

Toward an Electronic Medical Record in District of Columbia Non-Profit Clinics

An Evaluation of the Technology Opportunities Program (TOP) Grant
Awarded to the District of Columbia Department of Health

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Executive Summary

In October of 2001, the District of Columbia Department of Health (DOH) was awarded a Technology Opportunities Program (TOP) grant by the US Department of Commerce. The purpose of the project was to implement an electronic medical record (EMR) at three public health clinics in the District of Columbia and to evaluate the effectiveness of the EMR as compared to paper medical records. Nationally, studies have shown that the EMR can save provider time and improve the quality and continuity of care. Specifically, the EMR can eliminate time spent searching for medical records and results from laboratory tests and consultations. It can integrate clinical decision support systems that improve compliance with established standards of care and minimize the potential for medical errors. The EMR also can facilitate quality control efforts, improve the timeliness and accuracy of patient billing, and generate reports on waiting times, provider productivity, services utilization, and other aspects of clinic operation.

Nowhere are the efficiencies of the EMR more critically needed than in public health care delivery systems. In recent years, the cost of medical care has continued to rise, the numbers of uninsured Americans has increased, and public and private reimbursements have continued to decline. As a result, the health care safety net has been forced to treat increasing numbers of patients with fewer and fewer resources. The EMR has the potential to free valuable provider time that is now spent finding, updating, and maintaining paper medical records.

Many providers consider cost to be the most important factor in the decision to move to a paperless medical records system. However, beginning in 1996, the Department of Veteran Affairs (VA) has made its EMR, the VistA system, available free of charge to public providers and for a nominal cost to private providers. This system was developed by the Department of Veterans Affairs over the course of two decades, with an investment of hundreds of millions of dollars.

The VistA system was the subject of the three-year DC TOP project. At the conclusion of the project, numerous VistA modules both clinical and administrative—had been implemented at two nonprofit clinics, Community Medical Care and Mary's Center for Maternal and Child Care. Only one of the two clinics—Mary's Center—was still in operation at the time the project was evaluated in August and September of 2004. Thus, the evaluation focused exclusively on this clinic, which had been using the VistA system for three months when the evaluation began.

The desired outcomes for the project included 1) improved medical records processes, 2) improved provider satisfaction with the medical records system, and 3) improved patient satisfaction with waiting times and communications with providers. Baseline data were gathered from the three clinics that were supposed to have implemented the VistA system, using a survey developed by a contractor for this purpose. Follow-up data were gathered from Mary's Center, where four pediatricians and their staff members had implemented the VistA CPRS. Because the baseline data were not available by clinic, it was necessary to compare the combined baseline data for all three clinics originally slated to implement the VistA system (Mary's Center, Community Medical Care, and Family Medical and Counseling Services) to post-implementation data from Mary's Center.

The pre/post surveys yielded little meaningful information, largely as a lack of comparable pre/post samples and the fact that paper charts were still in use at Mary's Center at the time that at the time of the post-implementation survey. However, structured interviews shed some light on progress in relation to desired project outcomes:

- 1) Improved medical records processes.** Variables of interest under this category included the ease with which medical records are located, the ability to track ancillary tests and procedures and access results, the ease of locating information within the medical record,

and the amount of time spent locating and updating medical records. According to interviews with providers at Mary's Center, few if any improvements were seen in these processes. The combined paper/electronic medical records system in place at Mary's Center at the time of the evaluation still required providers to locate the paper record as well as the electronic record. While VistA has the functionality to track and report the results of ancillary tests and procedures, this is not currently being done because the lab service has not yet granted administrative access to its system. While progress notes were accessible by point and click, providers had issues with having to scroll through the old progress notes., thus simulating access by paper records., as they were not accessible by date or condition, At the time of the evaluation, the clinic was apparently using an older version of the software. The updated VistA patches contain the later versions which feature the desired functionality. However, the face sheet in the VistA CPRS did provide a useful snapshot summary of patient information, including a current problem list. Access to this summary information and problem list had improved with the implementation of the VistA CPRS.

2) Provider satisfaction with CPRS. Variables of interest in this connection included the organization, legibility and completeness of medical records information, the amount of time required to access information during the patient visit, the overall amount of time saved by the CPRS, and the security and confidentiality of patient information in the CPRS. Providers perceived the VistA CPRS module as more legible and more secure than the paper record. Additionally, the programmed medications list was perceived as helpful, and the programmed encounter form was expected to enhance compliance with Medicaid well-child standards. Problem lists, not always kept current in paper records, were automatically updated in the VistA CPRS. However, overall providers were dissatisfied that the current arrangement which required duplicate entry of information (to VistA and NueMD, an appointment/billing system) on encounters and additional time to enter progress notes-- which several providers did not want to enter during the patient visit. The increased amount of provider time required for updating medical records was not perceived as justified by the marginal gains that had been made in the content of the medical record. It will in all likelihood be justified, however, as soon as the billing interface is established and the lab connectivity is established, which will decrease reliance on paper charts, improve the comprehensiveness of information available on line, and decrease the need to page through the paper record for lab results and eliminate much of the double-entry by administrative staff and providers.

3) Enhancements to patient satisfaction with care. Factors under this category included decreased waiting times; increased time spent with the provider, and perceived improvements in the information available to providers. No data were available to suggest that patient satisfaction with care had been affected by implementation of the VistA CPRS at Mary's Center. Patient satisfaction with care at Mary's Center is generally high.

Despite the added workload, Mary's Center continues to progress with implementation of the VistA system. Scheduled improvements as of this writing include the addition of decision-support modules and the establishment of connectivity to two reference laboratories and integration of VistA with the billing system. Plans are also underway to expand the VistA system to include adult patients, so that all Mary's Center providers will be using the system.

As the DC TOP project draws to a close, the DOH VistA EHR moves to a new phase where DOH and the VA continue to support the implemented clinics, while at the same time these clinics move to become more self-reliant. As DOH and the VA look to bring up new sites. Mary's Center remains committed to

continuing the project. The next step obviously is to work collaboratively secure the funding needed to continue to support the existing projects.

Introduction

Research has shown that medical records are misplaced or missing in 30% of patient visits, and that even if the medical record is available, critical information is often missing, illegible or inaccurate (Dick, Steen & Detmer, 1997). As a result, physicians often spend valuable time locating records, contacting labs and other providers for diagnostic results, re-interviewing patients and recording and re-recording patient information. They may also lose time visually scanning disorganized paper records to find pertinent information. It has been estimated that physicians spend an estimated 38% and nurses an estimated 50% of their time writing up patient charts (Dick et al., 1997).

Problems with medical records also compromise patient care in a number of ways. Patients frequently must wait while providers or support staff attempt to track down their medical records. Continuity of care decreases as multiple providers—primary care physicians, specialists, social workers, nutritionists, and mental health workers--share a single paper record or develop duplicative records. Physicians are more likely to make prescribing errors and order duplicate tests when information in the medical record is incomplete.

In contrast, the electronic medical record (EMR) allows real-time, on-line access to comprehensive patient information by multiple providers, including patient history and physical examination findings, diagnoses, medications, and progress. When integrated with pharmacy and laboratory and across levels of care, the EMR can also provide information on when prescriptions are picked up and by whom, the results of laboratory and other diagnostic tests, reports from specialty care providers, and information on emergency room visits and inpatient hospitalizations. Advanced EMR systems may also incorporate clinical decision support systems and link radiological and pathology images to the medical record. Thus, the EMR not only improves the real-time availability of comprehensive medical information, but substantially reduces the burden placed on providers to maintain medical records, reduces the potential for provider error, and enhances continuity of care among the many providers that may serve a single patient. The savings in provider time can be used to increase the amount of time spent with the patient or to increase patient volume and associated reimbursement.

According to a recent study of one such integrated system, the estimated net benefit from using an electronic medical record in primary care settings over a five-year period was \$86,400 per provider (Wang, Middleton, Prosser, Bardon, Spurr, Carchidi, et al., 2003). These benefits included savings in drug expenditures, improved utilization of radiology tests, better charge capture and decreased billing errors. The EMR also can bring about reductions in the space and personnel needed to maintain paper records.

In the past 20 years, there has been considerable debate as to what constitutes a true EMR—which may also be referred to as a computerized patient record system (CPRS) or an electronic health record (EHR). At the low end of the scale, many such systems, particularly those in place in private and group practices, consist simply of scanned paper documents that can be accessed electronically by authorized individuals. At the high end of the scale, the truly interactive EMR integrates the full spectrum of clinical, financial and administrative functions of health care delivery systems and allows for continuous data entry and reporting of information on patients, services utilization, cost and quality of care, and billing and accounting. To protect patient confidentiality, the EMR typically resides on a dedicated network; however, several Internet-based systems are now being explored, particularly to enhance care management of individuals with chronic diseases (Lazoff, 2001).

The Health Information Management Services Society (HIMSS) defines the EHR as:

A secure, real-time, point-of care, patient-centric information resource for clinicians. The EHR aids clinicians' decision-making by providing access to patient health record information where and when they need it and by incorporating evidence-based decision support. The EHR automates and streamlines the clinicians' workflow, closing loops in the communication and response that result in delays or gaps in care. The EHR also supports the collection of data for uses other than direct clinical care, such as billing, quality management, outcomes reporting resource planning, and public health disease surveillance and reporting (HIMSS, 2003).

One of the few systems in use today meeting the HIMSS definition for a true EHR is the Veterans' Health Information Systems and Technology Architecture (VistA). VistA was developed by the US Department of Veterans' Affairs (VA) over the course of the last two decades with an investment of hundreds of millions of dollars. It is now used by more than 600 VA, military, and foreign hospitals, as well as a number of clinics and large group practices. Though VistA was developed in a hospital setting, it can also be used by providers of primary and specialty care, mental health services, oral health care, hospice care, residential care, wellness and other services. Subject to continuous modification and enhancement, VistA is a growing, evolving system. Its open architecture allows for integration of administrative, clinical and financial modules. It can also be integrated with commercial solutions, including Internet-based technologies, as well as off-the-shelf software and products. Finally, it can be linked to other national databases. Accordingly, VistA is expected to fully accommodate new and future technologies.

