I. Title: Medication Reconciliation Made Easy in a Multi-system Environment

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IV. NPSG Goal:

NPSG 03.06.01 Record and pass along correct information about a patient’s medicines. Find out what medicines the patient is taking. Compare those medicines to new medicines given to the patient. Make sure the patient knows which medicines to take when they are at home. Tell the patient it is important to bring their up-to-date list of medicines every time they visit a doctor.

HIT Utilized: Medication Reconciliation

Abstract. Medication Reconciliation is a required but difficult process at both hospital admission and discharge. Multiple sources of medication lists have complicated the issue as each contains medications which may or may not be the same. Using an ‘Expedia’ like approach, we have designed software that brings together med lists from disparate systems, displays them side by side with drugs in therapeutic class groupings, and uses an intuitive click/copy navigation system that allows the users to quickly and easily create an accurate admission or discharge medication list. The application presents all the electronically available information to the end user, saving user time and improving accuracy of input. Modification and rolling out this new application involved a 5 unit pilot program, multiple demonstrations to front line users (who subsequently took on the role of super user) and on line mandatory learning for all nurses and pharmacists before the ‘big bang’ start at four hospitals. The application was quickly embraced in the workflow, and subsequent data show a parallel in usage with the number of admissions and discharges. The admission data (more user numbers than numbers of admissions) support the notion that quick uptake and implementation of software can be achieved when the software is easy and intuitive to use, and provides immediate value to the end user. Similarly, the discharge data (less user numbers than number of discharges) point out that opportunities exist to improve physician communication and involvement in the use of computer applications.
**Background Knowledge.** Community Health Network is a 4 hospital integrated health care system in Indianapolis, Indiana. One of the hospitals is a specialty hospital (heart), and the Network consists of more than 100 sites of care (primary care, ambulatory/ endoscopy centers and emergent care) with over 500 employed physicians, 1440 beds and 46,000 yearly admissions. It is a $2.9B company of over 11,000 employees with a small family medicine residency and strong ties to community practitioners. Our facilities serve a wide variety of patients, but are mostly suburban/urban mix, typical of that found in a Midwest city.

The American Recovery and Reinvestment Act of 2009 (ARRA or “Stimulus) as signed into law included a Health Information Technology for Economic and Clinical Health (HITECH) part designed to promote adoption of meaningful use of HIT. Part of the requirements of that act required participants to provide an electronic copy of their discharge instructions, to include medications, which meant said list had to be electronically captured. Our current method of medication documentation in multiple electronic databases did not provide for this data to be easily extracted.

The process of medication reconciliation is one of many important processes that occur at every admission and discharge. The quality of that process is entirely dependent on the data at hand when the providers are verifying with the patient. This process is so important that it is covered in one of the National Patient Safety Goals (NPSG 03.06.01)

**Local problem.** Joining the movement toward more electronic records, our institution has followed the path of many in pursuing and purchasing ‘best of breed’ software. The end result is the best programs are available to address the specific care setting needs, but frequently these systems do not communicate to each other. In our case, we experienced the situation where our EMR solutions for ambulatory care clinics, inpatient hospital based care, and our home health solutions maintained patient health histories independent of each other. Providers who wanted to do a complete medication reconciliation and find out exactly what others had recorded on their med list would have to log into several different systems and search for the specific patient and date of service in each. Needless to say, the medication reconciliation process was not optimal.

**Intended Improvement.** We needed to create an overlay application that would enhance and simplify the data collection process for medication reconciliation and in turn, satisfy most of this patient safety goal:

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**Study Question.** How do we utilize our Health Information Technology to improve patient safety during the medication reconciliation process?

**Ethical Issues.** There were no conflicts of interest or privacy concerns in designing or implementing this application. Data were available to caregivers as data are typically and routinely available within our Network.

**Setting.** This intervention was implemented in our inpatient facilities where local care environments were similar and did not influence the proposed changes.

**Planning the intervention.** We had been working with a vendor (CareEvolution) to implement a clinical integration platform that enabled us to pull together clinical data from a variety of disparate systems. We used this clinical integration platform to provide our clinicians with patient longitudinal history across the care continuum. Working with the providers to meet their needs, we created four screens that displayed relevant data in response to frequently encountered patient care situations:

- Historical medical record (longitudinal summary)
- Last three shifts of inpatient data (daily summary)
- All historical Labs (Labs)
- All historical reports (Reports)
The clinical integration platform was set up to tap into the different systems for data and was already extracting medication information from our disparate systems. Using this platform, we deployed a comprehensive medication reconciliation tool that brought all the disparate med lists together and use intuitive navigation to make it easier for the providers to detect gaps and overlaps in the pharmaceutical therapies the patient may be receiving.

