Title of Project

Technology in the Clinical Setting: Nyack Hospital AcuDose-Rx

Introductory Remarks

By 2013, hospitals and health care facilities will need to meet meaningful use guidelines. In 2009 Congress and President Obama passed the Health Information Technology of Economic and Clinical Health Act (HITECH) as a part of meaningful use (Blumenthal & Tavenner, 2010). The guidelines of HITECH include a list of objectives that health care providers must complete in order to qualify for bonus payments provided by the Center for Medicare and Medicaid Services (CMS) (“Electronic Health Records”, 2011). The passing of this bill was an important initial step in the interest of creating a nation-wide electronic health record (EHR). Electronic health records improve healthcare by preventing diagnostic and medication errors, improving patient safety and the quality and efficacy of care. It will also allow easier access to patient information. The EHR should be comprehensive and include everything from patient admission, to past and current procedures, lab results, physician’s notes, etc (Blumenthal & Tavenner, 2010). These guidelines outline that computerization has been shown in studies to decrease patient mortality, improve communications among providers and streamline processes.

The purpose of this project was to evaluate health care provider perceptions of automated medication dispensing device (a valuable piece of Nyack Hospital’s steps to comply with meaningful use guidelines). We evaluated it based on the following criteria: ease of average use, impact on patients and safety, audit capabilities and technological concerns (Baker, Bavier & Keiper, 2005).
The purpose of this study is to provide baseline data for the researchers to evaluate the clinician’s perceptions of AcuDose-Rx, at two distinct time periods (three weeks and nine weeks) after implementation. This will help the researchers identify where changes in workflow are needed and where there are opportunities for improvement in the AcuDose-Rx system.

Nyack Hospital initiated use of AcuDose-Rx, an automated medication dispensing cabinet (ADC) on May 23, 2011. AcuDose-Rx is a computerized medication dispensing system that requires a login and password to access drawers that contain patient’s prescribed/profiled medication. This machine automatically decrements doses when requested by the clinician. It has two-way communication between the nursing units and pharmacy so that patients’ medications are available in a timely, safe manner. The automated medication dispensing device reduces the costs associated with manually checking for expired medications and ensuring all employees are in compliance with state and federal regulations regarding stocking and prescribing and administering medications and controlled substances (Baker, Bavier & Keiper, 2005).

Thus my research question was, how perceptive have the clinicians present in Nyack Hospital been to the new technology being implemented? And where are there opportunities for improvement from the administrative and support aspect?

**Research Design**

The research design proposed is a cross-sectional survey, which will be used to investigate health care provider’s perceptions of ADC. When conducting a study of this nature, all individuals affected must be considered (Baker, Bavier & Keiper, 2005).
Methods for Data Collection

The survey was distributed by placing a link to Surveymonkey.com on the Workstations on Wheels (WOW). Data was collected three weeks after implementation of the AcuDose-Rx. The second set of data will be collected nine weeks after implementation through the same process.

Data was collected from over 100 nurses, pharmacists, pharmacy technicians and respiratory therapists employed at Nyack Hospital. This hospital is a 345 bed facility with over 500 clinicians. There are more than 15 units and a number of outpatient services.

For this study, all registered nurses, pharmacists, pharmacy technicians and respiratory therapists, regardless of educational preparation were invited to participate. The inclusion criteria are: 1) currently employees Nyack Hospital; 2) ability to read and write in English. There are no other exclusion criteria.

Study Procedures

To ensure minimization of coverage error (Dillman, Smyth, & Christian, 2009), the director of nursing systems was provided a link to the survey through push technology to the WYSE wireless network. All questionnaires were available on SurveyMonkey.com for respondents to fill out at their convenience on the WOW. To ensure anonymous survey responses the SurveyMonkey data collection settings were set so the IP address of the computer from which the survey was being accessed will not be tracked.
SurveyMonkey (SurveyMonkey.com, 2008, pp. 103-4) in its policy statement on privacy, states that data are stored on its server are kept private and confidential. Security procedures for physical infrastructure include: the use of digital surveillance equipment, biometric recognition and passcards for entry into facilities, and controls for temperature, humidity, smoke, and fire. On a weekly basis network security audits are conducted and daily scans for hacker activity are completed to guard network security. The hardware infrastructure is equipped with servers that have backup power supplies. Data backup is hourly within the system and performed nightly in a centralized offsite location in case of a catastrophic event.

To ensure further protection of the participants' privacy and safety, once the dataset is created and coded, it will be stored on a password protected computer and the account used to administer the questionnaires will be closed after the data collection period.

Responses to the web-based survey are automatically saved in the Analyze folder in the Survey Monkey platform (SurveyMonkey.com 2008). The researcher will pre-test the accuracy of data collection in the Analyze folder by completing survey questions and then verifying that the responses are being accurately collected and transferred to the Analyze folder.

**Data Collection Measurements**

The measurement tool selected for this study is based on several considerations: the appropriateness of the tool for operationalizing the intended construct, psychometric properties, length of time required to administer the questionnaire and availability of resources. Each tool is described in the following section. The time required to complete all of the tools is
approximately fifteen minutes. There will be no identifying data on the response forms. The following tools will be used:

- A demographic assessment
- Automated dispensing device survey

**Individual Demographic Characteristics**

Demographic data will be obtained through 6 questions which query respondents in areas of gender, age, current unit, length of service, current shift and role. For Nursing, questions will be added regarding initial education in nursing and highest degree obtained.