Importantly, VistA is in the public domain and is available at no cost to government agencies and for as little as \$53 for private sector providers. It can be downloaded from the Internet and installed on personal computers, where it requires only a small amount of disk space. Built on a client-server architecture, VistA ties together workstations and personal computers with a user-friendly, Windows-based graphic interface. Many aspects of the screens can be customized by end users.

The VistA system has been available from the VA since 1996. Yet non-military organizations have been slow to adopt this low- to no-cost technology, despite its many benefits. Some of the barriers to adoption of EMR technology in general include concerns about confidentiality, data security, data integrity, and the time required to learn how to use a new system (Lazoff, 2001; Andrews, Pearce, Sydney, Ireson, & Love, 2004). Today, less than one-fourth of primary care providers any form of EMR. Thus, in spite of tremendous progress in medical informatics in the last decade, the EMR is still very much an experimental technology in outpatient settings.

Nowhere is the EMR more critically needed than in public health care delivery systems. In recent years, as the ranks of the uninsured have swelled to more than 45 million, managed care has limited provider reimbursement, and health care costs have undergone double digit inflation (see, e.g., Robert Wood Johnson, 2004). At the same time, the states have experienced economic recession and federal Medicaid funding has been reduced. As a result, safety net health care delivery systems have been increasingly called upon to treat greater numbers of uninsured and underinsured patients with fewer resources. The EMR has the potential to make more physician time available to patients, so that public clinics can treat more patients and capture additional revenues. It can make more complete and accurate information available to providers throughout the system, enhancing the continuity of care, improving the quality of care, and reducing the potential for provider error. Finally, the EMR has potential to substantially reduce the administrative costs of public health care delivery systems. The need for these enhancements has never been greater.

The fact that the VistA EMR software is in the public domain makes it particularly attractive to public and private sector providers serving low income, uninsured, and medically underserved populations. Most providers (58%) cite a lack of funds as the major barrier to implementing the EMR (Andrews, Pearce, Sydney, Ireson, & Love, 2004).

Project Description

In October of 2001, the State Center for Health Statistics Administration of the DC Department of Health (DOH) initiated a project to implement and evaluate the VistA EMR in three safety net primary care clinics in Washington, DC. This demonstration project was perhaps the first application of VistA in a non-Veterans Affairs, publicly funded primary care setting. To the degree that the VistA system proved useful in improving clinic productivity and efficiency and the quality of care, it stood to be widely replicated in safety net systems serving uninsured and underinsured individuals across the nation.

Purpose

The purpose of the project was to pilot implementation of VistA EMR in 3 of the 13 primary care safety net clinics in the Non-Profit Clinic Consortium (NPCC). This effort would involve a technology transfer of the Computerized Patient Record System (CPRS), a core module in the VistA system, from the VA Medical Center in Washington, DC—a recipient of the 2000 Government Technology Leadership Award—to the three clinics chosen for the pilot. The project was funded by a US Department of Commerce Technology Opportunities Program (TOP) grant to DOH (\$760,049), with substantial in-kind contributions on the part of the VA and DOH. The projected total project cost was \$1,520,098. The three-year project was initiated on October 1, 2001 and concluded on September 30, 2004.

As originally envisioned, the project would facilitate sharing of medical information and continuity of care among the 3 selected clinics and potentially among all 13 members of the NPCC.¹ Wireless communications (cell phones, laptops and palm pilots) were proposed to be used to strengthen remote access to the EMR during home visits. In addition, the EMR would be integrated with the patient appointment and billing systems, reference laboratories, and pharmacies, and would allow for tracking of patient referrals. Physicians would be able to prescribe medications and enter on-line orders for laboratory tests, consults, radiological procedures, and so forth. Clinical support systems would be implemented to reduce duplication of services, unnecessary procedures and prescribing errors and to improve compliance with evidence-based key clinical pathways. Various primary care providers—physicians, nurse practitioners, nurses, medical assistants, nutritionists, mental health workers, and social workers—would be able to enter progress notes and reminders. Physicians would have immediate electronic access to the results of laboratory and other diagnostic tests, including digital images from CT scans, ultrasounds, MRI's X-rays, and pathology slides. Duplication and

¹ It is unclear at this time as to whether or not expansion was to take place in the course of the three-year project or thereafter. However, one of the architects of the original proposal, Robert Cosby, Ph.D., indicated that his intention was to bring 9 clinics on line by the end of the three-year grant period.

fragmentation of services would be eliminated for patients seeking care at more than one outpatient clinic.

The project would ultimately produce a best practice model that could be replicated by the nonprofit primary care providers serving low income and underserved residents throughout the District of Columbia. These providers serve 127,000 of 572,000 DC residents, or 22% of the City's population (DC Primary Care Association, 2004).

Desired outcomes for the project included:

1. **Medical records process improvements**, including improvements in ease of locating medical records, ability to track ancillary tests and procedures and access results, ease of locating patient information with the medical record, and time spent on medical records
2. **Provider satisfaction with CPRS**, including the organization, legibility and completeness of medical records information, the amount of time required to access information during the patient visit, time saved by the CPRS, and security and confidentiality of patient information in the CRPS
3. **Enhancements to patient satisfaction with care**, including decreased waiting times, increased time spent with the provider, and perceived improvements in the information available to providers

In addition, the project designers sought to evaluate the ability of the VistA CPRS to comply with the requirements of the Health Insurance Portability and Accountability Act (HIPAA) and with the confidentiality requirements of the Ryan White Act.² The project also was expected to shed considerable light on the adaptability of the VistA software to special services often integrated into primary care in the public sector, including substance treatment services, mental health services, and home visitation services, as well as its interoperability with existing systems for clinic appointments, billing, and so forth.

Partnering Organizations

Partnering organizations for the DC TOP grant included the DOH State Center for Health Statistics Administration, which was the lead applicant; the Nonprofit Clinic Consortium; Community Medical Care; Mary's Center for Maternal and Child Care; and Family Medical and Counseling Services. As detailed in ensuing pages, two of these five agencies either folded in the course of project, causing delays and setbacks in implementing the CPRS.

DC Department of Health State Center for Health Statistics Administration

The DC TOP grant was housed within the DOH State Center for Health Statistics Administration (SCHSA). The mission of DC DOH is to promote and protect the health, safety and quality of life of residents, visitors and those doing business in the District of Columbia. Responsibilities

²This information was provided by Robert Cosby, Ph.D., who participated in the development of the initial proposal to the Department of Commerce, in the course of an interview conducted by the evaluator on August 12, 2004.

include identifying health risks; educating the public; preventing and controlling diseases, injuries and exposure to environmental hazards; promoting effective community collaborations; and optimizing equitable access to community resources. Within DOH, the mission of the SCHSA is to collect, preserve and analyze information on births, deaths and other vital events in the District of Columbia. The Center serves as the clearinghouse for vital records and as the District's state agency for providing official health data to other local, state and federal agencies.

Nonprofit Clinic Consortium (NPCC)

DOH partnered with the now-defunct NPCC to implement the DC TOP project. The mission of NPCC was to support and strengthen a comprehensive, integrated, cost-effective network of community-based health centers that provide and ensure access to health care and wrap-around services for underserved populations in Washington, DC. A tax-exempt organization, NPCC provided member services, advocacy, and assistance to 13 nonprofit primary health care clinics and centers representing 43 sites and providing more than 400,000 encounters to the City's medically vulnerable residents, including low income, minority, homeless, elderly, HIV+ and mentally ill individuals, immigrants, children with special needs, people with disabilities, and other special populations.

Founded in 1997, NPCC ceased operations in 2003. Although the agency is no longer in operation, the members of the NPCC continue to serve as safety net providers meeting the health care needs of diverse population. Within this network, three organizations were selected early in the course of the TOP project to test the VistA system, including Community Medical Care, Mary's Center for Maternal and Child Care, and Family Medical and Counseling Services.

NPCC was instrumental in the selection of the three participating clinics based on a number of criteria, including readiness to implement the VistA system and the objective to test the system in different primary care settings. Community Medical Care was selected because it serves DC's large population of low-income African Americans and makes home visits. Mary's Center was selected as a large primary care center also offering home visits, as well as case management services, to culturally different and low-income populations, including immigrants. Family Medical and Counseling Services was chosen because it provides not only primary care, but substance abuse, mental health, and HIV/AIDS prevention, outreach, and early intervention.

Community Medical Care

Community Medical Care served vulnerable populations as a family medical practice from 1978 to 2004, when it declared bankruptcy and folded. The mission of Community Medical Care, a nonprofit clinic, was, "To receive each person who came in wholeness - whole in body, mind and spirit; to provide comprehensive, quality, personalized medical and nursing care; and to create an environment in which healing can take place." Services included family practice, primary care and preventive health services across the life span. Home calls were made to the elderly and high-risk patients. The clinic was staffed by two part-time physicians, two nurse practitioners and support staff and treated an estimated 100 patients per week. A longstanding

“free clinic” using volunteer personnel, Community Medical Care lacked a formal medical records system of any kind.

Mary’s Center for Maternal and Child Care

Mary's Center was established in 1988 with joint funding from the DC Mayor's Office on Latino Affairs and the DC Commission of Public Health to address the demand for Spanish-speaking maternal and pediatric services in the predominantly Latino areas of the City. Today, the Center serves a multicultural population residing throughout DC, with a focus on families who work in jobs where health insurance is not available.

The mission of Mary's Center is, “to build better futures through health care, education and social services that embrace a culturally diverse community.” In addition to primary care services for children and adults, Mary’s Center provides mobile outreach to high risk pregnant women, a child development program, intensive home visits for vulnerable families, case management for teen pregnancy prevention and planning, educational training to prevent school dropout, employment referral and placement, HIV testing and prevention, and a housing program designed to prevent homelessness. In 2002, Mary’s Center served 3,092 patients, of whom 42% were uninsured.

