



**Title:** Leveraging the Tools You Have Instead Of Waiting for  
the Perfect Process: Introduction of an EMedication  
Reconciliation Process in a Small Rural Hospital EMR

**Author:** Michael Manning, M.D. Hospitalist Practice Medical Director  
Primary Point of Contact: (828)557-6768, [mmanning@murphymedical.org](mailto:mmanning@murphymedical.org)

**Author:** Rick Harris, RN, BSN, Clinical IT Coordinator  
Secondary point of contact: (828)361-2098, [rharris@murphymedical.org](mailto:rharris@murphymedical.org)

**NPSG Addressed:** 1) Improve effectiveness of communication among caregivers  
2) Improve the safety of using medications

HIT Technology: CPOE, eMedRec, ePrescribing

**Meaningful Use Goal:** Electronic Medication Reconciliation to improve Patient Safety and Care  
Coordination

## **Executive Summary:**

Now that medication reconciliation has become a Core Measure, most healthcare facilities are making an attempt to implement this technology. This process has been identified as a way to improve communication between caregivers, reduce the risk and improve the safety of using medications. Medication reconciliation takes advantage of Computerized Physician Order Entry (CPOE), clinical decision support and e-prescribing to reduce adverse drug reactions and promote patient safety. Introducing electronic medication reconciliation (eMedRec) is a difficult process to initiate at most facilities and few hospitals or vendors have found a successful way to immediately implement this healthcare technology.

Back in September of this year, we continued the adoption of our eMR by activating the newly released electronic medication reconciliation portion. Having had a relatively easy time implementing other parts of our eMR, we were completely unprepared when our system struggled out of the gate and went to almost zero use. Most of the physicians considered this to be another “failure” of the eMR and again expressed their desire for the eMR be perfected before they would attempt to use it again. By combining employee and physician reeducation and leveraging the tools we had to use in a relative short span of time, we were able to go from almost zero to > 50% usage of this technology. We could have not sorted out the problems in the system had we not had close and timely communication with our eMR vendor CPSI. Moreover, we used the eMR to improve our communication between hospital-based and primary care physicians at the transition of care from inpatient back to home or an extended care facility.

Waiting for the “perfect” electronic medication reconciliation would have delayed our implementation considerably and it would have provided physicians, who are already reluctant to adopt the eMR, to have another reason not to use the system. Our clinical IT department has been at the forefront of eMR implementation, however, they would prefer to be on the crest of the wave of healthcare IT rather than being swamped by it. By employing management’s support, making use of physician champions and being available on an as needed basis, we have created a team of nurses, pharmacists and physicians to reinvigorate the process and make it work without implementing or purchasing new technology.

**Title:** “Leveraging the Tools You Have instead of Waiting for the Perfect Process: Introduction of an Electronic Medication Reconciliation in a Small Rural Hospital”

**Background Knowledge:**

Murphy Medical Center (MMC) is a 57 bed rural hospital located in the far southwestern part of North Carolina. We see patients from the 4 furthestmost west part of the state as well as patients from northern Georgia and southeastern Tennessee with the largest portion being Medicare and Medicaid patients. In July of this year, our hospital signed a management agreement with Carolinas Health System but otherwise the hospital functions as an independent entity. Like most rural areas, we have been hit hard by the economic downturn and a large number of our patients are indigent. Primary care is still underserved in our area and many patients we provide care for have no local MD follow-up. Because we serve a rural population, our resources are less readily available. This past year has hit our hospital extremely hard financially but we have worked hard and this financial burden has been partially offset by Meaningful Use money. Because of this, our hospital administration has been highly supportive of the Health IT initiative. It is crucial to make sure patients understand their discharge instructions as well as any change in their medications; therefore it was absolutely necessary for us to implement a process to help us make sure we are doing that.

We first introduced our EMR (vendor CPSI) for business applications back in 1999. The CPOE and clinical portion of the EMR was introduced back in the fall of 2010. Our philosophy for physician use was on a voluntary basis with one physician announcing his retirement and most other physicians having the “I’ll do it if I am forced to” mentality. I must admit that when CPOE was first introduced this was my attitude as well. After attending several ACPE and the 2011 HIMSS meeting in Orlando the “scales fell from my eyes” and I realized physician use of the EMR was inevitable and I dove in head first and subsequently became the physician champion at our hospital. CPOE was made mandatory for the Hospitalist Practice at MMC but only achieved approximately 25% utilization. At time of reporting CPOE to meet Stage 1 Meaningful Use requirements, I was working in the emergency department. The Mid-Level practitioners and I managed entering electronic orders about 80% for the lab, X-ray and cardiopulmonary. Several other specialty physicians contributed to CPOE and we became the first hospital in North Carolina to receive our portion of the Federal stimulus from the Affordable Care Act. Currently, we have qualified and are awaiting our portion of NC Medicaid funds for Meaningful Use.