**Automated Dispensing Device Survey**

The automated dispensing device survey has four parts: ease of use, patient and safety, auditing and technology. A 5 point Likert scale is used; 1=strongly disagree; 2=disagree; 3=undecided; 4=agree and; 5= strongly agree.

**Data Analysis**

Descriptive statistics will be used to report the following demographic data: gender, age, educational level, job category, length of service at present job, role and shift will be represented graphically illustrating the frequency, percentages, mean, median, mode and standard deviation distribution when appropriate. Scores on Likert-scale items of scales will be summed to create total scores and examined to see if they approximate a normal distribution. Preliminary analyses will be used to clean the data (i.e. identify missing, out of range, and outlying values), report Cronbach alphas, and verify or transform variables to satisfy distribution assumptions.
Limitations

Self-report can be revealing and accurate, but also subject to many sources of error and bias (Neuman & Krzystofiak, 1979). Use of questionnaire data with limited specific groups in the healthcare environment limits the generalizability of this study, as it is possible that different results would be obtained with another sample. The use of a convenience sampling is also a limitation because of the problem of bias from obtaining participants who self-select and who volunteer to participate (LoBiondo-Wood & Haber, 1998).

Results/Discussion

The study titled “Automated Medication Dispensing Devices: Health Care Providers Perceptions on Ease of Average Use, Patients and Safety, Audit Capabilities and Technology” was IRB approved on June 17, 2011. This study focuses on AcuDose-Rx implementation and the generational issues among the four generations present in the workforce. Because I will not be present in the hospital for the second round of surveys and for the purposes of my project, I am simply analyzing the clinician’s perceptions on AcuDose-Rx and opportunities for improvement. I will be using the information from the survey created for the original IRB approved study, just not taking into account the relationships among the generations present in the workforce.

The survey was ‘pushed’ to the workstation-on-wheels (WOW) from June 28, 2011- July 8, 2011. 118 surveys were completed of which 73.7 % were RN and 24.2 % were Respiratory Therapists and the rest were pharmacists or pharmacy technicians. 59% of all respondents had never used an ADC at a previous place of employment and the results were largely positive. What this information suggests is that the AcuDose-RX machine is easy to use and the quality of education from the Nursing Education and Nursing Informatics departments were very high.
Although the results were largely positive the survey still presented the Nursing Informatics and Pharmacy teams opportunities to improve the ease of use, impact on patients and safety, audit capabilities and technological concerns regarding the AcuDose-Rx in Nyack Hospital.

There were three distinct high points for ease of use. The clinicians felt they could use the system confidently after minimal training, the screens were easy to use, and they found the medication delivery system useful. However, it was difficult to obtain medications from the AcuDose-Rx during an emergency.

In regards to patients and safety, the clinicians felt that the patient information is accurate and up to date. About 75% agreed or strongly agreed. They did not feel however that newly ordered medication was available in a timely matter.

In the case of audit capabilities, all responses were positive. The clinicians did however have many technological concerns. They felt as if the response time is not fast enough to keep up with their demands.

Since the release of the survey and collection of data, the Nursing Informatics team and Pharmacy team have been working to make improvements. From the nursing perspective, the Informatics team and the nursing educators are working with the unit nurses on the floors. As issues arise, they go to assist the nurse in need and show them the correct process for the question and issues they may have. The pharmacy is working to reduce their ‘turn around’ time. This means they are working to decrease the amount of time it takes to profile a medication into the cabinet, giving the clinician access to the medication.

At our weekly AcuDose-Rx meetings, both groups come together to discuss how the past weeks goals and issues were solved. We then discuss the possible problems for the upcoming
week and set goals for improvement. We are constantly interacting with the staff and working to make the system work efficiently for them. Since we are away from the bedside, the unit nurses may have more practical approaches to using the machine and finding ways to improve the workflow.

Attached to this project is also a copy of the survey, survey results and the PowerPoint I made. This will be presented by myself and Noreen Brennan, MA, RN, to the Operations Group which includes all senior and junior level management, and the Practice Council which is a sub group of the Shared Leadership Council.

**Summary & Comments**

Over the past ten weeks at Nyack Hospital, I have learned a great deal about AcuDose-Rx, meaningful use guidelines and EHR. I have worked with people from all involved departments and learned a little bit from each one of them. I worked with the Director of Nursing in the planning process of implementation. I worked with the Nursing Informatics team and watched and assisted them in making corrections to the errors in the system. I saw how pharmacy corrected their errors and had discussions with them about how they could reduce their turn around times and reduce the number of phone calls they received from the units on an hourly basis. I also had the opportunity to shadow nurses on the units one day and watch their work process first hand.

Although they have not been implemented yet, I have been involved in the planning process for the Medication Administration barcode/scanning system, and Computerized Physician Order Entry (CPOE). Both of these programs will be implemented in Nyack Hospital within the next six to eight months. Although I will not get the chance to watch them “go-live”
on the units as I did with AcuDose-Rx, I am involved in the planning and building process and watch the Nursing Informatics team build the screens, and the IT teams install and update the hardware and software. These are all things I did not get to observe for AcuDose-Rx but I have now.

I have watched the process from start to finish. Although it has been fragmented and out of order, I have had the opportunity to observe the building, testing, implementing and maintenance aspects of technology in a hospital. The experience I have gained has been invaluable and will most definitely help me to become a better nurse and administrator when I earn the opportunity, as I will have a greater understanding of the processes from the administrative end and from the nursing perspective.
References