Family Medical and Counseling Service, Inc. (FMCS)

FMCS is a 501(c) (3), non-profit, community-based organization. The mission of the organization is, “to utilize a community-based, culturally appropriate approach to provide comprehensive, holistic services that promote the emotional and physical health of families and individuals, regardless of income or social status, and maximize their quality of life.” Services provided by FMCS include counseling and psychotherapy, primary care, youth and adolescent prevention and education programs, alcohol and other drug abuse education and counseling, case management, HIV/AIDS prevention, outreach, counseling and testing, parent skill development, nutrition counseling/food bank, and support groups.

In addition to the formal DC TOP partners, the VA provided tremendous support to the project, devoting a full-time project director to the initiative and sending a team of consultants to DC to from Texas, upstate New York, and Texas at its own expense.

The VistA System

The VistA System consists of 61 clinical modules, 30 infrastructure modules, and 33 financial/administrative modules (see Appendix A). Together, these 124 modules allow for the implementation of a fully automated health care delivery system with full integration of all systems and functions. The software for each of the system’s 124 modules, along with end-user documentation, can be downloaded from the VistA Documentation Library

(<http://www.va.gov/vdl/>). The modules are all Windows-based, adding to the ease with which computer literate individuals can adopt the system.

The VistA system was chosen because it was a proven, cutting edge system that could be acquired by the City free of charge. The two VistA modules used in the DC TOP project were the Computerized Patient Record System (CPRS) and the administrative module for patient appointments and generation of reports.

Figure 1 shows the VistA CPRS Cover Sheet. The cover sheet summarizes current information active problems, allergies/adverse reactions, postings, active medications, clinical reminders, recent laboratory results, and vital signs, and appointments/visits /inpatient admissions. The tabs at the bottom of the cover sheet are linked to current and archival information on problems, medications, physician orders, notes, consults, discharge summaries, labs, and diagnostic reports.

Figure 1. VistA Computerized Patient Record System Cover Sheet.

Patient Information		Primary Care Team	Remote Data	Postings
DDE, WILLIAM C 243-23-6572 Sep 12, 1944 (56)		2B M Provider: ROBINSON, TOM	Primary Care Team Unassigned Attending: Brown, Stanley A	CWAD

Active Problems	Allergies / Adverse Reactions	Postings
Fatigue, Mental \$ Interstitial Emphysema Ob Ch Bronchitis W/O Exacerb \$ Ob Ch Bronchitis W/O Exacerb \$ Stress \$ * Lung Diseases, Obstructive	Amoxicillin Aspirin Milk Erythromycin Chroma-Pak Injection Diabetes Mellitus Type II Eggs	Allergies Crisis Note Jun 08, 00 Crisis Note Jun 08, 00 Crisis Note Aug 11, 99 Crisis Note Aug 04, 99 Crisis Note Jul 22, 99 Crisis Note Jul 22, 99

Active Medications	Clinical Reminders	Due Date
Kcl Inj, Soln Gentamicin So4 40mg/MI Inj Inj, Soln Theophylline 400mg/Dextrose 5% Inj, Soln 0.45ns Inj Gentamicin So4 40mg/MI Inj Inj, Soln Kcl Inj, Soln Diazepam Can Oral	Active Active Active Active Pending Pending Pending	Tobacco Cessation Education Diabetic Foot Exam DUE NOW DUE NOW

Recent Lab Results	Vitals	Appointments / Visits / Admissions
No orders found.	T 98.6 F May 11, 98 (37.0 C) P 72 May 11, 98 R 40 May 11, 98 BP 120/80 May 11, 98 HT 72 in Aug 23, 95 (182.9 cm) WT 190 lb Aug 23, 95 (86.4 kg)	Jun 25, 97 14:49 Inpatient Stay 1a Jun 23, 91 09:00 Inpatient Stay 1a

Navigation Bar: Cover Sheet / Problems / Meds / Orders / Notes / Consults / D/C Summ / Labs / Reports /

When fully integrated with other clinical modules, VistA CPRS enables providers to order lab tests, procedures, and medications, to make referrals to specialists, and to retrieve the results of ordered tests, procedures and specialty care referrals, as well as discharge summaries from inpatient stays. Integration with the Clinical Reminders modules enhances the quality of care as providers receive notifications of needed follow-up for various age groups, diseases, and health-related conditions. Provider orders can be automatically checked for duplicates, out-of-range values, maximum order frequency, allergies, and potential drug-drug, drug-dosage, drug-overlap, drug-lab, and drug-allergy interactions, with appropriate warnings issued. Menus can

be implemented for point-and-click resolution of clinical reminders to meet clinical guidelines. Quick orders and order sets defined by the user can be built into the menus. All physician orders are integrated with progress notes, results, procedures, diagnosis, and problems, which are updated automatically when orders are entered and completed.

When integrated with appointment and billing systems, VistA CPRS tracks patient appointments in the EMR and allows for electronic capture of patient charges. The system also enables clinicians, managers, and QA staff to extract patient and cost data in a way that supports clinical, fiscal and administrative decision-making.

By itself, as it was used in the present project, VistA CPRS serves as a stand-alone EMR whose main benefit is rapid storage and retrieval of health information generated in a single health care setting. The CPRS software allows for rapid point-and-click composition of progress notes and allows several users to enter portions of a single note, thereby saving clinician time while improving the quality, accessibility, and organization of information captured from multiple providers. End users can customize several features of CPRS, including the encounter forms, drop-down menus, the date ranges for items appearing on the Cover Sheet, the patient list, Quick Orders and Order Sets, notifications, order checks, printing formats, and links to other applications.

The electronic encounter form is the basic building block for VistA CPRS when used in an outpatient setting. The encounter form captures type of visit (brief, limited, intermediate, extended, or comprehensive), diagnoses, procedures, vitals, immunizations, skin tests, patient education, health factors, and exams. Patient diagnoses and procedures are coded using electronic versions of the International Classification of Diseases (ICD) and Current Procedures Terminology (CPT). The diagnoses are automatically added to the problem list, vital signs are updated, and other relevant information is added to the cover sheet

Project Implementation

Year 1 (October 1, 2001 – September 30, 2002)

Year 1 of the DC TOP grant was devoted to planning, formation of a steering committee, site visits and demonstrations, hiring of a project director, and cultivating support for the project. In addition, project personnel devised and implemented an interagency agreement with the VA to transfer the VistA software to DOH, as well as a data use agreement among the three participating clinics (see Appendix B).

In October of 2001, DOH established a steering committee to obtain management buy-in and participation in the grant planning process. Meeting monthly, the steering committee included the directors of each of the three clinic sites, staff of NPCC, administrators from key DOH offices, managers from the DC Public Health Laboratory, professional consultants, and the head of the medical records department at Montgomery College. Its mission has been to provide guidance on the project and serve as a liaison to various stakeholders, encouraging their support of the project.

The VA Medical Center provided demonstrations of the VistA CPRS at each of the three proposed clinic sites between October and December 2001. For the most part, providers and medical records technicians alike enthusiastically supported the project. However, some physicians who were not computer literate questioned their ability to participate in the pilot project. DOH subsequently provided keyboard and computer literacy training for clinicians in need of this support.

Also during the fall of 2001, advocates were identified at each of the project sites to inform, educate and promote the use of VistA and CPRS. Selection of these individuals was based on their level of responsibility, longevity and computer skill. A nurse practitioner fulfilled this role at Community Medical Care. The medical director was selected at Mary's Center for Maternal and Child Care, and a case manager at Family Medical and Counseling Services.

Concurrent with the above-described initiatives, DOH made arrangements to expend Department of Commerce funds. Before this could take place, Congress needed to pass a provisional budget for the City, after which the DC City Council could approve receipt of funds from the Department of Commerce and input the project budget into the City's financial management system. This process took six months to complete.

Subsequently, arrangements were for management of grant funds by the federal General Services Administration, which was believed to provide a more efficient and flexible alternative to grants management than the City purchasing and contracting services would provide. These arrangements, which included issuing an official Request for Proposals and awarded a contract for grants management, which took an additional six months to complete, were in place at the end of the first project year. Thus, accomplishments during Year 1 were completed with no advance expenditure of Department of Commerce funds.

Project Director Leroy Hackett was recruited and hired in January of 2002 by DOH to manage the execution of the project. His initial focus was on making arrangements for the City to receive and expend grant funds, building support for the project, working with the steering committee, and providing liaison with the VA Medical Center and NPCC clinics.

During the summer of 2002, draft pre/post surveys for providers, medical records clerks and patients were designed, field-tested at non-participating clinics, and revised. The surveys were used at the outset of Year 2 to gather baseline data prior to CPRS implementation.

Year 2 (October 1, 2002 – September 30, 2003)

With grant funds available to the project, work began in earnest in Year 2. Baseline data were gathered from the three participating clinics—Community Medical Care, Mary's Center, and Family Medical Services--during a four-week period during November and December of 2002. The data were gathered by the NPCC in collaboration with Dimensions International (DI), an IT contractor on the project, with a report submitted to DOH early in 2003.

In the first six months of Year 2, project staff purchased needed hardware and leased of dedicated T1 lines linking the three participating clinics to the DOH Data Center.³ The process of customizing VistA CPRS software was initiated, and clinic personnel were trained to implement the CPRS. The steering committee continued to meet regularly, and the VA continued to provide a project management and consultants in-kind. In February of 2003, a full-time staff person was hired with grant funds by the Mary's Center to oversee the project at that site.⁴

The first clinic to implement the system was Community Medical Care, Inc., which was "brought live" on April 28, 2003 after months of training and the scanning of paper medical records into a digital format. The clinic was undergoing substantial turmoil at the time, including financial

³ DOH Intranet is a secure, state-of the-art IT infrastructure. Project managers planned to test the VistA system in this environment before migrating to an Internet-based EMR.

⁴ According to Robert Cosby, Ph.D., former executive director of the NPCC, some controversy has surrounded the use of project funds. Members of the community believed that each of the three clinics had been promised a full-time staff person, and the NPCC had been promised a project coordinator. Mary's Center was able to negotiate the funding for a dedicated project coordinator; however, NPCC, Community Medical Care, and Family Medical and Counseling Services did not succeed in this regard.

difficulties and leadership changes. Unbeknownst to project managers, the board of Community Medical Care would dissolve in February of 2004, after months of reorganization, attempts to write grant proposals, and a bailout by the City. The clinic did continue to use the VistA CPRS through the end of the second grant year. However, once the board and clinic operations were dissolved, the space occupied by the clinic was taken over by Unity Health Care, Inc., a private DOH vendor. After reopening at the CMC site, Unity continued to provide primary care services. Based on the staff experience with the VistA system, Unity expressed an interest in continuing to implement the VistA CPRS at the time it assumed clinic operations but could not reach an agreement with DOH.