Our Hospitalist Practice had been without a director for about 1 year. It was covered by both hospital employed and Locums physicians and each doctor functioned pretty much as an independent entity with varying CPOE compliance. In April of 2011 I was appointed Medical Director for the Hospitalist Practice and one of first initiatives was to make CPOE a “have to”. I continue to use CPOE for about 60% of all my inpatient orders the other hospitalists use CPOE to varying lesser degrees despite the mandatory order. Incidentally, the mid-level practitioner approaches 75% with CPOE compliance. Despite the Hospitalists being required to use CPOE as often as possible, there is little incentive as there is no CPOE pay for performance metrics that contribute to physician salary. We are currently rewriting physician contracts to include CPOE use, eMedRec utilization and EMR use along with Core Measure compliance and HCAHPS scores to determine staff hospitalist salary.

---

### **Local Problem Being Addressed:**

Though our facility had been fairly successful with CPOE, we were severely lacking in the area of the medication reconciliation. The paper MedRec that was in use was both poorly and improperly utilized by physicians on a routine basis. Physicians using these paper generated records did not have access to computer driven drug interactions and incompatibilities, i.e. Clinical Decision Support . Discharge physicians often hand -corrected any changes in the home medications and wrote in new medications. This process, as expected, had resulted in physicians having to clarify verbally when there was a question about one or more of the discharge medications. Inevitably, a previous home medication was missed on the paper MedRec and about 30% of the time it was missed, the patient stopped taking that medication. Even more importantly the paper medication reconciliation never reached the primary care provider and was not included in the eMR. The only discharge medication list available to physicians outside the hospital was the discharge summary. The dictated discharge summary differed from the paper Medication Reconciliation 40 to 45% of the time on a monthly basis. Another problem that often occurred was when a patient was discharged to a local nursing home a copy of the paper MedRec would go with them. When the NH attending physician came to do the admission they would use the dictated hospital discharge summary and encounter discrepancies when compared with that paper MedRec. This often necessitated a flurry of phone calls between the NH admitting MD and the Hospitalist on call who was often unfamiliar with the patient since the Hospitalist who had taken care of the patient had rotated off service. This constituted a patient risk and severely compromised the quality of information flow between providers.

### **Intended Improvement:**

In August of 2011, our facility installed the eMedRec portion of theCPSI EMR. Installation of the eMedRec to our EMR was intended to improve the effectiveness of communication among caregivers, improve the safety of using medications, and provide a unified tool for medication reconciliation which would be universally applicable. It is our Health IT philosophy that we would rather be on the crest of the wave for EMR implementation rather than being forced into utilization by timelines. Based on this philosophy it would require a collaborative effort betweenhealth IT, Nursing, Ancillary, and Medical staff.

### **Planning and Implementing the Intervention:**

Because our prior experience with newly released portions of CPSI eMR software had been mostly positive we implemented the eMedRec portion anticipating a similar positive experience. Unfortunately, this did not happen and application of the EMR for medication reconciliation came to a virtual standstill, especially on the hospitalist practice. Most troubling were small errors at time of initial patient contact when the ER nurses attempted obtain a complete home medication list they did not match the patient's medication with the hospital's Medex pharmacy. This resulted in progressive delays as workflow was interrupted by what seemed like small errors in the beginning grew exponentially to cause a huge problem at discharge. The MD's surrendered and went back to the paper MedRec's and there was little enthusiasm to attempt to try the electronic process again.

Consequently, while CPSI looked into our problems from the central server end we went back to the implementation drawing board. We had to identify the problems we could control and those we could not. This would be extremely important if physicians were to attempt eMedRec again since ultimately physicians drive the process. Several problem areas were easily identified including and most arguably the biggest area for improvement was getting the nurses that had initial contact with the patient during the admission process to find as close match as possible with home medications and the Micro-Medex. Most problematic was the ER nurses feeling time rushed to enter medication data which often was incomplete, inaccurate and “free texted”. Another contributing problem was the perception by the ER nurses that the admitting physician held final responsibility for insuring home medications entered correctly. While in truth this is the case there was often miscommunication of the home medications with the list being inaccurate and/or incomplete and the physicians struggled and quite quickly ceased doing eMedRec and resumed the paper process to which they were already accustomed. Additional problems with implementation that were identified included admission units assuming the initial medication list was documented adequately and not performing any additional investigation to insure medication accuracy. The ICU also felt that were too involved in patient care to ascertain the home medication list. Each area that involved patient care during the admission process was functioning in “silo mode” and not being a team player to provide excellence in patient care.

