilized as a prototype for other hospital services and is currently being adapted to meet the varied needs of new employees. Future plans include development of a computer program which will easily accommodate updates as the system evolves.

Discussion

New nursing staff, nurse residents and nursing students are initially overwhelmed by CPRS. Although the usefulness of the CPRS guide may be limited to the first few weeks of orientation, it will potentially be a beneficial support to alleviate anxiety and confusion for new nurses, nurse residents, nursing students and staff who float to units where the templates used are dissimilar to their own.

Improving Stroke Education Core Measure Reporting Through the Use of Electronic Care Plans

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Introduction and Background

Hospitals are required to collect and transmit data to The Joint Commission (TJC) and Centers for Medicare and Medicaid Services (CMS) for a minimum of four core measures, one of which may be stroke (The Joint Commission, 2013). TJC, CMS, and Meaningful Use Stage 1 all require ischemic and hemorrhagic stroke patients or their caregivers be given educational material during the hospital stay addressing the activation of an emergency medical system, need for follow-up after discharge, medications prescribed after discharge, risk factors for stroke, and warning signs and symptoms of stroke (CMS, 2013). Though Elliot Hospital documented this information in the electronic medical record as part of a neurological assessment flowsheet, documentation was inconsistent, incomplete, and not intuitive for the nurse, which resulted in core measure compliance of 37 percent. Several reeducation attempts failed to improve overall compliance.

Method

We standardized patient education documentation by utilizing the electronic care plan template which contains all required stroke education content. The stroke care plan template auto-populates the Patient Education section of the electronic medical record, which allows nurses to easily document each required education topic as well as the learner's response to education. Care plan and patient education documentation is part of nurse's daily workflow making it much more intuitive to document this information. Standard core measure reports, provided by our software vendor, allows for daily proactive monitoring of stroke education core measure compliance.

Results

Implementing the electronic stroke care plan template with required education topics and documenting stroke education provided to patient and caregiver in a centralized location allowed Elliot Hospital to improve core measure reporting from an average of 37 percent to greater than 60 percent compliance within a few weeks. Standard core measure reports support automated quality abstraction reducing abstraction time significantly.

Discussion

When stroke education documentation was disconnected from nurse's daily workflow and other patient education documentation, it was no surprise that core measure compliance was low. Proactive monitoring of core measure documentation did not occur because it was labor intensive to abstract each patient's chart manually. With a retrospective monitoring process nursing learned about lack of stroke education documentation long after the patient was discharged resulting in lack of interest by the nurse as there was no connection between care provided, documentation, and core measure outcome. Incorporating tools that are already part of nurse's daily routine makes documentation more intuitive for the nurse. Proactive core measure monitoring connects patient education to nursing documentation real-time allowing the nurse an opportunity to update documentation as needed.

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Centers for Medicare and Medicaid Services (2013). 2011-2012 Eligible Hospital & Critical Access Hospital Clinical Quality Measures (CQMs). Retrieved 02/23/2013 from <http://www.cms.gov/site-search/search-results.html?q=stroke%20education>

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Nursing Informatics + Care Management = Success!

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Introduction and Background

NHP is a not-for-profit HMO in Boston, Massachusetts, that insures more than 243,000 members. Sixty-two percent of our membership is on Medicaid, 16% is covered by Commonwealth Care, and 22% is covered by other commercial insurers. NCQA has accredited NHP with a status of “Excellent” since 2008, and has ranked NHP as one of the top 5 Medicaid plans for the past 4 years and top 50 Commercial plans for the past 5 years. In early 2008, NHP purchased an electronic care management (ECM) system from Trizetto called Clinical CareAdvance (CCA), which contained Milliman Chronic Care Guidelines (CCG).

Methods

In August 2009, CCA went “live”. NHP's nurse informaticians harnessed the technology to streamline the care management of NHP's diverse population, reducing the amount of time that care managers spend on administrative tasks and redundant documentation, and increasing the time available for care management activities.

Results

The system facilitates reporting, collaboration and communication, and evidence-based practice.

Reporting:

The ECM system helps NHP's nurse informaticians to access patient outcomes data for reporting to NCQA and the state. This has proven especially valuable for meeting the NCQA quality improvement goal of “Complex Care Management.”

Collaboration/communication:

The ECM system allows care managers to easily communicate and collaborate regarding patients with multiple care management issues. For example, a diabetes care manager can refer a member who has financial and housing issues to a social care manager via a Care Management Referral Form. The social care manager in turn completes a Referral Action Form that documents the outcome of the referral. While the patient is co-managed by these two programs, care managers can view each other's cases and plan their care to meet the patient's needs.

Evidence-based Practice: In addition to the ECM system's standard content, NHP's nurse informaticians designed and built additional content such as assessments and care plans. This NHP content standardizes care management practice, helps NHP meet NCQA and state quality goals, and ensures evidence-based practice.

Discussion

Lessons Learned:

- a) Be very liberal with the time frame for project completion;
- b) Engage end users in the process of workflow modeling, content development, and end user testing;
- c) Accurately document and continually update design, build, and testing records.