The closure of Community Medical Care dealt a blow to project implementation. Further compounding the problem, NPCC had ceased operations approximately one year prior to the dissolution of the board of directors of Community Medical Care, Inc. NPCC's founder and long-time executive director, Robert Cosby, Ph.D., had resigned in February of 2003, and all NPCC operations had ended in the ensuing months.

In spite of these difficulties, DOH and its subcontractors continued with project management and implementation throughout Year 2. DOH provided ongoing training, technical assistance, project management, and liaison with stakeholders. Technical oversight of the project and customization of software was provided by Dimensions International, a subcontractor to DOH. The VA continued to provide training and technical assistance to the project team members and participating clinics.

By the end of Year 2, equipment had been obtained, T-1 connectivity established, clinic personnel trained, and the software customized for Community Medical Care. Most importantly, Community Medical Care had accrued five months of experience in using the VistA CPRS, which would help inform efforts to implement the system at Mary's Center.

Year 3 (October 1, 2003 – September 30, 2004)

During the third and final year of the project, the VistA CPRS was implemented by Mary's Center for Maternal and Child Care and arrangements were made to implement the system at Family Medical and Counseling Services, Inc. Mary's Center was brought live in May of 2004, after patient information (name, birth dates, address, demographics) was manually entered into the system for 7,000 patients. As of this writing, Family Medical and Counseling Services has not yet implemented the VistA CPRS. However, an IT Coordinator has been appointed from among existing personnel to assist with project implementation, and some training has taken place.

Project Evaluation

The final evaluation took place from August 8, 2004 through September 17, 2004. It consisted of:

- A comparison of post-implementation surveys from patients, providers, and the medical records technician at Mary's Center for Maternal and Child Care to baseline data
- A structured interview with DOH Project Director Leroy Hackett, who provided project management and oversight from January of 2002 to the end of the project
- A structured interview with Robert Cosby, Ph.D., former Executive Director of the NPCC, to obtain information on the implementation of the project through February of 2003, when he left the NPCC.
- A structured interview with Halima Roebuck, TOP Project Coordinator at the Mary's Center, to obtain qualitative information on project implementation and effectiveness
- A structured interview with David Rose, MD, Medical Director of the Mary's Center, also to obtain qualitative information on project implementation and effectiveness.

As noted, the pre-implementation survey was administered to staff and patients at the three participating clinics during a four-week period in November and December of 2002. Follow-up surveys were administered to staff and patients at the Mary's Center beginning August 20, 2004, and concluding on September 17, 2004. It was not possible, as originally planned, to conduct post-implementation surveys at Community Medical Care, which is no longer in existence, nor at Family Medical and Counseling Service, Inc., which has not yet implemented the Vista CPRS. FMCS further declined to participate in structured interviews.

The structured interviews took place on August 4, 2004 (Hackett), August 11, 2004 (Cosby and Roebuck) and August 20, 2004 (Rose).

The results of the evaluation follow.

Pre-Post Implementation Surveys

The pre/post survey instruments used to evaluate the project are shown in Appendix C, including a provider survey, medical records staff survey, and patient survey. The surveys were developed with grant funds by an NPCC contractor. Prior to implementation, the three

instruments were field-tested on a sample of five providers, six medical records staff, and eight

Survey Type	Mary's Center	Family Medical and Counseling Services	Community Medical Care, Inc.	Total
Provider	2	4	3	9
Medical Records Staff	1	3	1	5
Patient	50	50	21	121
TOTAL	53	57	25	135

patients from Community of Hope and Bread for the City, two NPCC members not actively involved in the DC TOP project, and subsequently revised. Pre-implementation survey data were subsequently gathered from patients (n = 121), providers (n = 9) and medical records clerks (n = 5) at the three sites slated for CPRS implementation (see Table I).

Table I. Number of Pre-Implementation Surveys, by Type and Site

The provider and medical record staff surveys were self-administered. The patient survey was individually administered as a face-to-face interview with each participant.

Provider surveys. Post-implementation provider surveys were completed by 12 staff members at Mary's Center for Maternal and Child Care. The 12 respondents comprised a 100% sample of Mary's Center staff using the VistA CPRS at the time of the evaluation.

The pre/post provider survey findings are shown in Table II. A few remarks on the survey results are in order. First and foremost, any apparent pre/post differences may reflect differences between the practices at Mary's Center and those at the other two clinics included in the baseline data, rather than the implementation of the EMR. Second, the responses relating to medical record availability, accuracy, completeness, and overall rating (Sections I, II, and V) did not relate exclusively to the VistA CPRS, but to the combined VistA CPRS and paper chart now in use at Mary's Center. Thus, the findings in these sections lacked validity as a measure of the effectiveness of VistA CPRS and could not be included in the evaluation.⁵

The data in Section III suggested that end users were not satisfied with the communications they had received about the TOP project and that, even as the project concluded, they lacked an understanding of project activities and timelines. Less than half (45%) thought that progress toward the project timelines was good to excellent. Some improvement was seen, however, in

⁵ It is this evaluator's opinion that, even if Mary's Center had replaced the paper medical record, however, the validity of the survey would have been compromised by a lack of sensitivity and specificity.

general understanding of the TOP project, which increased from 11% at baseline to 55% at follow-up.

The data in Section IV suggested that, despite perceived problems with project communications and guidelines, respondents continued to believe that the EMR would be effective. The information in Section V indicated that Mary’s Center providers continued to have serious concerns about the current medical records system (Item V.21), the quality control efforts performed in medical records (V.22), the quality of information in the medical record (V.23) and the time available to review records (V.24). No baseline data were available on these four items.⁶

Table II. Pre/Post-Implementation Provider Survey Findings

Item	Pre-Implementation (n = 9)	Post-Implementation (n = 11)
I. Medical Record Availability		
1. Providers indicating that the entire medical record was available at the time of the patient visit	89%	91%
2. Providers indicating that the current lab test results are included in the medical record at the time of the patient visit	89%	82%
3. Providers indicating that the content of the medical record is compiled on a timely basis	89%	100%
4. Providers indicating that they have access to information when patients use the other two NPCC sites participating in the project	NA	NA
II. Medical Record Accuracy and Completeness		
5. Providers indicating that they lose time compiling medical record information	45%	100%
6. Providers indicating that they lose time searching for missing pages, lab results, etc. in a medical record	67%	100%
7. Providers finding the organization of the medical record intact and user friendly	89%	90%
8. Providers indicating that the legibility of the medical record is an issue	56%	91%
9. Providers indicating that they corrected or completed medical records information when needed	89%	91%
10. Providers reporting that quality control is completed on medical records	77%	45%
11. Providers referring to the Physicians Desk Record to document a patient medical record	55%	55%

⁶ As noted elsewhere in this report, the evaluator was furnished only a summary report of the baseline data.

III. Intelligence and Implementation		
12. Providers rating the extent to which they feel that they had been informed about the TOP project as good to excellent	67%	64%
13. Providers indicating that their inclusion on discussions of the TOP project has been fair or better	78%	82%
14. Providers whose understanding of the TOP project is good to excellent	11%	55%
15. Providers whose understanding of project activities and timelines is good to excellent	11%	18%
16. Providers who feel that the progress toward scheduled project timelines is good to excellent	17%	11%
17. Providers who rate communication about the TOP project as good to excellent	48%	36%
18. Providers who give the TOP project an overall rating of good to excellent	67%	45%
IV. Electronic Patient Record Effectiveness		
19. Providers rating the future effectiveness of the electronic medical record on their positions as good to excellent	88%	80%
20. Providers rating the future effectiveness of the electronic patient record on patient care as good to excellent	100%	90%
V. Medical Record Rating		
21. Providers rating the current medical record system as good to excellent	No data	27%
22. Providers rating the quality control efforts performed on medical records as good to excellent	No data	44%
23. Providers rating the quality of information presented in the medical record at the time of the visit to address patient concerns as good to excellent	No data	60%
24. Providers rating the amount of time available to review a patient's medical record prior to the visit as good to excellent	No data	18%

Note: Missing data were excluded from the analysis.

Table III summarizes responses to open-ended items in Section VI of the provider survey. As might be expected, providers found the dual electronic/paper system burdensome (Item 26). In addition, provider comments suggested that the VistA system lacked the templates and content needed to capture health information on a pediatric population (Item 27). Concerns were expressed about the future of the system, the potential for a truly integrated system, and the need for provider inclusion in the decision-making process.

Table III. Provider Responses to Open-Ended Items

Item	Responses
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26. In reference to the current medical record system in your facility, please identify and briefly describe any other challenges or problems not presented in this survey	
<ul style="list-style-type: none"> • System is not user friendly for a pediatric practice • No site/pediatric specific templates • Does not make charting easier—takes more time to type in notes than to hand write at this point • Knowing where to find things on the computer (is a challenge) • Having enough computers for everyone (is a challenge) • Templates that are tough to work from 	<ul style="list-style-type: none"> • Extra typing involved • Small rooms • Patients take the chair to computer • Computers sometimes “down” • No immunization information in CPRS • Need to look at chart and computer for complete medical picture • It takes too long
27. What suggestions do you have for improving the medical record system in your facility?	
<ul style="list-style-type: none"> • Larger diagnostic database for pediatric, women’s health issues (ICD9 codes) • Growth charts integrated into the system • Allow us to make our own templates • Allow us to access labs in our system • Functioning computers in each exam room • Inputting information twice (once on paper and once on the computer) takes a lot of time 	<ul style="list-style-type: none"> • New/different template • Need specific templates to reflect population we see • Need more comprehensive list of diagnoses
28. Please describe any suggestions you may have for improving the project management.	
<ul style="list-style-type: none"> • Include us in future discussions about the system 	<ul style="list-style-type: none"> • A 3-month meeting including <i>everyone</i> involved
29. Please state any questions or concerns that you may have regarding the Technology Opportunities Program.	
<ul style="list-style-type: none"> • I am concerned about our lack of involvement in any decision making about the computerized patient record system • What is the long term sustainability of the project? The possibility it may lose funding? 	<ul style="list-style-type: none"> • Will labs/x-rays, other patient care related information be available for viewing electronically?