After troubleshooting the process from our end we estimated that MMC would require approximately 25% physician utilization to work out the gremlins in the software and reach the point where the eMedRec was as painless as possible. It became very apparent that if we were to approach this level of utilization the Hospitalist service needed to take the lead. Both the medical director and the nurse liaison for the hospitalists received additional education and training using eMedRec to become “super-users” to assist the other Hospitalists with the process. In addition, the clinical IT person at our facility made his expertise available at almost any time in his schedule to help with eMedRec. He was able to communicate closely with our eMR vendor, CPSI, so that if they needed to intervene or had a solution it was often available the same day as the problem occurred. The Hospitalist Practice at MMC is staffed by both hospital-employed and Locums physicians. Of the 3 employed MD’s only one uses CPOE consistently so getting the other 2, who are often reluctant to change their way, to use eMedRec would be problematic at best. Therefore, we choose to require all the Locums physicians to use this portion of the eMR, especially at admission and discharge since we could make this a requirement and no longer an option when they worked at MMC. We were going to use the locums as a wedge to get all the Hospitalists on board. After all, if the outside contract docs were using the eMedRec process efficiently and effectively there would not be any excuse for the staff hospitalists to use the same process. This idea still remains a work in process. The engaged hospitalists were provided additional training on the eMedRec process as well as back up support from Health IT and the Hospitalist super-users, the nurse liaison and medical director. They were also asked whenever a problem was encountered with eMedRec process to notify Health IT so they could locate where the problem occurred and if it was due to nursing at point of initial patient contact to educate them how to avoid subsequent errors.

Health IT and the Hospitalist medical director as well as the Vice-President of Nursing went to the Emergency Department nurses and reeducated them how crucial it was to match home medication as closely as possible with the Medex list. Also, the ICU was reeducated as to their role in the process of making sure the home medication list was authenticated. The Medical/Surgical floor developed an admission team process for which insuring the home medication list was correct by patient/family

interview, calling the primary care provider and/or local pharmacies. Pharmacy also began comparing the initial medication reconciliation with a list of home medications obtained from the patient's home pharmacy, physician's office and or direct patient interview. Pharmacy then found the best match in the formulary's Medex and performed an additional medication reconciliation if there was any discrepancies. Pharmacy took the opportunity when asking patients about medications to ask if there were any there questions about their medication regimen and offered a chance for patient education. Gradually a team approach to the eMedRec process emerged which enhanced its effectiveness throughout the hospitalization and facilitated the discharge process. Initially at the time eMedRec was introduced its use fell to almost 0% as physicians and nursing became frustrated with its use. Following the creation of what effectively was a team mentality, we were above 52% eMedRec at time of discharge in less than 2 months. Since the eMedRec was available almost immediately at the time of patient discharge copies of the eMedRec were faxed to follow-up physician offices or sent with the patient to an extended care facility or sent home with the patient for their first outpatient appointment.

### **HIT Dimensions Utilized:**

The specific technology that was utilized to implement our goal was the CPSI EMR and specifically the addition of their eMedRec module. This module was first installed on our test server allowing an area where we could learn the software and prepare the necessary training. After in-house testing, a training program was developed for users at the various levels. This training was provided to users prior to rollout on the live system. The eMedRec module has been in use on our system since late August.

### **Value Derived/Outcomes:**

After we had the eMedRec up and running the discrepancies between the dictated discharge summary and eMedRec dropped to 14%. We informed the attending physicians for the local nursing homes that the eMedRec was the ultimate authority for medications at discharge. The average number of phone calls that required clarification for NH patients dropped from 60% to approximately 15% after eMedRec utilization. As important, NH physician satisfaction for admitting patients using the eMedRec process was universally positive with the exception of 1 patient. Every one of those physicians thought the clear concise eMedRec was a vast improvement over using the Discharge Summary and paper eMedRec.

We also found out that now about 12% of patients seen at follow-up with their primary care provider would bring a copy of the eMedRec with them for that crucial first appointment after a hospitalization. Before this almost none of our discharged patients showed up with their post-discharge medication when seeing their follow-up physician. None of the patients that were discharged with the eMedRec were reported to have had a previous home medication stopped inadvertently. Also, realizing that we are small hospital and the length of time we have been using eMedRec process is only 2 months, we still have not had a patient return to the ER or be readmitted for an adverse drug reaction in which the eMedRec was performed. During that same length of time there have been 6 ER visits and 1 readmission for patients discharged by the paper MedRec that might have been averted using Clinical Decision Support, i.e. computer driven drug interactions and incompatibilities.

