

FINAL REPORT

Evaluation of the Tools for Quality Program

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Executive Summary

NORC at the University of Chicago is pleased to present this final report on the evaluation of the Tools for Quality program to the California HealthCare Foundation (CHCF). The overarching objective of the Tools for Quality Program is to improve the health outcomes of uninsured and underserved populations in California. To support this objective, the program offered matching grants to California community clinics to implement chronic disease management systems (CDMS), in order to help providers improve care of patients with chronic conditions.

In 2009, Tides Foundation funded NORC to lead a 2-year evaluation of the program to identify opportunities and challenges associated with the implementation and use of CDMS by clinics and to assess the impact of CDMS use on quality improvement activities. This study assessed community clinics' experiences implementing CDMS and the extent to which this experience prepared them for future acquisition and use of clinical systems, especially electronic health records (EHRs). Our results provide lessons learned to facilitate adoption and use of disease registry functionality to support quality improvement initiatives in community clinics and networks.

Background

Community clinics play a vital role in providing health care services to a patient population with a significant chronic disease burden. Currently, one third of Americans live with at least one chronic condition.ⁱ Furthermore, an estimated 11.4 million Americans with chronic conditions are uninsured, thus having diminished access to care.ⁱⁱ Treatment of chronic illnesses proves costly, accounting for three-quarters of total health care expenditures in the United States.ⁱⁱⁱ Given the high morbidity and mortality rates associated with these illnesses, experts agree that improving our methods for managing underserved populations with chronic conditions is a priority.

CDMS applications are designed to support organized care and management of patients by capturing, tracking, and monitoring care related to specific diseases. Successful implementation can potentially lead to a number of improvements including a streamlined clinical workflow, enhanced tracking and management of patients with chronic diseases, and stronger reporting of clinical measures, allowing clinics to ultimately build stronger quality improvement programs.

The Health Information Technology for Economic and Clinical Health (HITECH) provisions in the American Reinvestment and Recovery Act (ARRA) legislation have made EHR adoption a priority for all

providers including safety net providers. The legislation requires providers to report on clinical quality measures in order to demonstrate meaningful use of EHRs, however, many EHRs lack the ability to generate complex population-level reports. Thus CDMS may play an important role in assisting clinics to achieve meaningful use and to continue on a path towards quality improvement.

A major barrier for clinics' successful implementation of health information technology (health IT) software is a lack of resources, including financial resources required to purchase software and personnel to provide managerial and technical expertise necessary to implement such software. In 2008, six organizations came together to establish the Tools for Quality Program, with a shared goal of generating technology-enabled quality improvement for California community clinics through matching grants for the acquisition of CDMS. Led by CHCF and Tides Foundation, the funders included: Blue Shield of California Foundation (BSCF), Kaiser Permanente Northern California Region, Kaiser Permanente Southern California Region, and The California Endowment. The funding organizations proposed a strategy to enable clinics to combine resources through networks in order to purchase, implement and use an application to facilitate chronic disease management and improve quality of care.

Two rounds of funding were designated for California community clinics to purchase and implement CDMS in the form of matching grants which covered, in most cases, less than 50% of the total cost of purchase and implementation, including clinical laboratory system (lab) interfaces. Grant funds were provided to the first cohort in June 2008 and the second cohort in June 2009. The matching grants were used to fund five critical areas:

1. purchase of CDMS software and up to 15 software licenses per clinic;
2. interfaces between CDMS and practice management systems with the option of interfacing with major clinical laboratories;
3. participation in a three-day vendor-led training session;
4. funds for consortia organizations to host CDMS software and conduct regional learning sessions for in-network clinics in the Bay Area, southern California and central California; and
5. incentives for reporting on a standard set of diabetes measures for the California Primary Care Association (CPCA) Accelerating Quality Improvement Collaborative (AQIC) program.¹

¹ Incentives were provided to grantees that reported on a defined set of diabetes measures annually as part of the AQIC program.

The program and evaluation were supported by an advisory committee, established in 2008 to oversee the program. Comprised of experts and leaders in chronic disease management, health IT implementation and the needs of California's community health centers, the advisory committee met regularly and provided ongoing insight into program operations and evaluation activities.