Post-implementation medical records staff survey. The medical records staff survey was completed by the Mary’s Center medical records technician. The respondent indicated that the entire medical record was *sometimes* available at the time of the patient visit (I.1.) that the current test results are *sometimes* included (I.2), and that the information in the medical record is *sometimes* completed on a timely basis (I.3). The respondent indicated that she *usually* lost time compiling medical records information (II.4) and that she *always* lost time searching for missing pages/test results etc. (II.5). She *never* found the overall organization of the medical

record intact and user friendly (II.6), and *usually* found legibility to be a problem (II.7). The medical records clerk indicated that providers *sometimes* corrected/completed the medical record information when needed (II.8), and that quality control is *never* completed on medical records (II.9). Like the provider survey, these findings relate to implementation of the combined paper/electronic record.

The medical records clerk felt that efforts to keep her informed about the computerized patient record, her inclusion in the discussions about the project, her understanding of TOP and its activities and guidelines, were all *good* (III.10, 11, 12, and 13). She also felt that compliance with the established timeline for the project was *good* (III.14); however, she believed that project activities occurring as scheduled was *poor* (III.15). As an end user, the medical records clerk rated communication about the TOP project and the Technologies Opportunity Program itself as good (III. 16 and 17). She rated the future effectiveness of electronic medical record technology on her current position as *good*, and on patient care as *excellent* (IV.18 and 19).

With regard to the current medical records system (Item V.20), the clerk identified several problems, including “providers stay with charts/medical records instead of returning them;” that “there is no room for the charts we have;” and “finding materials that patient needs to be faxed (is a challenge).”

The respondent’s suggestions for improving the medical records system were, “to use (electronic) files then and there and make notes instead of taking the files;” and to “put notes in records when you have them available instead of end of day” (V.21). Her suggestion for project management was, “To please speed up the progress of having lab work sent by computer so they don’t have a lot of paper work that is behind in filing” (V.22). Her concerns about the Technology Opportunities Program were, “What other clinics in our area will have this program? What opportunities besides sharing of files will this bring?” (V.23).

Again, the utility of the findings from this survey is circumscribed by the fact that Mary’s Center is using both paper and electronic medical records, so that responses refer to this hybrid system.

Patient surveys. Post-implementation patient surveys were completed by a convenience sample of 21 clients at Mary’s Center. The results of the pre/post patient survey are shown in Table III.

Table III. Pre/Post Implementation Patient Survey Findings

Item	Pre-Implementation (n = 121)	Post-Implementation (n = 21)
I. Medical Record Information Availability		
1. Patients indicating that medical records information is	89%	71%

<i>always</i> available at the time of the visit		
2. Patients indicating that their lab test results were available at the time of the medical visit	71%	100%
3. Patients indicating that the nurse/doctor has the medical history available when the patient comes for a medical visit	84%	100%
4. Patients who have been asked to verify identifying information by providing name, date of birth, address, etc.	50%	90%
II. Medical Record Accuracy and Completeness		
5. Patients who <i>usually</i> or <i>always</i> spend time waiting to see the doctor	66%	76%
6. Patients who <i>usually</i> or <i>always</i> spend time waiting to see the nurse	No data	75%
7. Patients who feel that the nurse/doctor <i>usually</i> or <i>always</i> has the necessary information to care for them when the patient is speaking to them	75%	90%
8-9. Patients indicating that the provider (nurse or physician) spends time talking with them	82%	100%
10. Patients indicating that the doctor provides them with written information (e.g., pamphlets, booklets, etc.) to take home	75%	100%
11. Patients who have requested their medical record and who rate the time to receive this information as <i>good</i> to <i>excellent</i> .	87%	81%
12. Patients who have required that their medical record information be forwarded to another provider and who rate this experience as <i>good</i> to <i>excellent</i>	No data	64%

A smaller proportion of patients in the post-implementation survey indicated that the medical record was *always* available at the time of the visit (item I.1.) This could simply reflect the lack of understanding on the part of patients, rather than the true availability of the medical record.

The results of the patient survey appear to show some improvement in the availability of lab test results and patient histories at the time of the patient visit when Mary's Center patient responses were compared to those of the three original clinics (items I.2 and I.3). An increase was also seen in the percent of patients indicating the doctor or nurse *always* has the necessary information to care for them (II.7). However, it is impossible to determine whether or not these changes reflect the implementation of VistA system at Mary's Center or differences between Mary's Center and the two other clinics included in the baseline data.

Comments offered by patients indicated their satisfaction with Mary's Center. One patient reported that, "All is very good." Another stated that, "When I have need to know something

they always have answers. This is why I consider the service to my children excellent.” Others commented on the excellent front desk staff and physicians; however, one respondent remarked that some staff persons could be impatient. These general comments bear no apparent relationship to implementation of the VistA CPRS.

Structured Interview Findings

Structured interviews yielded information on the successes and challenges of project implementation at Community Medical Care, Inc., and Mary’s Center, as described below.

The Community Medical Care, Inc., Experience

The VistA CPRS was partially implemented at Community Medical Care, Inc., for a period of ten months beginning in late April of 2003 and concluding in February of 2004, when the clinic folded. The clinic was included in the original collection of pre-implementation survey data; however, no post-implementation data were gathered. The present evaluator collected the following anecdotal information in the course of a structured interview with Robert Cosby, Ph.D.

T-1 connectivity and PCs were provided to Community Medical Care, screens were customized for the primary care settings, and providers and medical records staff were trained to implement the VistA CPRS. Archival records were scanned into the system, and new patient information was entered directly into the system from the date that VistA went live (4/28/03). The concept of the EMR was readily accepted; however, implementation dragged. The grant provided no funds for project implementation and several staff members, perceiving the VistA CPRS as adding to their workloads, actively resisted its implementation.

Historically, Community Medical Care, which provided indigent care for walk-ins, didn’t keep paper records unless a physician prescribed medication. With the advent of Medicaid managed care and the DC Healthcare Alliance (in 1997 and 2001, respectively), Community Medical Care and the City’s other free clinics were required to maintain paper medical records in order to receive reimbursement, yet compliance with this requirement had been low. Further, the clinic’s part-time physicians had difficulty trusting the VistA system, and saw little reason to change the existing medical record system, which had no formal layout or organization but contained all the information the physicians needed in chronological order.

Community Medical Care was also trained to implement the VistA appointment module to replace the hand-written calendar, which posed confidentiality and privacy concerns. However, the clinic’s registration clerk failed to implement the module.

The Mary’s Center

Training, Customization, and Initial Implementation of CPRS. Providers and managers from the Mary’s Center have been involved with the DC TOP project since its inception, assisting NPCC in project design and development, completing pre-implementation surveys of

staff and patients, participating on the steering committee, and attending trainings and skill practice sessions at the VA Medical Center (VAMC) in Washington, DC and DOH headquarters.

The EMR IT Coordinator, Halima Roebuck, was hired by the Mary's Center with grant funds in March of 2003 to provide full-time support to the project. Ms. Roebuck attended trainings in April of 2003 and March of 2004 and also attends the VA's annual national conference on the VistA system. She in turn trained staff at Mary's Center to use the VistA CPRS in the months prior to implementation. She also supervised the process of implementing CPRS, with technical assistance provided by DOH contractors and Kay Craddock, the VA Project Director, who works at VAMC.

Ms. Roebuck coordinated with DOH, its subcontractors and the VA in establishing connectivity from Mary's Center to the DOH Intranet, obtaining needed hardware, and customization of the VA's software—a process that continues to be ongoing. Ms. Roebuck also oversaw the process of manual data entry into the CPRS system from the Mary's Center medical records, including patient name, date of birth and other demographic information, address, and emergency contacts. Though this information exists in the Mary's Center's existing registration and billing system, NueMD, it was not possible to link the two databases. Thus, information on more than 7,000 patients was manually entered into CPRS. Paper medical records were not scanned, though the CPRS does have the capacity to contain scanned records. For this and other reasons, Mary's Center continues to use paper medical records along with the CPRS.

Mary's Center providers found the templates developed by Community Medical Care (for screens, drop down menus, etc.) helpful in the customization process. During this process, providers were able to make a number of decisions about the style and look of the VistA CPRS (buttons vs. drop down menus, free text vs. point and click options, etc.) Providers were not able to change the content main screens or their sequencing; however, they could specify the content of pediatric progress notes and associated drop-down menus. They created sections within the progress notes for behavior, temperament, sleep, nutrition screening, developmental screening, physical appearance, and other factors relevant to pediatric primary care. For the most part, these sections and drop-down menus were newly developed to match the forms in use by clinicians at Mary's Center. Completing the mandatory sections of the CPRS helps ensure that progress notes are comprehensive and detailed, thus improving the quality of health information available.

Status of the VistA CPRS. From the time that the system went live in May of 2004, all new patient information has been entered into the VistA CPRS; however, providers at Mary's Center continued to use paper records during the patient encounter to access archival information. In addition, paper charts were needed for current signatures, lab results, and reports from consulting physicians, none of which are available in the CPRS, when used as a stand-alone

system. To ensure that paper medical records were complete in the event that CPRS was unavailable, paper copies of electronic progress notes were printed and filed in the record.⁷

Four physicians, one nurse practitioner, four medical assistants, one registered nurse, and one administrative assistant were using the VistA CPRS system at the time of the evaluation. The physicians and nurse practitioner entered diagnoses, procedures, and progress notes during or after patient encounters. Medical assistants entered vital signs, immunizations, certain procedures (e.g., phlebotomy), laboratory findings, hearing and vision screening results, and progress notes for patients who do not have a physician/nurse practitioner encounter. The registered nurse and administrative assistant, who made referrals to other providers, also input this information the CPRS.