Teleneurology for Stable Epilepsy in Pediatric Long Term Care

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Introduction and Background

Residents of pediatric long-term care benefit from ongoing management of complex health problems to maintain an optimal level of health. Consultations for the care of epilepsy may take place in traditional office settings, or at the nursing home. Costs and benefits are associated with both service delivery models. Patients, families, and clinicians seek ways to use money and time wisely without sacrificing quality. Telemedicine may provide one way to maintain quality of care while containing costs and contributing to patient and family satisfaction. The use of videoconferencing to conduct neurology clinics between a remote neurologist and a nursing home resident, facilitated by an onsite nurse practitioner, provides a third service delivery model for epilepsy consultation.

Method

The *Clinical Value Compass* provides a framework for presenting the results of chart reviews, satisfaction surveys, and interviews that evaluate a teleneurology clinic in a pediatric long term care facility. The *Clinical Value Compass* provides four points corresponding to the directions North, East, South, and West. North corresponds to functional and risk status, including social role and perceived wellbeing. East corresponds to patient and family satisfaction in relation to needs and expectations. South corresponds to direct and indirect costs. West corresponds to a person's biological and clinical status. Value can be assessed through the relationships between compass points: Value = Quality/Costs.

Thirty-two residents of a pediatric long-term care facility participated in chart reviews for function, quality of epilepsy care, and costs associated with that care. Baseline function was operationalized as participation in available programming in the year 2011. Costs of office and on site clinic care were operationalized through billed travel costs, appointment cost per CPT code billed, and staff hourly salary paid in 2011. Clinical quality of 2011 follow up appointments for stable epilepsy was operationalized using an adapted version of the American Academy of Neurology physician performance measurement set for epilepsy. Eleven residents, 8 guardians, and 5 staff members participated in the teleneurology clinic. Satisfaction with teleneurology was measured through satisfaction surveys and semi-structured interviews. Costs of the teleneurology clinic were operationalized as technology costs and staff salary costs. Quality was evaluated with the same audit tool used in the chart review.

Results

Residents participated in 54% to 99% of available programming in 2011. 47% of participants received annual follow up with a neurologist in 2011; for all other clinical quality measures, quality was equivalent across groups. Costs to MassHealth and the nursing home were lowest with on site clinics. Travel to 13 traditional office appointments cost \$1770.18. Teleneurology costs to the nursing home for 11 visits totaled \$1313.59. Guardian and staff satisfaction with teleneurology was high. Interviews reflected positive impressions of teleneurology from guardians, staff, and the neurologist. Participants seen in office settings may have more complex clinical needs than those seen in teleneurology or on site.

Discussion

Teleneurology provided cost savings through elimination of travel costs, and created access to care. Technology costs of teleneurology decrease as numbers of appointments increase. Staff costs of all models are constant, and highest for traditional office appointments. Value for MassHealth is achieved with decreased travel. Function of residents is facilitated by decreased travel time to appointments. Given equivalent quality outcomes and varying cost profiles, participant satisfaction is a crucial variable in determining the value of teleneurology.

Surveillance Boards and Special Panels – A Proactive Approach to Care

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Introduction and Background

Historically static reports have been used to gather data and monitor patient care compliance to meet core measures and improve quality of patient care. Patient Status Boards have been used as a way to track patients in various clinical applications to track and categorize patient locations and display patient data. A similar but advanced concept to the status board, Surveillance Boards and Special Panels, are two methods being introduced to help monitor and trend condition specific data in real time.

Methods

Partnering with Organizational Excellence nursing staff in the inpatient setting, MIS clinical nurse analysts drafted a variety of Surveillance Boards to monitor CMS core measures. Patient results, orders and documentation are populated on a specific condition surveillance board for ease of quick identification and up to date status of care.

Special Panels are patient specific tables that offer the distinction of drilling down and displaying relevant clinical data for identified patient populations in each individual patient record. Patients at risk can be monitored for focused data such as SIRS criteria for sepsis. This specific data, such as vital signs, lab results, medications, weight, fluid balance can be easily then easily tracked to monitor progress. Special panels can be used for both inpatient and outpatient settings.

Results

Examples of boards identified as useful include skin monitoring, vaccine screening compliance, and Foley catheter usage. As new data is entered or interfaced into the EMR, each surveillance board is updated in real time eliminating the need for searching through the record or report for specific information. Surveillance boards have also been developed to monitor Surgical Care Improvement Project (SCIP) measures and queuing for interdisciplinary rounds. End users have access to view surveillance boards pertinent to their practice and responsibilities.

Discussion

Although recently implemented, surveillance boards and special panels show promise to be used by provider staff, nurse leaders, and unit nurses in taking a proactive and efficient approach to care.

From Paper to Electronic Consent Forms

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Introduction and Background

Paper consent forms are one of the most frequently scanned documents into the electronic medical record after a patient is discharged from the hospital. Each month, our Health Information Management department scans an average of 3,650 paper consent forms into the medical record. Many times patients or their legal representative sign multiple consent forms during a hospital stay. To decrease the amount of paper scanned into patient's medical record, decrease document storage space, improve staff efficiencies, and enhance the use of our electronic medical record the Document Management Steering Committee supported piloting electronic consents in the Neonatal Intensive Care Unit (NICU). The plan included expanding the use of electronic consents in pediatrics, pediatric intensive care unit, labor and delivery, and maternity post NICU pilot.

