

1. TITLE:

“Using Health Information Technology - CPOE to Advance Performance Improvement in Heart Failure Patients at Virginia Commonwealth University Health System”

2. ORGANIZATION: Virginia Commonwealth University Health System (VCUHS)

3. AUTHOR'S NAMES

- Laura R. Kreisa RN, BSN, CPHQ
- Performance Improvement Coordinator
- Primary Point of Contact: 804-828-5627, lkreisa@mcvh-vcu.edu

- Colin A. Banas MD, MSHA
- Chief Medical Information Officer
- Secondary Point of Contact: 804-827- 4196, cbanas@mcvh-vcu.edu

4. Goals addressed in submission:

- Improve the effectiveness of communication among caregivers (2010 –NSPG)
- Computerized Provider Order Entry (CPOE)
- Improve quality, safety, efficiency, and reduce health disparities (Meaningful Use Goal)

Using Health Information Technology CPOE to Advance Performance Improvement in Heart Failure Patients at Virginia Commonwealth University Health System

I. Background Knowledge

A primary goal of the VCU Health System is to become the safest hospital in America. Since July 2002, US hospitals have been collecting data on standardized indicators of quality developed by The Joint Commission and the Centers for Medicare and Medicaid Services (CMS). These indicators have been endorsed by the National Quality Forum adopted by the Hospital Quality Alliance, effectively used to track hospital performance and used to demonstrate health care disparities.

The Virginia Commonwealth University Health System is an urban, comprehensive academic medical center in central Virginia. As the only academic medical center in central Virginia, the VCU Medical Center is on the forefront of health care, providing patients with the most progressive treatments and medical technology available.

Our medical staff includes internationally recognized physicians and highly skilled nurses who provide state-of-the-art, comprehensive patient care. Many of our physicians have been ranked among the top doctors in Richmond in specialties ranging from allergies to vascular surgery. The medical center has been ranked among the top centers nationwide in U.S. News & World Report's "America's Best Hospitals." In 2006, the center received Magnet designation for excellence in nursing services by the American Nurses Credentialing Center.

MCV Hospitals is the teaching hospital component of the VCU Medical Center, which also includes outpatient clinics and MCV Physicians, a 600-physician faculty group practice.

The 779-bed VCU Medical Center is a regional referral center for the state and is the region's only Level I Trauma Center. The center offers nearly 200 specialty areas, many of national and international note. In addition to multidisciplinary centers for cancer, cardiology, neurosurgery and transplantation, the center offers virtually every form of contemporary medical service. In particular, the medical center has received international recognition for early diagnosis and treatment of chest pain and strokes, organ transplant, head and spinal cord trauma research, burn and wound healing, neonatal intensive care and genetic research, as well as cancer research, treatment and rehabilitation.

As a large academic medical center with multiple services and subspecialties, it is difficult for the large volume (650 annually) of heart failure patients to be discharged from one unit and/or service. This ubiquitous disease state requires a uniform solution to reach every unit and/or service that discharge these patients. It is a widely known fact that it is critical to educate patients with heart failure and their families. Patient non-compliance with discharge instructions is often a cause of re-hospitalization. Because heart failure is the most common Medicare diagnosis-related group, and more Medicare dollars are spent for the diagnosis and treatment of heart failure than any other diagnosis, this is a measure that is publicly reported through the CMS Medicare website.

II. Local Problem

At the VCU Health System (VCUHS), demonstrating evidence of all *six* written heart failure discharge instructions has been a problem that has presented an opportunity for improvement. Barriers to improving the documentation of the six heart failure discharge instructions included the complexity of patients and services required for those who seek care at VCUHS, noting that heart failure is often not the sole focus of medical care or the primary reason for admission to acute care. Further, patients are admitted to a variety of medical service teams (cardiology, medicine) and are discharged from a variety of nursing units. Between 2003 and 2007, data collection revealed that evidence of all six written discharge instructions remained below 60%. The discharge instructions of interest are:

1. Activity instructions
2. Diet instructions
3. Follow –up
4. Medications
5. Symptoms worsening
6. Weight monitoring

III. Intended Improvement

- A. The primary goal of the program was to ensure patients with heart failure received clear, complete, written discharge instructions so that they were better prepared for self-care at home including when to call for help. The key project indicator was the CMS Core Measure Heart Failure Discharge Instructions measure, outlined above, with a goal of achieving 95% through implementation of sustainable systematic interventions.