The registered nurse, administrative assistant, and front desk clerk used the VistA administrative module that integrates with CPRS, to schedule patient appointments. VistA was perceived as being helpful from a clinical perspective in that it links with CPRS, updating both the individual patient record and allowing providers to electronically access their daily schedules. It is also the module that is used to generate reports from the VistA system, including encounters, diagnoses, utilization, and so on.

At the same time an appointment was made by Mary's Center staff in VistA, it was also entered into NueMD, a proprietary software package linking registration, appointments, encounters, and billing. (In the future, as more VistA modules are brought on line to integrate patient registration, scheduling, and billing, it may eventually be possible to phase out the use of NueMD. Until that time, it will be necessary to operate two separate appointment systems, unless a system interface was temporarily established as a stop-gap measure.) Any staff person making an appointment (receptionist, RN, Administrative Assistant) was required to enter the information in both NueMD and VistA. The receptionist who closed the clinic at the end of the work day made sure that the appointments for the following day was entered in both systems.

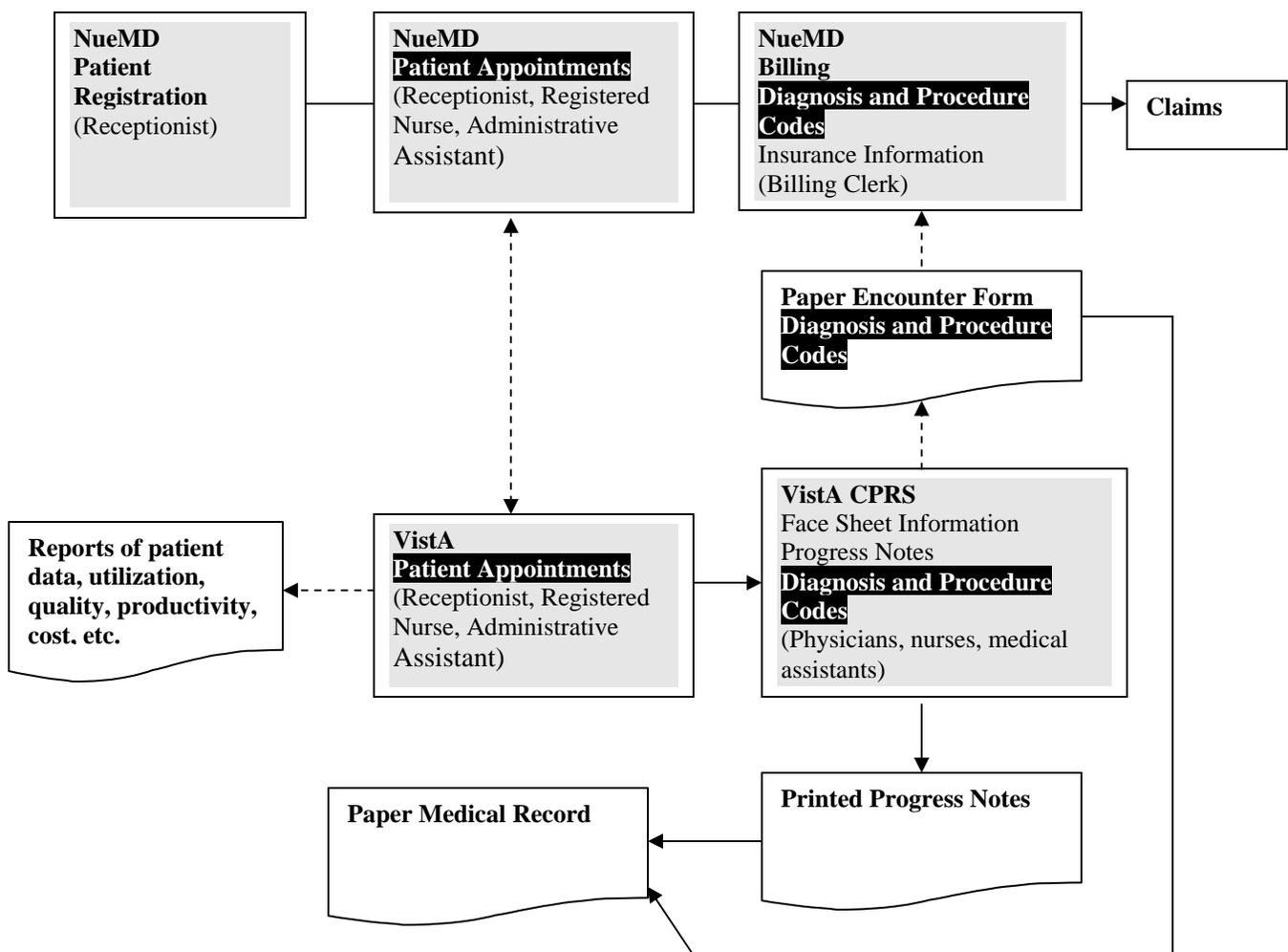
The system of tracking encounters at Mary's Center was also redundant. During or after the patient encounter, providers entered the diagnosis and procedure code into VistA CPRS--which had been customized to include the diagnoses and procedures on the Mary's Center encounter form--as well as onto a paper version of the encounter form. Information from the paper encounter was entered into NueMD so that a bill could be generated. The paper encounter was filed in the paper medical record, along with printed copies of the electronic progress notes.

⁷In one instance, the DOH network crashed for more than two hours. Additionally, there has in the past been some question as to that owns the data on the DOH Intranet. While a data sharing agreement has been signed between Mary's Center and DOH, the staff continues to back up CPRS with paper.

The three redundant IT systems in use at the Mary's Center are schematically depicted in Figure 2 on the following page. Redundancy on this order is typical of the period of transition from paper to a paperless system.

Figure 3 on page 24 shows the actual and proposed EMR implementation at Mary's Center at the time of the evaluation. The bold/shaded boxes show actual implementation, while gray boxes show future plans. As indicated, connectivity existed only between Mary's Center and the DOH Intranet, where the VistA CPRS database was located. No connectivity had been established with reference laboratories, pharmacies, consulting physicians, or providers of specialty, emergency or inpatient care.

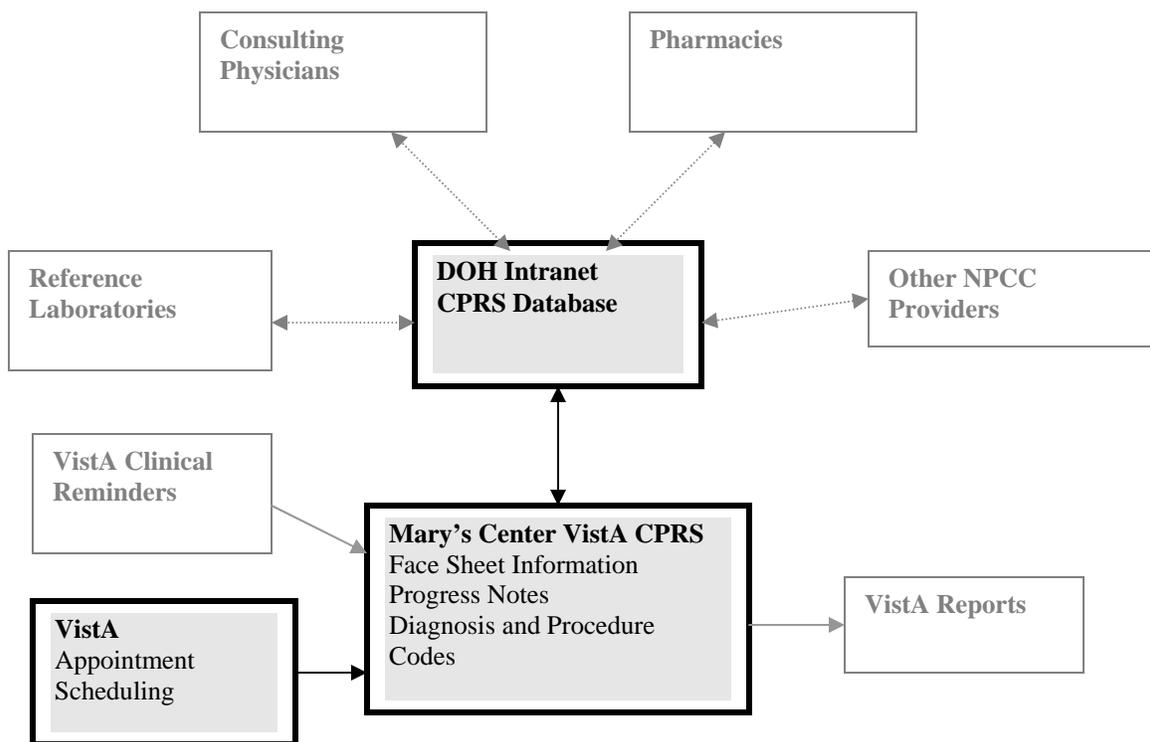
Figure 2. Redundant Systems for Appointments, Encounters and Medical Records in Use at Mary's Center



As one might suspect, from an administrative point of view, the redundant systems for appointments, encounters and medical records were perceived as requiring more—not less—time to operate than before the introduction of the VistA System. At the same time, from a clinical point of view, providers were impatient to implement the VistA functionality needed to eliminate redundancy, to enhance the quality, accuracy and completeness of health information, and to improve patient management.

Mary's Center providers were continuing the customization process, with 20 new changes submitted to DOH during the second week of August 2004. They were particularly interested in continuing to tailor CPRS formats to accommodate the information on Mary's Center forms. Providers were also in the process of selecting and customizing clinical reminders for use in the Mary's Center's pediatric practice (see list of available clinical reminders in Appendix D).

Figure 3. Current and Proposed EMR Implementation at Mary's Center.



Eventually, the staff hoped to be able to access current progress notes by date, diagnosis, and/or procedure. (At the time of the evaluation, the progress notes had to be “paged “ through until the most recent notes were accessed. This issue apparently will be addressed when the sites receive later versions of the software.) Plans were also in place to expand the VistA CPRS project to adult medicine, so that all Mary’s Center providers would use the system.