Method

Over a seven month period, an interdisciplinary team of providers, nurses, and information technology staff worked diligently to ensure a smooth transition from paper to electronic consent forms. Consent forms were identified, converted to electronic format using Hyper Text Markup Language (HTML), reviewed for accuracy, and thoroughly tested. Mobile computer workstations were outfitted with electronic signature pads. Workflows were established with patients/legal representative, providers, staff, and infection control practices in mind. A thorough training plan was developed ensuring all stakeholders across the hospital were adequately educated. To date, 20 paper consents have been converted to HTML format and are being utilized daily in five departments.

Results

NICU successfully implemented electronic consents in July 2012. Audits of patient's charts during the first few weeks of the pilot demonstrated 90 percent of patients had at least one if not several electronic consents signed in the medical record. Pediatrics, pediatric intensive care unit, labor and delivery, and maternity successfully implemented electronic consents in January 2013 with similar compliance. Subsequent audits of all areas consistently demonstrated 98 - 100 percent of patients have electronic consent forms signed in the electronic medical record.

Women's and Children's Services spent \$4,800.00 for electronic signature pads. Projected return on investment for the first year is \$2500.00. The projected return on investment does not take into consideration outpatient volume or additional paper documents requiring signatures and that have not been converted to electronic format.

Discussion

Implementing electronic consent forms improved nursing and provider workflow as consent forms are now readily available in the electronic medical record reducing the need to leave the patient's bedside to obtain paper documents. The electronic consent process has been a positive experience for staff with many departments requesting to implement electronic consents rather than waiting to be asked to do so. The electronic consent process has also been well received by patients and their families with many stating an electronic process is preferred as they are used to signing documents electronically in other venues. Our goal of reducing the amount of paper consents scanned into the medical record was also achieved.

Challenges Implementing Barcoded Medication Administration in the Emergency Room

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Introduction and Background

Barcoded medication administration (BCMA) has been successfully implemented at a number of hospitals in recent years and been shown to decrease medication errors (Poon et al, 2010). BCMA was implemented in 2010 at a 637 bed tertiary-care hospital with medical/surgical, oncology, cardiac, maternal/child, pediatric, psychiatric and special care inpatient units, and a 64 bed emergency department (ED). The technology had consistently higher utilization on some floors than on others, suggesting that it was easier to use in some environments. In particular, the ED had lower utilization than the med/surg floors. A search of the literature revealed little mention of BCMA use in the ED except to note that BCMA was not used in the ED (Fitzhenry et al., 2011; Early et al, 2011). The purpose of this study was to explore contributing factors.

Methods

A 29-bed geriatric unit and a 38-bed general medical/surgical unit and its 6-bed step-down unit were chosen for comparison with the ED. Structured Query Language (SQL) queries used in BCMA utilization reports were extended to include medication frequencies, administration routes and the number of medications in each pass. Audits of the data, observations of medication administrations and interviews with nurses were used to validate the data and to organize the results describing the barriers to BCMA use.

Results

BCMA was used to chart medications 95.6% of the time on the medical/surgical units during the six month period from January 1 through June 30, 2011. The ED was more than 20 percent lower (74.7%). BCMA could not be used to chart medication administration for two common ED occurrences: 1) verbal or protocol orders and 2) medications dispensed to patients by prescribing providers.

SQL queries revealed that the ED nurses gave more stat and now medications, fewer oral medications and fewer medications per pass than their med/surg counterparts. Audits of the data revealed that invalid wrong medication alerts were more likely to occur when stat or now medications were given, creating additional alert fatigue for the ED nurses. There were more steps when administering non-oral medications, increasing the workload for ED nurses. Med/surg nurses enjoyed an economy of scale when administering more medications a given pass since each pass involved overhead such as system logon and review of patient data.

Barriers such as the chaotic nature of the ED environment could not be quantified. Some issues, such as hardware problems, impacted all users.

Discussion

New solutions should be developed for BCMA in the ED keeping in mind the requirement to chart medications when there is no order in the system, the need to document medications distributed by prescribing providers, the unpredictable nature of nursing workflow, the increased workload imposed by BCMA, the effect of alert fatigue on users and the choice of scanning hardware.

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Characteristics and Clinical Experiences of Informatics Nurses on their Transition to the Specialty: Results of Pilot National Convenience Survey

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Introduction and Background

Implementation of Meaningful Use requirements has accelerated the implementation of technology in healthcare. This has required more nurses from different backgrounds to leave direct patient care to assist with the evolution of bedside technology and electronic documentation. It is important to understand the characteristics and perceptions of this growing cohort of nurses during their transition to informatics practice. Patricia Benner's model From Novice to Expert provided the framework for this research on nurses who have made the transition to the non-clinical specialty of Nursing Informatics. The objective of this research was to obtain a snapshot of the characteristics of Informatics Nurses and to find out if the years of nursing experience directly relates to the perception ease of transition from healthcare provider to Informatics Nurse. The experience of the transition from one setting to another is important because factors such as having a mentor could facilitate the process and create a more positive experience.