We had med lists in a McKesson Home Health product, a GE Centricity outpatient product and both admission and discharge lists in Centricity Information System (a sunset GE system).

**The intervention.** At admission, we were able to pull together med lists from each of those systems and display the drugs by therapeutic class with a blank column on the right. After the nurse or pharmacist verified with the patient what drug and dose they were on, a click on the arrow would populate the column on the right. Further clicking on the pencil would bring us a details screen, if changes were needed. If the med was brought over in error, a click on the trashcan would eliminate it from the column.

At discharge, the important meds to consider when discharging a patient are what the patient was on at admission (the now created home med list on admission), current meds ordered, including PRN meds. Displaying these data...
sets in the same fashion, using the same click/move technology allowed the clinician to rapidly create a new ‘going home’ med list. Once populated, this list stayed until the patient was discharged, which allowed specialists to create their med lists when they last see the patient, or attendings to create their med list before the weekend (when covering physician discharged the patient).

Once the list was created, the patient was given a printout that quite clearly stated which medications were NEW, which were to be CONTINUED and which were to be STOPPED. The nurse would sign, the patient would sign and a copy placed in the paper chart.

The improvement phase and rollout phase. We identified a select group of front line nurses (for the admission med rec process) and discharging providers (for the discharge med rec process) and over a 2 week period they exercised the application and we took their inputs to refine the application. We then piloted the application on 5 units over a 4 week period before making final adjustments and rolling it out to the entire 4 hospital system. During this final 4 week shake out period, we selected nurse leaders on each unit and trained them on the application (they would become the ‘super users’ on the units during roll out). We authored an online learning module and through senior nursing leadership, made it mandatory for all nurses. Physician champions were identified, and they were charged (along with the nursing staff) to teach physicians how to use the tool during the discharge process. Online learning was optional for physicians.

Planning the study of the intervention. Throughout the development period, feedback was obtained using a dropdown feedback memo, immediately accessible in the workflow. This enabled end users to provide their feedback immediately when they had the issue, without too much disruption in their work.

Methods of evaluation. Success would be determined by usage ‘hits’. In addition, feedback continued to be obtained after go live, and was used to modify some of the programming (these improvements were made on the fly). Since we were moving from a handwritten discharge med list to a printout of the med list, there were no measurements of accuracy/legibility (improvement from hand writing to
printouts is well documented). Any content discrepancies were collected via the end user feedback tool.

**Analysis.** Qualitative analysis was obtained by observing the feedback we received. Physicians and nurses are not shy about giving feedback when something new is thrown at them and we were not disappointed. Surprisingly, the anecdotes were uniformly positive! “saved me time”, “best thing IT has even done for me!” Quantitative analysis demonstrated rapid and sustained uptake from the day of go live. Since this was not a study per se, no pre/post data were obtained to compare costs or ROIs. The rapid uptake and universal usage reflect value to nurses and physicians in time saved.

**Outcomes.** The tool was piloted in each of our sites, allowing for any differences in settings or organizational culture changes. The rollout was preceded by a required educational on line learning for the nurses and optional for the physicians. Rapid uptake was observed. (see chart). Some lessons learned from the feedback required some small programming changes to correct, but were not quantified (for example, some meds were showing up twice from the inpatient pharmacy list and our programmers immediately fixed it). We could not measure any changes in patient outcomes as the study did not follow the patient post hospitalization. However, there was improved satisfaction from the nursing staff who were delighted with the ease of use of the tool and the clarity of the printout for the patients at discharge. Anecdotal feedback from physicians was overwhelmingly positive by those who were trained. In spite of frequent communication in a variety of forums, there were still physicians who were unaware of this application and who were upset with the changes. Once trained (which took about 10 minutes) they realized the value, and were only complaining about the lack of warning. (a common issue that nobody seems to have the answer to!)

**Summary** Due to the ease of navigation and wealth of information, training physicians, always the most difficult part of any IT rollout, was rapidly accomplished. Time was saved on the nurse intake and accuracy in recording the details of medications was improved.

**Relation to other evidence.** This is the first use of such point/move technology to create med lists from a variety of med lists that we are aware of.

**Limitations** The uptake of this application was a bit slow in the emergency department, as the need for speed and change do not go well together. We have monitored the usage to make sure there gains did not weaken over time, and they have not. The ability to provide an electronic copy of the patient’s med list is part of the Federal Meaningful Use requirements, and nursing administration have been following/monitoring our compliance with the use of this tool.

**Interpretation.** The ability to use an easy to use application that pulls data from disparate sources was shown to be helpful in the clinical process of medication reconciliation.

**Conclusions** Although this change was driven by the Federal Stimulus initiative, we immediately felt a positive impact in our daily workflow and time spent and accuracy of documenting medications. This application has the capability to be implemented in other organizations who have the same need for integrating software.