The secondary goal was, through the use of current Computerized Physician Order Entry (CPOE), to develop rules and alerts to support providers in documenting appropriate data. The proposed outcome was to have pertinent information printed/documented on *all* discharged patients' education forms.

The identified specific heart failure discharge instructions documented in a written format supports the following National Patient Safety Goals:

- Improve the effectiveness of communication among caregivers
- Assist in medication reconciliation across the continuum

These initiatives demonstrate the following use of Health Information Technology:

- Computerized Physician Order Entry (CPOE)
- Electronic Medical Record (HER)

- B. This initiative was triggered when a variety of interventions were not sustained as noted below:

- a. Education of involved staff and feedback of performance data. The staff then identified the four highest volume discharging nursing units, which worked closely with DRG Assurance RNs to identify heart failure patients concurrently. While the results were better, sustained improvement was not achieved as this process relied on the memory of nursing staff to give written education to the patient *and* document in the EMR. The team then explored having the diagnosis drive the education; however, diagnoses were not consistently entered into the patient's electronic record in a way that triggered heart failure specific education.

- b. The initial team consisted of advanced practice nurses and staff nurses from the VCUHS Heart Center, staff from the Office of Clinical Transformation, Performance Improvement and patient education liaison from department of Education and Professional Development.
- c. This project impacted a large amount of patients with a common disease state cared throughout multiple buildings on the VCUHS campus. Thus, with a unified electronic medical record (EMR), more focused interventions were identified at the process level to impact all patients vs. a specific population, minimizing outliers by defining specific point in the hospitalization. The discharge process then became the gatekeeper for this intervention.

IV. Planning the Intervention

- A. To achieve sustainable change, a series of phases was launched. Phase I involved a collaboration between Cardiothoracic Surgery and Cardiology Nurse Practitioners and staff from Performance Improvement and the Office of Clinical Transformation (OCT) to develop an electronic Cardiac Discharge Information Form (Cardiac DIF) that was utilized for all cardiac surgery and cardiology patients discharged from the VCUHS Heart Center. This phase included a checkbox that triggered inclusion of a series of instructions, including all six aspects of best practice Heart Failure written discharge instructions. While quite successful, use of this tool was limited to the Heart Center, and about half of VCUHS heart failure patients are admitted to general medical units, that did not utilize the Cardiac DIF.
 - a. Appendix A – illustrates looking at the nursing units where the initial interventions were targeted.
 - b. Appendix B – illustrates the variability of the individual elements being addressed and the impact to the overall score of written discharge instructions.
 - c. This was reviewed retrospectively as a qualitative study.
- B. In Phase II, data analysis revealed that the most significant gaps were the exclusion of clear written activity and diet instructions. This phase focused on the development of an electronic rule and alert in the EMR that required that discharge activity and diet orders must be entered in order for the discharge order to be entered for patients discharged from the VCUHS Heart Center. The activity and diet rules were then tied to the discharge order for all VCUHS patients effective October 2008.

V. HIT Dimensions Utilized

Cerner is the VCU Health System's fully integrated electronic medical record (EMR). Currently, VCUHS has full inpatient and ED Computerized Provider Order Entry (CPOE) which provides the foundation for real-time clinical decision support in the form of face-up rules and alerts. The health system also enjoys 100% online documentation, medication management, longitudinal patient diagnosis and problem list recording digital results retrieval, and online reference and educational material repository. On the HIMSS Analytics scale we are a stage 4.3 health system which places the organization in the top 5% of U.S. health systems in EMR maturity and adoption.

VI. Outcomes

A. Nature of setting and improvement intervention

The VCUHS leadership has supported this process by keeping the spotlight on the issue. First, the organization's Performance Improvement Council, which is co-chaired by the Chief Nursing Officer and the Chief Medical Officer, identified this initiative as one that it monitors and reviews on a regular basis. In addition, resources from the VCUHS Performance Improvement department have been assigned to manage the project. This project has also been placed on the priority list of the institution's Information Technology department. The Office for Clinical Transformation has prioritized this initiative and dedicated the time of an analyst to develop and implement rules and forms. Financial support was given for printing of educational materials by the Pauley Heart Center. Finally, data from the initiative is displayed quarterly in a "Dashboard" report that is presented to and discussed with the VCUHS senior leaders, directors and governing board.