Two types of grantees were awarded matching grants for CDMS software acquisition: 1) individual community clinic grantees, and 2) consortia or networks of clinics, which received additional funding to host CDMS software for in-network clinics and to organize and lead a set of four regional learning sessions. Each learning session involved a full day of on-site participation hosted by the consortia in one of three regions, and included a combination of formal presentations on specific topics, break-out sessions, demonstrations, and open question and answer formats. Consortia also played a critical supportive role for in-network grantees outside of the learning sessions, in some cases offering training, technical assistance and implementation support, and creating opportunities to coordinate resources and collaborate outside of sessions. All grantees participated in formal three-day training led by the i2iTracks vendor.

Each grantee clinic or network was required to purchase CDMS software to participate in the program. Criteria for CDMS software inclusion was developed by funders based on critical areas of functionality related to chronic disease management. The funders supported grantees' purchase of CDMS software of their choice that met these criteria, however i2iTracks was the only approved CDMS software for purchase as no other suggestions were submitted by grantees for inclusion in the program. I2iTracks is a chronic disease management system that uses interfaces with practice management systems, labs, or EHRs to automate disease registry functions, allowing users to produce robust population-level reports to track and manage conditions and reducing duplicative data entry.

The software allows multiple users to simultaneously document care using the system, supporting a team-based care approach. Built-in report templates facilitate completion of federal and regional reporting requirements, including the Health Resource and Services Administration (HRSA) Uniform Data System (UDS) report and the AQIC report, among others. Users can also conduct ad-hoc queries using simple or advanced search mechanisms, or set up custom reports.

At the point-of-care, i2iTracks can be used as a reference tool through reminders, prompts and easy retrieval and entry of relevant patient data. The tool allows providers to enter data into a patient visit summary sheet, which is a form that each organization designs to track the most important information on

patient care and chronic conditions, such as diabetes care measures. This data is then stored in the system and can be easily retrieved and manipulated for reporting.

Overview of Grantees

Cohort 1 included 16 grantees representing a total of 33 clinics. A second cohort of nine grantees representing 11 clinics was selected for matching grants in June 2009. Subsequent to being funded, six cohort 1 clinics and five cohort 2 clinics dropped out of the program, each for different reasons. A total of three host consortia and 27 clinics completed the program and four cohort 2 grantees have implemented CDMS to date.

Among those participating, sixteen clinics self-hosted their CDMS software, while 11 clinics used a hosted CDMS solution provided by a network. Almost all grantees selected diabetes as their first area of focus and started by using a CDMS module focused on improving care to this population. The diabetes module allows clinics to capture data from existing systems, enter data by hand and produce reports specific to improving quality of care delivered to diabetic patients.

At the time of this report, NORC was able to obtain 2 full years of data from cohort 1 grantees, including information on pre and post implementation conditions. Of a total of six cohort 2 grantees, four grantees had fully implemented CDMS. Thus this report focuses on cohort 1 grantees, but also includes themes from the limited number of cohort 2 grantees for which we have information to the extent that they expand upon or extend findings from cohort 1.

Purpose and Approach

Our evaluation of the Tools for Quality Program focused on formative issues related to planning, implementation and early use of CDMS for quality improvement. We looked at clinics' existing resources and program participation at two intervals: 1) pre-implementation and 2) post-implementation. Our findings provide lessons learned to facilitate adoption and use of disease registry functionality to support quality improvement initiatives in community clinics and networks. We also sought to assess to what extent grantee experiences with the implementation and use of CDMS prepared them for future acquisition and use of other clinical systems, especially electronic health records (EHRs). Overall, we sought to:

1. *Assess grantee clinics' experiences in implementing and using CDMS*
2. *Assess the effect of existing information technology (IT) and quality improvement (QI) resources, network participation, and learning sessions on implementation experience*

3. *Assess the impact of the program on a clinic's ability to track quality metrics, generate reports and implement continuous quality improvement*
4. *Identify key lessons learned*

Evaluation Activities and Findings

Our evaluation relied on several basic sources of information. We conducted two rounds of surveys and semi-structured discussions with grantees as well as a limited number of site visits.