Methods

A 17-item survey with questions about the nurses' educational and work background and transition to the role of the Informatics Nurse was developed. It was posted on the American Nursing Informatics Association (ANIA) e-list serve from May 22, 2012 to June 5, 2012. A frequency distribution and chi square analysis was conducted on the results to determine its statistical significance. A comparison of variables such if the respondent had a mentor and their self-reported ease of transition to the informatics practice. Another comparison was done by looking at the experience of the nurse and their ease of transition. Both of these questions were validated or nullified through the chi square analysis.

Results

The convenience sample of 300 respondents had diverse backgrounds and skill levels. The most frequent response in the age range was 50-59 with over 30+ years of nursing experience but only 0-4 years of Nursing Informatics experience. The most significant finding is that the respondents who did have a mentor did have a self reported ease of transition than those who did not. (p= 0.01). While the years that a respondent was a nurse and how long it took them to transition to their new role as an informatics nurse was not statistically significant. (p=0.38).

Discussion

This survey indicates as more Nurses transition to the field of Informatics, there is a corresponding growth in the need for mentors as the data shows that having a mentor makes a significant difference. The processes that occur during this transition require further study and analysis.

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Governance Structure for Nursing Informatics: Toward Model Development and Recommendations

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Introduction and Background

The past few years have resulted in an unprecedented level of rapid implementation of electronic health records (EHRs) combined with initiatives for care redesign. EHR configuration and implementation is complex and requires attention to potential patient safety issues and impact on interprofessional workflow and communication. The Institute of Medicine's 2010 report, *The Future of Nursing*, emphasized the critical importance of expanding nurses' leadership and collaborative decision making roles to redesign health care, advance the collection of health data, and improve information infrastructure. Specifically, the IOM's report states that nurses should practice to the full extent of their education and training, and this includes assuming leadership roles with decision-making rights and accountability. Fostering nursing leadership, collaboration, and innovation is critical at all levels within a hospital and is often dependent on a robust shared governance structure that facilitates involvement. Yet, there is a significant lack of recommended models for nursing informatics governance and shared decision-making. The expertise required to make nursing informatics decisions within an organization stretches beyond existing collaborative governance models to integrate informatics expertise and interprofessional collaboration. We know that poor teamwork and communication is associated with patient safety errors, inefficient use of resources, and excessive lengths of stay.

Methods

To work toward a model and recommendations for nursing informatics governance, interviews were conducted with 12 nursing informatics leaders from integrated healthcare systems that have pioneered in EHR implementation projects. The aim of these interviews was to understand and evaluate the governance structure and informatics roles at each organization. Institutional Review Board approval was obtained. Interviews were audio-recorded and transcribed. We analyzed the data for common themes and developed a generic model of clinical informatics governance, roles, and councils for informatics and EHR adoption/optimization work. All of the health systems that participated in the interviews had a mature clinical information system and infrastructure with a current goal of EHR work to standardize the EHR across the health system.

Results

Results include a representation of key critical elements, roles and partnerships for nursing informatics at each level within a health care system and a model for informatics councils' structure. Specific lessons learned will be presented, organized by facilitators and barriers for successful clinical informatics governance and the top-down and bottom-up communication required for success. Conclusions and future steps to investigate nursing and clinical informatics will be presented.

Discussion

Optimization of electronic health records (EHRs) will require an understanding of why and how to leverage innovative collaborative technologies, such as mediums for computer-supported collaborative work and interprofessional tools (e.g., shared plans of care) to enhance interoperability and patient centered care. Organizations that have pioneered as early adopters of EHRs have engaged with their nursing governance structure and employed a large number of hospital-based nurses to work on EHR implementation projects due to their clinical expertise and skills in coordination of care among multiple health professionals.

Engineering CDC Immunization Forecasting Rules

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Introduction and Background

Each year, the CDC publishes immunization schedules for children/adolescents and adults. A study performed in 2012[1] evaluated the effectiveness of childhood immunization guidelines implemented in the Regenstrief EHR. It compared pediatric vaccination suggestions by nurses against the CDC. The survey reported that nursing suggestions diverged from the guidelines due to the following: 1) vaccination eligibility was missed by nurses 2) nurses sometimes suggested a vaccination before the recommended minimum age or minimum dose administration interval 3) lack of validation of immunization history by nurses 4) patients were administered an extra dose. This study highlights the need for automatic vaccine evaluation and administration forecasting within an EHR at the point of care.