Mary’s Center was also looking forward to implementing the reports that could be generated by the VistA system on numbers of patients, workload statistics, service utilization, waiting times etc., and had scheduled a training to be conducted by the VA on the various reporting options. The list of reports selected by provider staff is contained in Appendix E.

Provider adoption of CPRS. Initially, concerns were expressed by Mary’s Center providers about having a computer in the exam room and typing notes during the patient/provider encounter, which might alter communications and dynamics of the encounter. Staff was not accustomed to typing while interacting with patients, but jotting down notes, and there was considerable variability in the computer literacy of end users. However, concerns about entering data into the computer during patient encounters subsided as providers evolved their own work styles using the VistA CPRS. Some finished their progress notes during the encounter, and some during charting time. Some took paper notes, and others entered all information directly into the computer. The perception continued, however, that the CPRS had increased, rather than decreased, the administrative burden of the medical record. This was largely a function of the fact that there were completely redundant paper and electronic records in what staff hoped was a transitional phase.

Providers also experienced some initial difficulty using the VistA CPRS to find diagnosis and procedure codes. However, additional training helped resolve this issue, and with practice, providers came to know where to find different drop-down menus and to enter specific types of data.

Overall, providers believed that the while VistA CPRS had added some value to the medical record. It had not necessarily improved the comprehensiveness of health information, as that same information was available in the paper record. While CPRS was considered to be more readily accessible than the paper record, the need for parallel paper and electronic medical records had added to the provider workload. According to Medical Director David Rose, MD, providers had to “bounce back and forth” between paper and electronic versions of the record, in effect doing “double duty.” As a result, implementation of VistA CPRS had progressed only as providers became resigned to the adoption of the VistA system.⁸

⁸ Provider resistance to adoption of the EMR is commonly encountered. See, e.g., Tough love approach helps physician practice transition to EMR. *Performance Improvement Advisory* 8(1), pp. 6-8. January 2004.

For the most part, the short-term inconveniences incurred in the implementation of the VistA CPRS were tolerated by Mary's Center staff because the Center's leadership and key managers held a vision of the long-term potential of the VistA system in which the system not only would streamline operations and improve the quality and accessibility of patient information, but improve the management of resources and the accuracy of patient claims. It also was held to have the potential to link to citywide surveillance systems for maternal and child health, chronic diseases, and utilization of services by DC Medicaid patients and members of the DC Healthcare Alliance, the City's health plan for uninsured persons up to 200% of poverty. At the time of the evaluation, Mary's Center routinely compiled and submitted many different reports to the DC Department of Health that could in theory be extracted from CPRS.

Clinical benefits of CPRS. The lack of integration with pharmacy, laboratory and other providers, along with the lack of decision support, limited the clinical benefits of the VistA CPRS. As Medical Director David Rose, MD, put it, "Those interfaces that truly make this a system of patient management are missing. Right now it's just an electronic medical record, just like my chart. It doesn't do anything, it just sits there." Some concern also was expressed about the fact that, for reasons that remain unclear, Mary's Center was using an obsolete version of CPRS. (At the time of this review DOH and the VA were in the process of updating the VistA software).

Yet there were several perceived advantages to the VistA CPRS, even as a stand-alone module. Specifically:

- The paper encounter forms had been programmed into the system, as well as the template for Early and Periodic Screening, Diagnosis and Testing (EPSDT)--the Medicaid standards for well-child care--for infants at two, four and six months. These computerized forms used "point and click" menus and were expected to enhance compliance EPSDT standards, which are integral to the quality of pediatric care.
- The pharmacy formulary of approved medications was also programmed into the system. Again, this represented an improvement over the paper chart, which did not contain a medications list.
- The network was perceived as secure, requiring three passwords to access patient information. This represented an obvious improvement over the traditional paper record, which is handled by many different technical, administrative and professional people at different levels of the organization, increasing the potential for violations of patient privacy and the confidentiality of health information.
- Problem lists were kept current in VistA CPRS, but not in paper charts. In the course of completing an encounter in CPRS, the provider had the option to specify which diagnosis (es) should appear on the problem list on the face sheet.

Perhaps the greatest perceived advantage of the VistA CPRS was the ready availability of comprehensive patient information on the face sheet. As Dr. Rose put it, "I can pull up a face sheet on a client, and there on the face sheet is their problem list, their medications list, all the appointments that they'd had . . . and maybe allergies. So that's something that's been useful. At least I have that information, and don't have to go looking all over the chart to figure it out. I get a snapshot of the patient as soon as I walk in and turn on the computer."

Future enhancements. There was a great deal of interest at Mary's Center in the possibility of providing connectivity to the two reference laboratories used by the Center--Quest and LabCorp. This connectivity, combined with implementation of the laboratory modules for the VistA system, would make it possible for physicians at the Mary's Center to electronically order laboratory tests not performed on site, including blood work, cultures, organ and disease panels, and various combination tests. At the time of the evaluation, Mary's Center received the results of lab tests by mail or fax, after which they were filed in the paper medical record. One physician retrieved lab results from the Quest website, copying and pasting them into the electronic progress notes; however, this did not replace the need for authorized laboratories to enter lab results under the "Labs" tab. The VA Medical Center and DOH have actively taken on the challenge of helping Mary's Center establish two-way electronic communications to Quest and LabCorp.

Mary's Center providers further expressed a desire to establish connectivity from consulting physicians to the CPRS. As of the fall of 2004, providers entered information on referrals to consulting physicians in the patient progress notes and sometimes emailed messages to these physicians. (Actual appointments were made by the nurse or administrative assistant.) Providers also entered orders for diagnostic tests and special procedures in the progress notes. However, they were not able to make referral appointments or enter physician orders electronically, nor did they receive the results of referrals and physician orders electronically. Instead, the results are mailed or faxed back, entered manually into CPRS, and filed in the paper medical record. (VistA has the capability of accepting scanned documents into the patient's. There also exist VistA utilities that allow web-based access to physician referrals. Both these require additional training and system support by the VA, DOH and its vendors)

Additionally, pharmacy connectivity was perceived as desirable by Mary's Center providers, though it was afforded less importance than connectivity to consulting physicians and reference laboratories. Providers were entering information on prescriptions into CPRS progress notes and giving written prescriptions to patients, who typically used one of several neighborhood pharmacies. However, pharmacists were not connected to the VistA system and were therefore not able to make notes in the patient record about time and date the prescription was picked up, instructions to the patient, etc. This would require implementation of additional VistA software and linking of the pharmacies used by Mary's Center patients to the DOH Intranet. Alternatively, the VistA CPRS has the capability of migrating to an Internet-based system; however there were no plans in place for such a transition at this time. (Note: There is a pharmacy module available through VistA. This assumes an on-site pharmacy which is not the

case at community-based clinics. VistA has a comprehensive pharmacy package based on national standards. Prescriptions ordered are maintained in the system and the scripts can be printed from the system and given to the patient. Establishing an electronic pharmacy interface or E-Rx was not within the original scope of the TOP project, but is seen as an obvious next step and should serve as a target for future funding)

Other desired enhancements to the VistA CPRS included

- Scanning of paper charts to enhance electronic access to comprehensive health information on the patient.
- Implementation of clinical reminders, particularly on immunizations, physicals, and chronic conditions such as asthma, to help enhance the quality of care. (These were being developed at the time of this review.) As Dr. Rose stated, “On days when we’re tripping all over each other . . . we’re going to miss some things unfortunately. If the computer would catch us when we fell, that would be an improvement.”
- Programming of the pediatric growth chart from birth to 18. The growth chart contains an algorithm that calculates the child’s height and weight as a percentile in comparison to a normative sample for his or her age in years and months. Providers traditionally must plot this information graphically as a point on a curve to derive the percentile.
- Access to progress notes by diagnosis and procedure. This enhancement would eliminate the need to scroll through pages of electronic progress notes to find current information. It would also represent an improvement over paper charts, in which progress notes were hand-written by date.

According to EMR IT Director Halima Roebuck, priorities for Mary’s Center were to implement the VistA CPRS in the Adult Medicine Clinic, to add the VistA laboratory module (Laboratory Electronic Data Interface) and connect electronically to the Quest and LabCorp, and to implement selected clinical decision support modules and reports, after which the pharmacy and billing systems would be put in place. Mary’s Center would like to have the VistA system fully operational, and there was a high level of commitment among management, administrators, and providers. Until such time the integrated system was implemented, however, the VistA CPRS would continue to function, as the staff refers to it, as “an electronic progress note,” with dual entries into two different systems required to generate claims.

Continuing concerns. In sum, continuing concerns about the VistA CPRS included:

- 1) The labor required to maintain both paper and electronic records for the foreseeable future.
- 2) The lack of integration with pharmacy, laboratory, and other providers and lack of clinical reminders limit the clinical utility of the system.
- 3) The need for dual entry of registration information, appointments, and patient encounters in the VistA system and NueMD in order to generate a bill.

- 4) Mandatory fields for veterans. Some information required by the CPRS concerns veterans. For instance, the patient must be registered as a veteran before emergency contact information can be entered. Dates of service must be provided before next of kin can be entered. It wasn't possible, at the time of the evaluation, to skip the screens pertaining to veterans, so that Mary's Center staff felt they were entering false information into children's records. (The VA, DOH and its consultants are working on a fix for this issue. This field was originally left in to capture information regarding veterans. This made more sense with the Alpha site, Community Medical Care Health Center, because it had a larger percentage of adult patients.)

Some concern also was expressed about ownership of the data; however, that issue seemed to have been resolved with the signing of the data use agreement in Appendix B.

As Mary's Center reached the 120-day mark post-implementation, the greatest underlying concern was what lay ahead for the system. With the Commerce TOP grant funding coming to an end on September 30, 2004, and no additional funding secured, the future of the system was uncertain. Funding was needed to continue to fund Halima Roebuck's position and to purchase continuing technical assistance from the VistA consultants. With only the VA support staff and qualified VistA and DOH vendors authorized to customize the software, Mary's Center would need to plan on a long-term business relationship to implement and maintain the full VistA system. (DOH has identified commercial VistA vendors and in-kind VA assistance available for system customization)

Because it was not considered feasible for Mary's Center to continue with duplicate systems for appointments and encounters for very long, there was a sense of urgency among the staff that funding needed to be found if the project were to go forward. (A process for interfacing the VistA and NueMD systems is pending). Absent this funding, the return to a paper medical record would be cumbersome, as months of patient information had been entered into the VistA CPRS. Meanwhile, Mary's Center stood poised and ready to excel in the implementation of a true EMR.