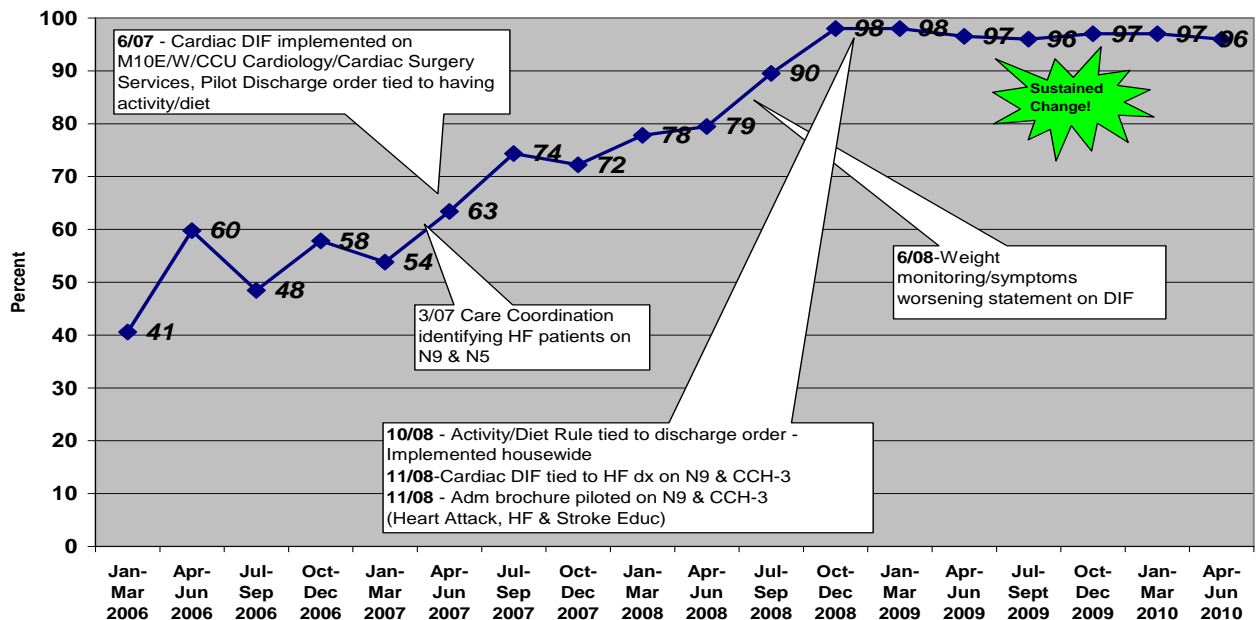
Other hospitals could achieve similar success, regardless of the electronic medical record system utilized, by leveraging functionality of EMR through clinical decision support and forcing functions. Similar interventions could be applied to other projects, and for other patient populations. Multi-disciplinary teams, including clinicians, healthcare quality professionals, and information technology experts can work collaboratively to understand current workflows and develop EMR rules and alerts to prompt providers to document desired information and to populated desired discharge instructions to electronic discharge documentation pathways at any hospital, using almost any EMR system.

B. Changes in process of care and patient outcomes associated with intervention

After our iterative process improvements we consistently exceed 95% in ensuring our heart failure patients receive appropriate written discharge instructions and education at time of care transition. This level of performance has been sustained for seven quarters.

Developed by: Laura Kreisa RN
Performance Improvement
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Percent of Heart Failure Discharged patients with Documentation of all Six Written Discharge Instructions January 2006 - June 2010



Additionally, the Cerner electronic medical record information system has been leveraged to assist with providing clear written discharge instructions in a variety of other ways. These include specific patient education statements that are included as a part of discharge education for all patients since 2004, stating:

If you or a member of your household currently smoke, or have smoked with the past 12 months, you and/or your household member are advised to quit smoking. Please ask your healthcare provider for more information. For further resources in the community visit the Smoke-Free Virginia website (www.smokefreevirginia.org) or call 1-877-856-5177.

Likewise in June 2008 a statement began automatically printing on all discharged patients addressing heart failure daily weight monitoring and when to call their doctor. This statement addresses 2/6 measures – weight monitoring and symptoms worsening.

If you have heart failure follow the instructions from your provider. Remember to weigh yourself every morning after you go to the bathroom and write the result in a daily log. If you gain 4-5 pounds or more in a week, call your doctor.