Method

As depicted in Figure 1, our approach is to first identify the conditions under which a vaccine is not indicated. If none of the "not indicated" forecasting scenarios apply, then the vaccine is indicated. Determination on whether a patient is not indicated for a certain vaccine should be based on: (a) any contraindication to vaccine administration, (b) the allowed timeframe for vaccine administration, and (c) vaccine series completion. Contraindications for a given vaccine should be determined by available medical history, including current immunity to the disease, medical conditions defined as contraindications, or adverse reactions to previous administrations. The timeframe is established based on the minimum and maximum age ranges suggested in the guidelines. We also allow for the incorporation of "catch-up" vaccine regimens by implementing an absolute maximum age limit for appropriate vaccine series. Lastly, patients will not be indicated for a vaccine if they have already completed the vaccine series according to CDC guidelines.

Results

If the evaluation of patient data does not result in a vaccine administration being "not indicated", then, by process of elimination, the patient falls under an indication scenario. The determination of which dose in the series a patient qualifies for is based on current age, history of previous administrations, and any high-risk conditions to begin a vaccine series which would not be indicated otherwise. Some scenarios also need to be qualified with a precaution when specific conditions are present. Providers are asked to use clinical judgment to determine future vaccine administrations whenever patient data falls outside of the published guidelines for "indicated" or "not indicated". We applied this process and recently completed the authoring of all CDC immunization schedule rules. The rules are currently being tested and validated.

Discussion

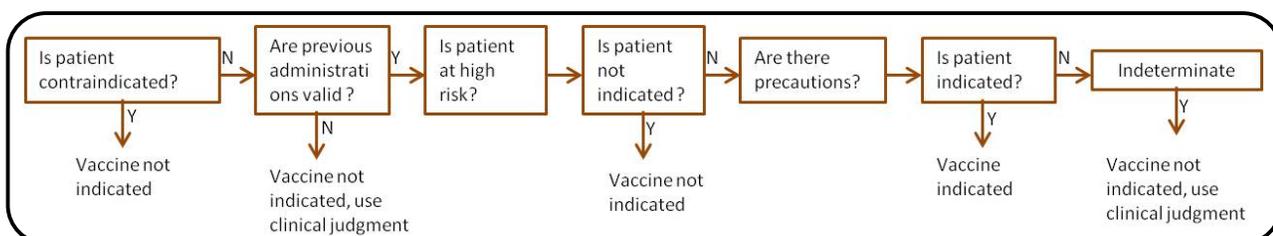
Our aim at Partners Healthcare is to interpret the CDC immunization guidelines [2] and create executable rules to represent the suggested vaccination schedule and the catch up schedule. We applied a systematic knowledge engineering process for immunization schedule decision support rules. The process includes: (1) Extraction and modeling of the patient data elements referenced in the CDC guidelines, (2) Inventory of possible forecasting scenarios (e.g., indicated, not indicated), and (3) Translation of immunization schedules into production rules. This process allows rule authors to apply a consistent model for a large set of rules that are both highly complex and require frequent maintenance.

References:

[1] Zhu V, Grannis S, Rosenman M, Downs S, Evaluation of clinical decision support algorithm for patient-specific childhood immunization *Artif Intell Med* 2012. 56(1):51-7

[2] Immunization Schedules. Centers for Disease Control and Prevention: <http://www.cdc.gov/vaccines/schedules/index.html>

Figure 1 - Sequence in which each rule scenario is evaluated for the CDC immunization guidelines



Health Information Technology Community College Consortium Project

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Kennebec Valley Community College part of Region E led by Tidewater Community College

Introduction and Background

The growing demand for Health IT professionals to assist hospitals and medical practices in the process of transition from paper to electronic health records was the impetus for grant funding to train a workforce prepared to assist in that transition. The Office of the National Coordinator of Information Technology (ONC) divided the country into five regions for the purpose of developing a workforce of trained Health IT professionals. Community colleges in each of the five regions were responsible for refining and delivering Health IT training. Kennebec Valley Community College was part of the project since the beginning and in the final year, was responsible for providing training not only in the state of Maine, but New Hampshire and Vermont as well.

Methods

The 26 week curriculum was organized and taught combining project and change management methodology. Project management structure focused on the EHR “system side”, task-oriented (what and why) side of things while change management focused on the EHR “people-side” process oriented (how) side of EHR implementation.

Results

Table 1: Overall Program Enrollment and Completion for the 31 month duration

<i>Program Enrollment and Completion</i>				
	Program Y1 2010-11	Program Y2 2011-12	Program Y3 2012-13	Total
Total students	68	143	96	307
Target	85	150	300	535
Percent of Target	80%	95%	32%	56%
Maine Target (year 3)			100	
Percent of Maine Target (year 3)			69%	
Completed	40	109	81	230
Percent Completed	58.8%	76.2%	84.3%	75%

Table 2: HITPro Certification Exam Statistics: graduates had options to sit for up to six exams dependent upon which track was take or if both tracks were taken.

