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## **A Sample Paper for Improving Quality of Care for Chronic Disease in the Primary Care Setting: A Quality Improvement Program Using SAS<sup>®</sup> and Electronic Medical Record Data**

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### **ABSTRACT**

In Virginia the Federally Qualified Health Center Network has long been engaged in an active primary care quality improvement effort. After a widely implemented electronic medical record system had been in use long enough for the data to mature, we began exploring ways to use this rich resource to help improve our quality of care. After finding that the internal EMR reporting was not suitable for this purpose we turned to SAS<sup>®</sup> to fill this need. We are using base SAS<sup>®</sup> and SAS<sup>®</sup> Access for ODBC to retrieve this data and produce clinical performance measures that help the physicians to monitor their compliance with established clinical guidelines.

### **INTRODUCTION**

This paper details the experience of a group of Virginia community health centers in trying to use the rich data available in electronic medical records to improve the quality of medical care in the primary care setting.

### **RETROSPECIVE OF A CLINICAL QUALITY IMPROVEMENT PROGRAM**

Community Care Network of Virginia (CCNV) is a community Health Center Controlled Network (HCCN) owned by and supporting the activities of the state's Federally Qualified Health Centers (FQHC). Established in 1996, our 358 health care professionals provide primary care access to medically underserved, uninsured and insured populations at 90 delivery sites within Virginia's rural and urban communities. The internal staff at CCNV provide support services to our member centers so that they can concentrate on providing patient care. We supply billing, provider credentialing, payer negotiation services, IT services, training and facilitate the Quality Improvement (QI) program. CCNV is directed by a series of committees comprised of providers and management from the health centers. Day to day operations are carried out by a staff of approximately 35 people.

Since 1999 we have had an active primary care quality improvement program that focuses on promoting the best evidence based practices for our patients. The QI program historically has been directed by the Medical Management committee, which is composed of volunteer clinical staff from the centers such as Physicians and Nurse Practitioners. This committee, facilitated by the CCNV Center for Data and Informatics (CDI), has determined the areas of focus and developed and maintained the clinical practice guidelines which form the heart of our quality improvement program. The CDI staff is composed of four individuals: the Director of Performance Measurement & Improvement; a Programmer/Analyst; a part time Biostatistician and as of March, a Business Analyst.

The Medical Management Committee determined to focus their efforts on chronic diseases because these illnesses have the greatest negative impact on health in the US. Over 90 million Americans live with chronic illness. They account for over 70% of all US deaths and they are responsible for over 75% of US health care expenditures. They are also mainly managed in a primary care setting, and community health centers have significant numbers of patients with these diseases. They determined that they would work on five chronic diseases encountered in the primary care setting: Diabetes and Pre-Diabetes; Cholesterol; Hypertension; Stroke; and Obesity. They reviewed the literature and existing best practice models and then, combined with their own clinical experience, created detailed step by step documentation outlining their consensus on treatment. These documents are called the CCNV Clinical Practice Guidelines and are updated at least annually based on the best current evidence.

Once standards of care had been established, the committee began looking for ways to measure adherence to the guidelines. Several ways to achieve this goal were discussed and some tried, but the disadvantages and cost made

most impractical for universal implementation. Finally, Virginia's health centers were given grants to implement Electronic Medical Record (EMR) systems. While not the primary motivator behind these grants, one important side benefit was that EMR deployment allowed the committee to proceed with the measurement portion of the quality initiative. EMR systems provide a source of universal data which does not require chart reviews or dependence on billing data. Once the EMR data had matured enough to allow a full year look-back period, a center's entire medical record for all patients could be queried to measure provider adherence to CCNV Clinical Practice Guidelines.

Virginia's Federally Qualified Health Centers have almost universally adapted the eClinicalWorks EMR system. It was implemented on a rolling basis throughout the state with some centers approaching three years of EMR use and some centers with less than one year. The committee had hoped to use the EMR's built-in reporting function to produce the clinical measures. While eClinicalWorks does have strong reporting tools it became clear that the clinical reports were not comprehensive enough to support the committee's requirements. As a result, the committee decided that the fastest way forward was to develop and test the measures in house. SAS® was selected for this task because of its multi-platform architecture; ability to easily work with diverse data sources; strong data presentation functionality and its ability to be used for rapid development of large and complex data manipulations.

eClinicalWorks stores its data in a MySQL database using a proprietary data model and each center has its own instance of the database. Almost every external code such as ICD9 diagnosis, CPT procedures and NDC drug codes are translated into internal codes – many of which are different for each installation of the EMR. The non-standard elements of the medical record, such as doctor's notes, are stored as free text columns within the relational model. This presents a huge hurdle for collection of complex clinical data because it requires the developer to interpret medical jargon, notes and varying abbreviations and spellings into a zero-error result. This means that, while we have access to the entire record for all patient care at the center, we have found it is not yet feasible to extract high quality analyzable data, other than "the basics". Currently we have implemented measures that rely on encoded or strictly numeric data sources such as diagnosis, age, lab test or vitals such as height, weight and blood pressure. We have the ability to develop measures that rely on the softer data elements, but have decided not to because provider acceptance is dependent on accurate results.