To accompany the electronic solutions outlined above, a brochure was also developed which was distributed at admission. This brochure educates patients and their families regarding heart attack, heart failure and stroke. Nurses continued to utilize a variety of methods to educate patients, including these brochures, the information that auto-populates and is typed into the patient's Discharge Information Form, videos, and other methods.

As noted from the graph above, this did not get the documentation to 100%, reasons for this are varied. Medications may be in discharge summary and not on discharge form, even though medication reconciliation is completed electronically. Follow-up information may not be entered on the discharge form and patient did not receive any other supplementary heart failure written education materials. Likewise, if the nurse prints out the discharge form *prior* to the entry of the discharge order, the prompt for the activity and diet order will be after the fact and the patient will not have the information.

VII. Barriers Encountered

The barriers encountered in the road to success in our heart failure patients are not unique to our institution. The strongest barriers included reluctance to adopt a new electronic process as well as the typical fears which accompany significant change. There is a significant opportunity cost when considering process change. As with many electronic solution considerations – resource competition became the biggest barrier. Key to the success of this initiative was the vocal support of the content experts in Cardiology as well as the upper Administration.

VIII. Challenges Faced

VCUHS itself enjoys an advanced Electronic Health Record (EHR) system with a long history of Computer Physician Order Entry (CPOE) dating back to the late 1970's. A 2004 upgrade to a Cerner contemporary windows-based system brought along physician and nursing electronic documentation as well as advance clinical decision support including the ability to use discrete, patient information in the decision support engine. This upgrade expanded our use of evidence based processes (we currently have over 300 evidence based ordersets in production) as well as

empowered the institution with the toolset to affect rapid and meaningful change through use of a unified record.

VCU Medical Center, a 779 bed quaternary care center recently opened a 13-story critical care digital hospital architected around and in anticipation of adopting extensive health information technology. The MCV hospital includes 69 affiliated clinics operating on a shared data repository ensuring VCUHS and MCV hospitals operate with a single repository serving transaction systems and knowledge management systems across both venues.

The institution made significant investment in transformation through use of an EMR with protected performance improvement and clinician informaticist time. After the initial financial outlay to implement a unified electronic record with our vendor the subsequent finances for this initiative were devoted to the development of internal expertise and talent specifically surrounding our decision support engine and discharge processes. Iterative collaboration with our EMR vendor improved the features of both the support logic as well as to help optimize features of the tools. In this synergistic way, both parties benefitted and as by-product so did our patients.

The biggest challenge was time, content creation (and harmony among the internal experts). As noted above, there are many competing demands for our limited IT resources. This project was prioritized by leadership to allow our in house experts with the support of our vendor to develop computer code, rules and other tools that were not in use by our vendor.

IX. Summary

The heart failure discharge instruction triumph shows how iterative and thoughtful change can result in real and measurable adherence to core measures which make patients safer. This particular solution leveraged multiple aspects of a mature EMR as well as an innovative use of manpower to propel it into lasting compliance. In short we accomplished the special mélange of decision support rules, educational content, required fields, CPOE, Problem List adoption, and process improvement by re-tasking an existing workforce.

Other hospitals could achieve similar success, regardless of the electronic medical record system utilized, by leveraging functionality of EMR through clinical decision support and forcing functions. Similar interventions could be applied to other projects, and for other patient populations. Multi-disciplinary teams, including clinicians, healthcare quality professionals, and information technology experts can work collaboratively to understand current workflows and develop EMR rules and alerts to prompt providers to document desired information and to populated desired discharge instructions to electronic discharge documentation pathways at any hospital, using almost any EMR system.

X. Interpretation

This intervention with the EMR assisted in identifying the importance in standardizing a process for all patient discharges vs. a specific population as in heart failure discharges. When the individual components of the discharge instructions were reviewed, it was clear that all patient discharges would benefit from an activity and diet order. The standardization of the process allowed the discharge order to function as a gatekeeper increasing the reliability of the orders being entered. However, as noted previously this is not a fool proof system and has minimized variability amongst providers and achieved a much higher success of documentation. Utilizing

the EMR minimizes the human factor of having to remember and facilitates data entry. Thus, the transferability of this intervention would work best with a standard electronic discharge order entry process.