	Graduates Y1 2010-11 (40 students)	Graduates Y2 2011-12 (109 students)	Graduates Y3 2012-13 (81 students)	Total (307 students)
Took HITPro Exam	5	14	28	47
Percent who took exam	12.5%	13%	35%	15%
Total # of exams taken***	5	37	55	97
Total # exams passed	4	35	50	89
Percent Passing	80%	94.6%	90%	92%

***Many students took multiple exams

Discussion

At the beginning of the program, 34% of the student population was employed in Health IT; 44% of the student population was employed in Healthcare; 3% of the student population was employed in IT; and 19% were employed in the “other” category. Upon completion of the program, most participants indicated that they felt well-qualified to act as an EHR Consultant or EHR Engineer. Most of the employers indicated that they see value in the students’ participation. The employment target was 80 percent, and here the results are somewhat less clear. Many of the participants work in a health care setting and most of those workplaces have begun to implement an Electronic Health Records system.

The involvement of the participants has ranged from being part of the team that has selected the EHR product and is now working as part of a team that will implement the system to essentially end-users of the EHR system with a better understanding of how the system fits into the overall mission of the workplace. Of the 48 respondents to the survey in Year Three, only two reported not having any job (5 percent) and only six indicated that they were hoping to get their first EHR-related position after completing the course (15 percent). So 80 percent of respondents are employed and use the training in their work. It should be noted that several respondents are not working in the health care field directly but believe the training will be useful to them on the job.

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Hartley, Carolyn & Jones, Edward; EHR Implementation: A Step-by-step guide for the medical practice, second edition, AMA, Chicago, IL

Health IT Workforce Curriculum Components: National Training and Dissemination Center <http://onc-ntdc.info/> Curriculum created by: Columbia University, Duke University, Johns Hopkins University, Oregon Health & Science University, and The University of Alabama at Birmingham

HIMSS: Dictionary of Healthcare Information Technology Terms, Acronyms and Organizations, second edition, 2010, HIMSS, Chicago, IL

A Pilot Study to Explore the Feasibility of Using the Clinical Care Classification System for Developing a Reliable Costing Method for Nursing Services

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Introduction and Background

Traditionally, hospital nursing departments have calculated nursing services and resources or personnel costs as part of the facility rate per patient room using the nurse-to-patient ratio in lieu of calculating the real-time cost for individualized nurse-patient services.[1] While nursing has conducted research studies to evaluate quality of care, patient outcomes and the cost of nursing services, different variables and methods have been used without a standardized terminology. The purpose of this pilot study was to evaluate the feasibility of using a standardized nursing terminology, the Clinical Care Classification System (CCC), for developing a reliable method for determining the costs of nursing services. This project tested whether the Relative Value Units RVUs for the 4 CCC Action Types and the simple cost-to-time methods are valid for estimating costs of nursing services.

Methods

Specific aims:

1. To test and validate four relative value units (RVUs) for the 4 CCC Action Types
2. To determine a unique cost for each of the 4 CCC Action Types
3. To compare the aggregated RVU s and simple cost-to-time costs for the 4 CCC Action Types with hospital financial salary and wage (SW) costs.

Two nurses with expertise with the CCC system recorded observations on medical unit. The observation tool linked the interventions with appropriate Action Types and recorded the time duration for each intervention-Action Type. The durations were used to calculate costs for each Action Type and for the specific Intervention-Action Types using the RVU formula and the simple cost-to-time method.

Results

We found that the simple cost-to-time method was an accurate and straightforward way of calculating nursing cost. Total costs calculated using this method reconciled (within \$.30) with the salary and wage costs provided by the institution. The RVU costs were less accurate in that the cost of nursing care was consistently over-estimated using this calculation method.

Discussion

While nursing activities represent a significant proportion of inpatient care, there are no reliable methods for determining nursing costs based on the actual services provided by the nursing staff. Capture of data to support accurate measurement and reporting on the cost of nursing services is fundamental to effective resource utilization. Adopting standard terminologies that support tracking both the quality and the cost of care could reduce the data entry burden on direct care providers. This pilot study evaluated the feasibility of using a standardized nursing terminology, the Clinical Care Classification System (CCC), for developing a reliable costing method for nursing services. Two different approaches are explored; the Relative Value Unit RVU and the simple cost-to-time methods. We found that the simple cost-to-time method was more accurate and more transparent in its derivation than the RVU method and may support a more consistent and reliable approach for costing nursing services.

References

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Evaluations of Intravenous Medication Errors with Smart Infusion Pumps in an Academic Medical Center

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Introduction and Background

While some published research indicates a fairly high frequency of Intravenous (IV) medication errors associated with the use of smart infusion pumps, the generalizability of these results are uncertain. Additionally, a lack of a standardized methodology for measuring these errors is still an issue.

Methods

We developed a web-based data collection tool using Redcap software to capture IV medication errors using a participatory design approach with interdisciplinary experts. Using the tool, a prevalence study was then conducted at a 793-bed tertiary care academic medical center, in Boston, Massachusetts. Three inpatient units were recruited for participating in the study. Two trained nurses collected data on the Redcap tool and compared the infusing medication, dose, and infusion rate on the pump with the prescribed medication, dose, and rate in the medical record. All orders were obtained from electronic medical records. Tubing and labeling of the infusing medication according to hospital policies were also assessed. Each error was rated by NCC MERP INDEX by observers. All data was entered on the Redcap data collection tool.