We began the evaluation by reviewing materials submitted by grantees as part of their participation in the program. Our review of grantee materials included grantee proposals, quality improvement plans, and regularly submitted grantee and consortia progress reports. We used this information to summarize background information on grantees, learn about their resources prior to the grant and understand their demographics.

NORC also consulted with advisory committee members in the early phases of the project to obtain insight on the evaluation framework, and later led several semi-structured interviews with advisory committee members to obtain feedback on instrument design for the study.

Primary data collection was conducted at two intervals: pre-implementation (round 1) and post-implementation (round 2). For both round 1 and 2 data collection activities we fielded a survey, reviewed consortia progress reports and led semi-structured discussions with a small subset of clinics. We concluded our round 2 data collection activities with site visits to seven clinics.

The first round of data collection focused on grantee characteristics at the start of the program and their initial implementation experiences with CDMS, the role of learning sessions conducted by consortia funded under the program, and early lessons learned. In round 2 we examined the use of CDMS by providers and support staff, the impact of CDMS on clinic operations and clinical outcomes, clinics' future plans for CDMS in the context of the EHR incentive program, and barriers and enablers of progress. Below, we outline findings from each of these stages.

Planning for implementation requires more effort than anticipated. Findings suggest the need for a deliberate planning process prior to implementation, greater emphasis than is typically planned for training and an understanding that the implementation of CDMS is likely to surface a series of unexpected infrastructure and software issues that require resolution. As a result of these obstacles, often a product of

deep reliance on legacy systems, we found that migrating to CDMS often takes much longer than anticipated.

Workflow redesign is critical for optimal use. Using CDMS effectively requires significant changes to clinical workflow. Provider and support staff engagement in each step of the implementation process is essential to ensuring that the process meets the needs of clinic staff and that the software can be used by clinic staff to achieve its intended purpose. In many cases, prior to implementation, clinics did not have a baseline understanding of the various workflows already in place throughout their sites. As clinics started down the path of planning and implementation, they noted a significant need to learn and document their existing workflow and data entry processes and then re-work and re-document those processes in the context of using CDMS.

Existing IT and staff resources had an impact on clinics' ability to implement. In interviews and discussions, all clinics indicated that their IT and staffing resources prior to grant award impacted their decision to host CDMS applications locally or to outsource hosting to the consortia. While most of the grantees had some form of registry prior to the program, most commonly the PECS system formerly supported by HRSA, they varied in terms of how they entered data into their existing registries and whether they had instituted a specific workflow for their diabetic population to compliment the reports and decision support they were receiving from the existing registries. This variation affected the scale of changes to clinical workflow and data entry processes that would be necessary to implement CDMS under the Tools for Quality Program. The approach to interfacing to CDMS also varied depending on how existing software was hosted.

In order to work effectively, the CDMS diabetes module uses both demographic and diagnostic data from a practice management system as well as clinical data from laboratory tests. Most grantees implemented interfaces between clinical laboratories' systems and CDMS as well as between each clinic's own practice management system and CDMS. In a limited number of cases, clinics used existing interfaces between their practice management system and clinical laboratories' system allowing them to set up a single interface between the CDMS and their practice management system.

Data cleaning is time and resource intensive, but essential to assure the accuracy and completeness of CDMS reports. Grantee clinics discovered a host of inconsistencies in the way encounters and patient data were entered into their practice management systems, which led to duplicate patients and encounters, and inaccuracies or difficulties in reconciling whether key procedures or tests were conducted for a particular patient at a particular encounter. Cleaning these data and setting new rules for data entry into all

systems or reinforcing existing rules for staff to ensure consistency in data entry practices provided a crucial step in the implementation process for many grantees. Most grantees spent significant time going back to source systems such as their practice management systems to clean data. They also anticipated that additional data cleaning would be necessary as part of planned EHR implementation projects.