Medication reconciliation is important at all stages of hospitalization but most crucial at discharge. While CPOE systems are effective in reducing errors during prescribing, it will not be effective if the admitting physician fails to prescribe a medication the patient was taking at home or fails to inform their primary

care provider what changes were made in their usual medications and/or new medications they are now taking after discharge. It has been demonstrated that electronic medication reconciliation may be effective in reducing such errors (1, 2). Transitions in care such as transfers from ICU to less specialized care is also a time that a medication being given in the ICU may not be continued on the floor or a home medication that was being held while the patient was stabilized may not be restarted and even go missing at time of discharge. It has been demonstrated in the “To Err is Human” review of the literature that was based on two large population studies that adverse drug events occur during hospitalization but did not include the same events in the post-discharge patient population. The 2003 Annals paper that did look at adverse events post-discharge found 76 out of 400 patients experienced an adverse event with adverse drug events to be the most common accounting for 66% of such events. Many of these adverse drug events were preventable and not communicated well with follow-up physicians (3). A JAMA article found that direct communication between hospital physicians and primary care physicians occurred infrequently (3-20%). Discharge summaries being available at the first follow-up visit were also missing 66-88% of the time. Even in the cases when the discharge summaries were available, 2 to 40% either lacked discharge medications or had an incomplete listing (4). Finally a 2010 study found that there was no difference in medication discrepancies between hospitals at transitions in care with or without an eMR. It was their conclusion that “Reducing such problems may require specialized computer tools to facilitate medication review and reconciliation” (5). Without having an eMedRec in place and actively being used there is no way to improve the system and find out what these tools may be. Sometimes the tools may not even be computers but the health care professionals involved directly at point of patient care.

### **Barriers/Challenges Faced:**

Upon implementation of our eMedRec, our system struggled out of the gate and went to almost zero use. Most of the physicians considered this to be another “failure” of the eMR and again expressed their desire for the eMR be perfected before they would attempt to use it again. By combining employee and physician reeducation and leveraging the tools we had to use in a relative short span of time, we were able to go from almost zero to > 50% usage of this technology. We could have not sorted out the problems in the system had we not had close and timely communication with our eMR vendor CPSI. Moreover, we used the eMedRec module of our eMR to improve medication communication between the hospitalists and the primary care physicians at the transition of care from inpatient back to home or an extended care facility.

### **Financial Considerations:**

There was no outside funding.

### **Summary/Conclusions:**

The discharge process is the most important time to insure a seamless transition of the patient back to home or an extended care facility. Moreover, communication between the hospitalist and the primary care provider is instrumental in this transition. Now the primary care provider could have an up to date medication list when the patient was discharged. It proved to be very important to get both nursing and pharmacy as well as physician buy-in to make the eMedRec process effective. Educating the nurses at the point of initial patient contact and demonstrating to them how to align home medications with those in the Medex proved to go a long way to improving data input. It seemed as if small errors at time of initial

entry of patient medication became an exponential problem as the patient transitioned through their hospitalization. Taking the time to reeducate everyone about the medication reconciliation process was also huge in doubling our goal. Management, having already realized the importance and financial rewards of eMR adoption backed us at every step along the way. After the initial rollout of the eMedRec most physicians found another wedge to not use the eMR. As the process improved and more physicians became familiar with an improved eMedRec its use became more frequent. Also we educated physicians about previous adverse drug events that could have been avoided had an electronic medication reconciliation process been followed. If we had waited on the perfect system we would have delayed implementation of eMedRec for who knows how long. For us education as well as making use of the tools already available resulted in a winning team. We just needed to sharpen our tools to make them more effective.

Agrawal A, Wu W. Reducing medication errors and improving systems reliability using an electronic medication reconciliation system. *J. Comm. J. Qual. Patient Saf.* 2009; 35: pp106-14.

Agrawal A Medication errors: prevention using information technology systems. *Br. J. Clin. Pharmacol.* 2009; 67;6 pp 681-86

Boockvar K et al. Electronic health records and adverse drug events after patient transfer *Qual. Saf health Care.* 2010; 19: pp.1-5

Forster, Alan J et al The incidence and severity of adverse events affecting patients after discharge for the hospital *Ann. Intern. Med* 2003; 138: pp. 161-167

Kripalani, S. et al. Deficits in communication and information transfer between hospital-based and primary care physicians *JAMA.* 2007; 297: pp. 831-841.