Results

The results showed that the tool was easy to use and effectively captured all IV medication errors. Through the prevalence study, violation errors of hospital policy were found that could potentially place patients at risk, but no critical errors which contribute to patient harm were noted (Table 1).

Table 1: Frequency, type and potential harm rating of errors.

Type of error	# of errors	Frequency per medication observations (n = 181) *	NCC MERP severity rating		
			C	B	A
Label complete according to policy	171	94.5	171		
Tubing tagged according to policy	81	44.8	81		13
Unauthorized medication	61	33.7	35		26
Clamp closed	2	1.1	2		
Right meds programmed in correct channel /pump	1	0.6	1		
Rate deviation	1	0.6	1		
Incorrect info on label	1	0.6	1		
Incorrect medication	0	0			
Delay of rate or medication change					
Total	0	0			
Patient identification error	0	0			
Total	318				

*Percentages in this column do not add to 100 because some medications had multiple errors.

Discussion

Although no high-risk medication errors were found, violations of hospital policy for tubing tags and labeling were identified. Information from this study can be used to help to improve safety of administration process, identify areas where improvements in policy and practice are needed. Collecting the same data using the electronic data collection form will allow us to compare these findings across a broad range of hospitals.

References

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Teaching Student Nurses to Navigate the Internet for Research

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Introduction and Background

This innovative teaching collaboration facilitates the use of the internet to teach student nurses how to navigate library services for research. The incentive to provide this additional offering is that searching the internet for evidence-based research continues to elude even seasoned nurses. This electronic library presentation is an additional tool to reinforce prior teachings on how to find evidence based research. As nurses, we strive to base our nursing care on evidence-based research. Incorporating the internet provides access to a wealth of diverse information to improve application of evidence-based research during patient care. Ultimately, this will improve students' self-confidence in navigating the internet for evidence-based research when they are professional nurses. Incorporating this facilitates successful student professional nurse evidence-based research development.

Methods

Teaching methods include an in person tutorial on how to navigate the internet to find journal articles. A written instructional handout was provided as an additional teaching tool. Each nursing student via anonymous electronic survey submitted questions prior to the tutorial. Bandura (1997) self-efficacy theoretical framework influenced this project. The goals are to improve patient-centered and family-centered care by developing professional nurses who are competent regarding evidence-based research internet searches. The new generation of nursing students requires reinforcement that involves practical use of technology. Internet tools provide positive reinforcement, encouragement, structure, and technology to improve self-efficacy in accessing evidence based research.

Results

This educational collaboration incorporates the *QSEN Prelicensure KSAs 6 competencies (www.qsen.org)*: Patient-Centered Care, Teamwork and Collaboration, Evidence-based Practice (EBP), Quality Improvement (QI), Safety, and Informatics. Via an anonymous internet survey after the presentation, the student nurses found the librarian presentation very thorough. The student nurses expressed that it was a good foundation to expand their abilities on searching evidence-based research.

Discussion

The goals of this evidence based research and internet presentation are to improve the student nurse self-efficacy during internet searches on clinical topics and provide tools to find these in a timely manner. The librarian emphasized that library services are available to assist staff. The librarian shared that this institution has a separate patient library. The ultimate goal is to improve patient care. The incorporation of technology during clinical practicum empowers each student to be competent in navigating the internet to find evidence-based research

Selected References:

1. Bandura, A. (1997). Self-efficacy. New York: W.H. Freeman and Company.
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Utilizing Internet Resources to Teach Student Nurses Spirituality

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Introduction and Background

This innovative teaching collaboration facilitates clinical informatics and spirituality awareness in student nurse development. Research has shown that nursing education regarding spiritual care is lacking and nurses do not consistently address patients' spiritual needs (Deal, 2010). Incorporating informatics provides access to a wealth of diverse internet information to improve nurse spiritual awareness. Ultimately, this will improve their self-confidence in addressing patient's spiritual care when they are professional nurses. Each institution has chaplain services. Nurses commonly do not know how to approach spirituality or use resources for spiritual care in their place of work. Incorporating clinical informatics facilitates successful student professional nurse development in addressing patient's spiritual needs.

Methods

Teaching methods include internet links related to spirituality articles and chaplain services. Each nursing student via anonymous electronic survey submitted questions prior to the presentation. The hospital chaplain was a guest speaker who facilitated discussions surrounding patient's spirituality needs and referral to chaplain services. Bandura (1997) self-efficacy theoretical framework influenced this project. The goals are to improve patient-centered and family-centered care by developing professional nurses who are sensitive to patient's spiritual needs. The new generation of nursing students requires reinforcement that involves practical use of technology. Internet tools provide positive reinforcement, encouragement, structure, and technology to improve self-efficacy in addressing a patient's spiritual needs.

Results

This educational collaboration incorporates the *QSEN Prelicensure KSAs 6 competencies* (www.qsen.org): Patient-Centered Care, Teamwork and Collaboration, Evidence-based Practice (EBP), Quality Improvement (QI), Safety, and Informatics. Overall, the nursing students thought the presentation was a great idea and helpful to build confidence in discussions to address patient's spiritual needs. Students requested more practice scenarios.