Learning sessions provided a valuable source of implementation support. Overall, grantees viewed the learning sessions as useful opportunities to collaborate with peers, to learn about new ways to use CDMS, and to obtain support when needed. Some clinics established ongoing external workgroups with peers after forming relationships during learning sessions. In addition to reporting on a number of benefits derived from session attendance, grantees offered suggestions for improving the format and structure of future learning sessions. A central challenge was assuring learning session content was appropriate given that clinics often implemented at different paces. One successful resolution was to invite advanced grantee clinics to present their early experiences and identify challenges that slower implementers should expect to encounter. In some cases, host consortia arranged to bring in even more advanced clinics that were not part of the Tools for Quality program to inform the efforts of the advanced grantee clinics. Further, learning session workgroups focusing on specific topic areas such as point-of-care data entry, interfacing to local vaccination registries, or issues of concern for specific stages of implementation (e.g., data cleaning), were considered highly constructive even for those clinics that had already implemented, but were looking to expand their uses of the product.

Network support is critical for organizations with limited resources. Engagement with networks or consortia for hosting and training was an important component of the Tools for Quality Program. Our results indicate implementation support and hosting by health center networks was essential for community clinics with limited IT resources. Clinics reported that the decision to use a hosted CDMS solution was based on the clinic's size, availability and extent of in-house IT infrastructure, experience implementing other health IT solutions, and existing relationships with networks. Those who relied on networks or member clinics to host their applications, typically smaller clinics with fewer IT resources, received additional support from the networks in the form of project management, technical support, training or system implementation. Although it was less likely for self-hosted clinics, usually larger organizations with more robust IT resources, to receive additional support from networks outside of the learning sessions they reported advantages of local control over the application and flexibility to tailor it to their needs.

Manual data entry cannot be avoided despite interfacing with other systems. In interview discussions and surveys, grantees reported using a number of methods to populate data into CDMS. Results from

round 2 data collection indicate that all clinics were entering data both manually as well as through interfaces with practice management systems and/or lab systems. While most data is automatically populated through these interfaces, some important items such as vital signs required manual entry. Additionally, clinics noted that women's health presented unique challenges in terms of changes to workflow and data entry, as Pap smear tests required interpretation from providers prior to or at the time of data entry.

Clinics customized CDMS to expand use beyond diabetes. Findings reveal that all grantee clinics used CDMS in various ways to meet their quality improvement needs. Each clinic tailored the patient visit summary sheet to meet the particular concerns of their providers and the organization as a whole. For example, some diabetic patient visit summary sheets included additional measures for other chronic diseases, which allowed providers to enter information on comorbid conditions. Medical Assistants were then able to track multiple conditions using CDMS. Additionally, some clinics found they were able to track new conditions or enhance their methods for tracking existing conditions.

Regularly, clinics conducted ad-hoc queries to identify patients in need of follow-up as well as to run reports. Some clinics had not yet produced their own reports for regular use, while others produced standard reports and continued to add measures to improve the information available to support quality improvement.

While clinics used CDMS in many different ways, all grantees used CDMS to support three common functions:

1. To identify diabetic patients who would otherwise fall through the cracks, e.g. those who have not had an HbA1C test or foot exam in 6 months;
2. To track high risk diabetic patients as a second step in the process after tracking patient visits and diabetes management; and
3. To track care delivered to individuals with other conditions such as asthma and women's health.

Clinics improved existing processes and reporting through the use of CDMS. All clinics reported that they experienced process improvements, such as more efficient clinic workflows, better tracking of diabetic patients, and enhanced follow-up procedures, with some clinics reporting improvements in the number of diabetics who received HbA1c tests and foot exams. A small number of advanced clinics reported improvements in overall HbA1c levels for diabetic populations, and most clinics suggested that over time their ability to better manage patients through the use of CDMS would lead to improved health

outcomes. All clinics also indicated that they were able to use CDMS to produce reports more efficiently than using older registries or paper charts.