## CCNV MEASURES OF CLINICAL QUALITY

Our current measures are: blood pressure measurement and control; BMI; Hemoglobin A1c measurement and control; cholesterol measurement and control and aspirin/anti-thrombotic use. We are able to select appropriate patient populations for each measure based on age and/or diagnosis and then test to see if these patients received the level of care called for in the clinical practice guideline. For example, the Medical Management committee has determined that a diabetic patient should have at least two Hemoglobin A1c tests per year at least 91 days apart. Using only data elements that we know to be highly reliable we can find all patients who have a diagnosis of diabetes in the period and then query the lab data results to find all of the A1c test results and when they occurred. Then we can determine if a given patient has met the standard of care. To create a score for a provider we find the percentage of her diabetic patients who met the standard.

Full definitions of the CCNV clinical quality of care measures:

1. Blood Pressure Measurement - Percentage of Cardio Vascular Disease(CVD), Diabetes Mellitus(DM) or Chronic Kidney Disease(CKD) patients who have had two or more BPs documented in the last 12 months
2. Blood Pressure In Control - Percentage of CVD and DM/CKD patients with blood pressure in most recent visit in appropriate control in last 12 months (CVD patients less than 140/90; DM/CKD patients less than 130/80)
3. BMI Measurement - Percentage of patients > 2 years of age with BMI documented in the last 12 months
4. BMI distribution (informational) - Percent of patients with BMI 25-30 by provider, by site and across the Network; Percent of patients with BMI > 30 by provider, by site and across the Network
5. Hemoglobin A1c Measurement – Percent of patients with two HbA1c tests in last 12 months (at least 91 days apart)
6. Hemoglobin A1c Control - Average HbA1c value - distribution of most recent HbA1c by range: percent patients with an average HbA1c value less than 7.0%, percent patients with an average HbA1c value greater than 9.0%
7. LDL Measurement – Percent of patients with CAD or CAD risk factors with a documented fasting LDL within the last 12 months

8. LDL Control – Percent of patients with CAD or CAD risk factors with a documented fasting LDL in the last 12 months with most recent fasting LDL <100
9. Aspirin/Anti thrombotic Use - Percent of patients >40 years with CAD or CAD risk factors who have a current prescription for aspirin or other antithrombotic agent

## RESULTS

The measures were first implemented in mid-2008 and have been re-run and refined on a quarterly basis since then. The first centers and providers were members of the Medical Management committee. (As an aside, these are physicians who are all deeply committed to providing the best possible care to their patients.) When they saw the first results many of them were surprised that they did not score near 100% on Blood Pressure Measurement. We reviewed the data and the programming and found that there were some data entry problems that were corrected by code edits, but the numbers were still less than expected. Once we were certain that the results were as accurate as possible, the providers reviewed their procedures to see what they could find. They discovered that there were cases where patient either did not get a blood pressure taken or it was not recorded. The next time we checked the data we noticed an improvement regardless of any formal program instituted at the center. Just measuring this area resulted in improvements in documented blood pressure monitoring.

The committee members from some centers have instituted formal programs to ensure maximum compliance with the guidelines, using the measures as performance benchmarks. Other centers have pulled lists of patients who had not met the A1c and Lipid measurement guidelines and had initiated outreach efforts to contact these patients and get them to come in for the tests. These kinds of efforts are beginning to be reflected in individual center's rates for some measures.

For example, on the first run we found, based on 988 patients at two centers, that compliance on hemoglobin A1c measurement (2 HbA1c tests/Yr at least 91 days apart) for diabetic patients was 45%. We were only able to calculate this for two of the centers because the lab data was not mature yet at the third. In our most recent results 65% of diabetic patients were compliant for HbA1c measurement. This was based on 4278 patients at 8 centers with mature lab data. The improvement is due to a combination of factors: focusing on work flow at the center to fully document all lab tests; providers becoming more aware of the need to keep up with this best practice and now that they know which patients are not compliant the centers are becoming more aggressive in their outreach efforts.

## FUTURE PLANS

Given the success that we have been able to demonstrate with our pilot project, we plan on continuing to both expand the clinical areas measured and include more centers until we cover all eClinicalWorks implemented FQHCs in Virginia. The flexibility of eClinicalWorks, while being our biggest hurdle to getting usable data, is also our most likely path forward. This EMR system allows for the creation of what they call Structured Data and also allows for custom designed forms to be linked with these new data elements. This means that we can develop EMR front-end modifications that allow the physician users to be more productive and at the same time collect standardized analyzable data. In the first project of this nature, CCNV is partnering with the state of Virginia and eClinicalWorks to implement Tobacco Cessation forms that will help providers focus on this major contributor to chronic disease. We hope to prove that surfacing this information at the time of the patient encounter will lead to an increase in referrals to Quit Lines that have proven to be effective in reducing tobacco use. We will implement what eClinicalWorks calls a Smart Form tailored to our state. It will also help collect measurable performance data to further quantify any improvements in quality of care.

Further down the road, we hope to implement the clinical practice guidelines fully into the EMR. The idea is to use the clinical data to help direct the patient's care and ensure that all the best practices are followed in every case. CCNV believes that this development effort will benefit our patients by helping the clinical staff at Virginia's community health centers provide the absolute best care available.

## CONCLUSION

One of the reasons for pushing for universal EMR implementation is that the resulting data can be used to improve patient outcomes. We have demonstrated that it is possible to use current generation EMR systems to create tools for providers to use to improve the quality of the care they provide to patients. However, unless the data stored in these records are encoded and standardized in such a way as to allow ready access, these systems will prove to have limited use.

## CONTACT INFORMATION

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