Discussion

The goals of this spirituality and informatics presentation are to improve the student nurse self-efficacy in assessment and provide the tools to address patients' spiritual needs. The chaplain emphasized authenticity during patient communication to inquire what helps them and prior coping skills. The chaplain emphasized that chaplain services are available at all times to assist staff and patient's spiritual needs. The ultimate goal is to improve patient's spiritual care. The incorporation of technology during clinical practicum empowers each student to be competent in spiritual care and referral.

Selected References:

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6. http://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFaqId=290&ProgramId=47
7. <http://www.qsen.org>
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Improving Nursing Competence in Identifying and Providing Care to the Delirious Patient in a Small Community Hospital

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Introduction and Background

Delirium is a significant patient problem which can prolong patients' length of stay, result in long-term cognitive dysfunction, and higher mortality. The U.S. Department of Health and Human Services Agency for Healthcare Research and Quality recommends the following: the use of standardized instruments for assessing cognition and the presence of delirium, along with delirium risk factor assessment, prevention, and treatment. Delirious patients have higher healthcare costs, typically \$16,303 to \$64,421 per patient, which annually increases the healthcare system burden by approximately \$38 billion to \$152 billion. Besides the financial impact, for each day a patient remains delirious, there is a 20% increased risk of remaining in the hospital, and a 25-35% increased risk of neuropsychological deficit. Approximately one-third of all patient related delirium episodes are preventable.

Methods

Winchester Hospital Nursing Staff Education department recently chose a delirium assessment scale (Nu-DESC), but they had yet to implement it. This tool was chosen for Winchester Hospital because it is a quick, easy tool to use which takes very little time and has a high reliability and sensitivity. In addition to learning how to use the tool, Winchester Hospital nurses had not received any formal training in delirium assessment, prevention or treatment. This capstone service learning project was intended to create a nursing delirium annual competency HealthStream module. The HealthStream module is an overview of delirium and includes the chosen delirium assessment scale. The 48 slide PowerPoint HealthStream includes a ten question, multiple-choice exam prior to and after viewing the HealthStream module to measure learning.

Results:

A passing test score of 80% was established. In addition, Clinical Nurse Specialists will monitor whether security codes and restraint use decreases. Also, Clinical Nurse Specialists will perform chart reviews for nursing delirium interventions based on delirium screening results.

Discussion:

The educational goal for this project was for staff nurses to be more knowledgeable in assessing, identifying and formulating a plan of care for delirious patients after completion of HealthStream module. As we are early in the project outcomes of the project are not yet available. Our poster will display the assessment tools we use as well as screen shots from the learning module.

References:

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Developing a Standardized SBAR Handoff from Urgent Care to the Emergency Department

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Introduction and Background

Effective communication is an integral part of safe and effective patient care. Ineffective communication between healthcare providers has been linked to preventable medical errors in all areas of nursing.¹ Knowing the significance of effective hand-off, the Joint Commission set forth a patient safety goal to assure safe patient care by implementing standards for communication between healthcare providers, specifically by implementing a standardized hand-off between healthcare providers and allowing an opportunity to ask questions.² Evidence also shows that electronic documentation tools improve the continuity and quality of reported hand-off information.³ Utilizing this information, Elliot Health Systems Urgent Care Unit Practice Council set forth to provide an evidence-based solution to the issue of telephone transport reports between these free standing facilities.

Method

Utilizing the electronic health record already in place within the health system, members of the unit practice council developed a standardized hand-off note for use when patients from the urgent care required a higher level of care and required transfer to the emergency department by either private vehicle or ambulance. Prior to implementation, staff from both the urgent care centers and the emergency department were surveyed about their own personal satisfaction and work flow perception. Also, staff was asked to record the amount of time spent on the telephone giving report. Upon completion of the standardized transfer note in the electronic health record, one to one education was given to both urgent care staff and emergency department staff to assure compliance. The transfer note, which utilizes the situation-background-assessment-recommendations (SBAR) template, was developed to auto-populate important information from the patient's record which was decided upon mutually by department staff. Vital signs, chief complaint, medications given, and any intravenous access will automatically populate from the record.

Evaluation

Prior to implementation, phone call times ranged anywhere between one and 14 minutes, with a mean of 4 minutes. Within three months of implementation, urgent care nurses had 100% compliance using the transfer note. Over this time, over 17 hours of telephone time was saved based off the initial data prior to implementation. When staff satisfaction and work flow perception was reassessed, all areas showed a positive improvement.

Discussion

Utilizing the available resources, the Urgent Care Unit Practice Council was able to develop a simple and intuitive electronic transfer note. Pull down menus are available for information such as the fall risk assessment and mode of transportation to the emergency department. Minimal free text is required by the transferring nurse to assure a timely transfer of the patient. Transferring nurses have the ability to ask for a return phone call from the accepting nurse in order to assure all questions have been answered and all pertinent information has been reported. Since implementation, the health system developed a similar transfer note for patients being admitted for inpatient care, and has shown positive outcomes for workflow in all areas.

Resources

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