XI. Conclusion

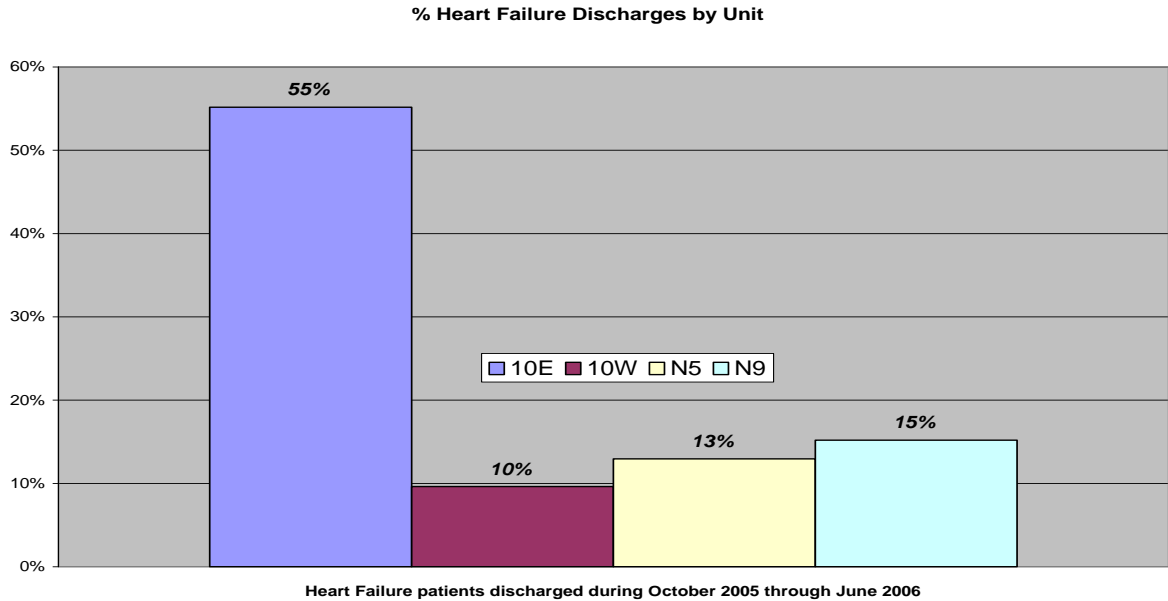
Research and governing bodies recognize the extreme importance of an accurate and successful hand-off at the time of discharge. What is sometimes missing from the hand-off discussion is the patient's role and responsibility in this process. We have demonstrated a number of key learning points here:

- Process change which leverages the EMR needs to be iterative and multi-pronged. No single solution will achieve total success. Success comes as a result of titrated applications of technology at the appropriate point of process.
- Education of providers alone is not an effective strategy for improvement, as this still relies on healthcare providers' memories to complete and document the correct education for patients.
- Many competing priorities within a large healthcare system make many performance improvement efforts challenging; however, leadership interest and prioritization of the project are key to success.
- With small population of heart failure patients on some nursing units and some medical services, reliance on provider memory and vigilance is not effective – more reliable systematic interventions were necessary for sustainable change: Electronic forcing functions, prompts through rules and alerts, and automation of specific information.
- Performance feedback to the individual nursing units was important, as these data were used to spark healthy competition among nursing units.
- Concurrent review nurses can be utilized to scour the patient's electronic record in real time and when necessary to populate the patient's diagnosis and problem list and in doing so produce a data element in the system that can be used to trigger further clinical decision support

XII. Financial Considerations

There were no additional financial considerations budgeted in the implementation of this project. Leadership prioritized this initiative as it is publicly reported and it is also tied to a pay for performance initiative, Anthem Q-HIP (Quality Hospital Incentive Program). Theoretically, the process measure's rationale is to decrease 30 day readmission rates through better patient and family education. Our reviews of heart failure patients and comparison data of related readmissions and non-related readmissions do not supported this as a direct causal relationship. Thus, a cost savings is not able to be detailed. Future plans to study this intervention will involve overlaying the discharge instruction rates with our patient's rates of readmission within 7, 14, and 30-days along with drilling down to all reasons patients return to the hospital.

Appendix A- Represents nursing units with heart failure discharges.
 10E – Cardiology Telemetry unit, 10W- Cardiac Surgery Telemetry unit, N9 – Medicine unit with some telemetry capability, N5 – Medicine unit
 Initial interventions focused on the Cardiology unit (55% of discharges).



Appendix B – The far left columns illustrate when there is one area lagging it impacts the overall score. Activity, diet, symptoms worsening and weight monitoring were inconsistently addressed at discharge.