Evaluation Findings in Relation to Proposed Project Outcomes

As noted in the Project Description, desired outcomes for the project included a number of medical records process improvements, provider satisfaction with the CPRS and enhancements to patient satisfaction with care. The following narrative summarizes project evaluation findings in relation to each of these areas, which were agreed upon at the outset of the project by DOH and the Department of Commerce.

- 1. Medical records process improvements, including improvements in ease of locating medical records, ability to track ancillary tests and procedures and access results, ease of locating patient information within the medical record, and time spent on medical records.**

The pre/post implementation provider surveys yielded little information to suggest that medical records processes had improved. It appears that this result was influenced significantly by the need to operate dual systems (VistA and NueMD) during this transitional phase. Without baseline data specifically for Mary's Center, it was impossible to determine the reasons for any differences observed in the pre/post implementation data. Any such differences were as likely to reflect differences in the processes at the three sites involved in the pre-implementation survey vs. Mary's Center--the only site involved in the post-implementation survey--as they were to reflect true pre/post differences.

In contrast, the results of the structured interviews with providers shed considerable light on perceived changes in medical records processes. Providers believed that the VistA system had the potential to improve the ease of locating records, the ability to track ancillary tests and procedures and access results, and the ease of locating patient information within the medical record, and to decrease time spent on the medical record. However, these potentials had not been realized by the hybrid system that was implemented in the course of the TOP project. To the contrary, the hybrid system was more cumbersome than the original paper system, requiring dual entries for encounters and printing and filing of electronic progress notes. As a result, time spent on medical records has actually increased, particularly for those providers who were not yet comfortable entering information into the computer with the patient in the room.

In a more positive vein, patient information was considered to be somewhat easier to locate within the medical record, as the VistA face sheet provided a detailed overview of the patient. However, providers still needed to "scroll" through pages of electronic progress notes, as these notes were not accessible by date or by illness/injury.

2. Provider Satisfaction with CPRS, including the organization, legibility and completeness of medical records information, the amount of time required to access information during the patient visit, time saved by the CPRS, and security and confidentiality of patient information in the CPRS.

Again, the pre/post surveys yielded little information on provider satisfaction with CPRS. The structured interviews, however, pointed to several advantages of the electronic patient record when compared to the paper record. Specifically, it was perceived as more legible and secure than the paper record. The programming of the medications list and paper encounter forms should increase data capture and enhance compliance with Medicaid well-child standards. Finally, problem lists, not always kept current in paper records, are automatically updated in the VistA CPRS.

Overall, providers tended to be mixed in their satisfaction with the VistA CPRS. The increased amount of provider time spent typing handwritten notes into the computer was not considered to be justified by the marginal gains made in the programmed content of the CPRS. In the long-term, however, this expenditure of provider time may be justified when modules for on-line ordering of laboratory tests and medications are added. These enhancements are expected to

decrease reliance on paper charts, improve the comprehensiveness of information available on line, and decrease the need to page through the paper record for lab results.

3. Enhancements to patient satisfaction with care, including decreased waiting times, increased time spent with the provider, and perceived improvements in the information available to providers

No data were available to suggest that patient satisfaction with care had been affected by implementation of the VistA CPRS, or that the system had decreased waiting times, increased time spent with the provider, or brought about perceived improvements in the information available to providers. Patient satisfaction with care at Mary's Center was generally high, and there was no way to draw valid conclusions from the patient surveys comparing Mary's Center to the three clinics in the baseline survey.

Summary and Conclusion

The original vision for the DC TOP project was to implement an EMR at a minimum of three clinics, integrated with each other, with home health, and with laboratories, pharmacies, and specialists (With the exception of lab and home health, this was assuming these were in-house services. Currently, providers can access VistA remotely through specially configured laptops such that patient data can be viewed and entered). The original evaluation plan called for assessing savings in provider time, improvements in the availability and accessibility of health information, and enhancements in the continuity of care.

The DC TOP project encountered many challenges in achieving this vision. The challenges began with the length of time required for DOH to access funds awarded by the Department of Commerce through the City's financial management system. Other hurdles included the closure of the NPCC and Community Medical Care, Inc., and the initial provider resistance to adoption of the new technology.

In spite of these problems, some progress was made. At the conclusion of the DC TOP project, pediatric providers at The Mary's Center for Maternal and Child Care were using the VistA CPRS in combination with the paper medical chart. Customization of the VistA CPRS had been fairly extensive, bringing about several improvements in clinical documentation. Improvements included the "point and click" encounter forms, which conformed to EPSDT requirements and captured diagnoses and procedures; the "snapshot" of patient information contained on the VistA CPRS face sheet; the comprehensiveness of the problem list on the face sheet, which was updated automatically; and the automated medication list.

These improvements came at a high cost. There is little reason to believe that implementation of the VistA CPRS saved provider time or improved the quality or continuity of care. Instead, because of the need for dual entry into VistA and NueMD and the lack of connectivity with the

labs, the system was used largely as an “electronic progress note” that added to provider workload. Many of the staff has been trained extensively in the use of the VistA system. They have seen how robust and clinically sophisticated the VistA software is and want the latest customized version available for their clinic. Understandably, many of the providers are frustrated by the extra burden handed them during this transitional phase.

This situation would change if clinical reminders were implemented, connectivity was established with laboratories, pharmacies, and other providers, and the VistA system was linked to billing. These desired enhancements would make it possible for Mary’s Center to implement a true, integrated EMR with patient management capabilities.

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Evaluation Notes

Please note that the content of this evaluation document remains essentially the same as the draft produced by the DOH professional evaluator, Kirsten Hinsdale. Obvious errors of content, context and omission have been corrected. In addition, annotative comments were inserted for additional explanation or expansion where appropriate.

Because of the loss of our original evaluator and some survey data with the demise of Non-Profit Clinic Consortium, the format of this evaluation was changed somewhat, though the expected outcomes remained unchanged. Thanks are to be given to Ms. Hinsdale on her ardent and comprehensive work on the evaluation document.

Since the D.C. Department of Health was awarded the TOP grant in July 2001, a lot has transpired. DOH has endured many challenges both administratively and technically. Much of this has already been documented in the Close-out Final Report and the lessons learned documentation. In addition to those documented items, it could be noted that during those two and one-half years, DOH has had four Directors and undergone a major re-organization.

Major technical issues affecting the Top project implementation include:

-Delay in Identifying Qualified VistA consultants

After the initial software implementation by the VA national support team, the DOH was required to hire VistA consultants to customize the software and to complete rollout. The first group of consultants did not possess the proper skill sets. After reviewing consultants recommended by the VA, we were able to identify qualified consultants to provide the appropriate level of VistA support. Some of those also were able to train DOH support staff, thus strengthening our internal capacity to support DOH VistA. In addition, the D.C. VA Medical Center continued to provide some technical support.

Impact: Delay in hiring appropriate VistA consultants resulted in delay in developing templates and clinical reminders necessary for decision support tools and other important enhancements that would assist providers in improving quality of care.

-Completing Laboratory Linkage

The VistA software includes remote laboratory access functionality. However, electronic connectivity must be initiated by formal agreements and administrative approvals, as with any EDI between business partners. For the last year or so, DOH with the assistance of the VA has been negotiating with LabCorp and Quest to allow electronic connectivity to DOH VistA. All systems have been tested and the VPN tunnel between DOH and Quest (the primary lab

service) is complete. Final administrative approval is pending. We will focus more on LabCorp as soon as the Quest agreement has been assured.

Impact: When lab functionality is established, the results will flow automatically into the patient record. This will reduce paper documentation requirements for providers and allow activation of reporting and graphic features displaying lab trends. The result will be a product that is much closer to a true EHR.

-Implementation of Billing Package

Because of security reasons, the VA did not allow the transfer of its billing/financial package. The VA recommended a vendor specializing in VistA billing. The package available at the point of contact was a functional but lacked an updated front end with an attractive Graphic User Interface (GUI) equivalent to the NueMD system in use at the Mary's Center. The vendor was in the process of creating an updated front end that would be acceptable to all the project clinics. Creating this customized billing package that would be integrated into VistA was deemed to be the preferred and less expensive strategy than creating an interface with an OTS billing system. This interface would not obviate the existing commitment to pay OTS license and support fees. The modest license and training fees for the VistA billing system were much less by comparison. Because the production date for the full VistA billing package was pushed back in recent months, the general assessment now is that an interface between the NueMD and VistA systems would be a prudent interim move, especially with the provider and clerical concerns with the time and paperwork required for dual system entry. The VA and VistA consultants have established the framework for this to be completed.

Impact: The establishment of an integrated EHR/Billing system, would greatly reduce data entry and paperwork requirements on virtually all the clinic staff from registration staff, to triage, to medical records and to clinical providers. This would also relieve a significant amount of stress associated with balancing data entry and paperwork leaving more time for staff to commit to patient care.

DOH VistA Legacy

On a national level, the federal government, primarily Health and Human Services (HHS), has begun a structured, organized movement to actively encourage the use of Electronic Health Records and HIPAA-compliant electronic connectivity, leading eventually to local health information networks and designated regional health information organizations (RHIO's). The 'TOP Project' has contributed to that federal EHR effort by partnering with the Department of Veterans' Affairs to modify the VA's award-winning VistA EHR software. The software resulting from those modifications formed the basis for VistA Office that is being developed by the Center for Medicare and Medicaid Services. In the next six months to a year, CMS will make this

product available nationally to physician offices offering services to Medicare and Medicaid patients.

Post-TOP Award

The DOH will continue to work with the VA, the clinics and its other partners to continue to support DOH VistA and to assist in identifying future funding for expanding VistA.