Future uses of CDMS. The Tools for Quality program was initiated prior to the American Reinvestment and Recovery Act (ARRA) and HITECH. Approximately ten months after the evaluation started, HITECH became law and the policy was introduced to provide incentives for Medicare and Medicaid providers for meaningful use of electronic health records (EHRs). To ensure that we captured the impact of these external factors on the program, we assessed how the EHR Incentive program influenced grantee implementation experiences and future use of CDMS. Below we highlight some key findings:

- *Clinics will both adopt EHRs and continue using CDMS, at least in the short-term.* In response to HITECH, grantees and networks reported uniformly gearing up for the implementation of EHRs. Discussions with clinic staff revealed that grantees had relatively low expectations about the ability of EHRs to perform population health management functions similar to those available in CDMS. Of twenty-six total cohort 1 clinics responding to the round 2 survey, 78 percent reported they plan to continue using CDMS in the short-term.
- *Clinics plan to expand their use of CDMS.* Twenty-two of 24 respondents in the round 2 survey indicated they have future plans to expand CDMS use. When asked to describe all of the ways they plan to use CDMS in the future, forty-six percent indicated they will add new chronic disease modules. Thirty-eight percent of clinics also noted they plan to increase the number of users of i2iTracks throughout their clinics by implementing i2iTracks at additional sites or in other clinic departments such as dental or behavioral health departments, or by bringing on board additional types of users, such as clinicians. Notably, twenty-five percent of respondents indicated they will also use CDMS to track measures such as immunizations or obesity. Five out of twenty-six respondents also indicated they plan to use i2iTracks to expand referral activities. Findings from interview and site visit discussions further suggest that in the near-term grantees plan to use CDMS to focus on improving existing processes; conducting panel management, or managing panels of patients with particular chronic diseases; and improving the internal reports that they produce. In the long-term they anticipate expanding the use of i2iTracks throughout their clinics and using i2iTracks to track and manage additional patient care measures.
- *The Tools for Quality Program will help grantee clinics and networks implement EHRs.* While 96 percent of cohort 1 grantee clinics (26 out of 27) did not have an EHR in place at the time of the 2nd round survey, clinics reported in discussions that they were in the process of evaluating or acquiring EHR systems and will likely have these in place within the next year. They also indicated that the Tools for Quality Program was instrumental in helping them to understand the

importance of training, workflow analysis, establishing stakeholder buy-in, cleaning data and planning for transition.

Conclusions and Recommendations

CDMS' are important software applications that play a critical role today in helping community clinics track and manage uninsured and underserved patient populations with a high presence of chronic disease. These software applications help clinics in the following ways:

- Managing data to effectively track care processes and outcomes for patients with chronic illnesses and reaching out to those patients for the purpose of improving their care
- Assisting grantees to meet federal, state and regional reporting requirements
- Helping clinical and administrative leaders to produce ad-hoc reports and queries based on clinic needs
- Serving as a critical tool to improve quality of care and enhance care processes
- Helping enhance communication on quality issues within the organization
- Serving as an important learning opportunity and stepping stone for EHR implementation

Below we produce a set of recommendations for implementation and use of CDMS based on findings from our evaluation. Many of these areas also offer practical lessons applicable to EHR implementation in community clinic settings.

It is important to establish a 'culture of quality'. Effective technology-enabled quality improvement projects typically require strong support for quality improvement as an organizational priority. The project must be supported by all levels of staff, including administration, provider leaders, medical assistants, IT staff and outreach staff. Clinics with this level of support across the organization experienced a cleaner implementation and were able to derive more benefit from CDMS use. Particularly, input from providers and clinical support staff on key initial steps such as the design of visit summary sheets is important to ensure that CDMS will meet user needs and provide the highest utility for the clinic..

The most effective implementation follows a stepwise plan with distinct phases which build upon one another. While it may be tempting to implement more than one technology at a time, such as implementing a new practice management system and CDMS simultaneously, this caused significant delays and created problems with staff buy-in for some clinics in this study. Adjusting workflow patterns and accommodating a new technology takes time and effort, and clinic staff benefitted from focusing efforts on one technology at a time. Additionally, some clinics implemented multiple chronic disease

modules at once to increase efficiency, but measures and reports developed for each module were often less sophisticated than staff would have liked because of the time required to attend to ongoing implementation issues associated with other modules. Results indicate a slow and deliberate approach to implementing modules may be important for EHR implementation, as clinics adopting integrated systems may prefer to implement new practice management systems first and then implement basic EHR functionality, opting to implement more complex features such as clinical decision support last.

Updating, validating and improving quality data is an ongoing process. The most successful clinics established mechanisms to continually improve upon existing measures, mechanisms and processes. Some suggested that determining what to measure and selecting the most useful measures was a difficult phase of the project, as clinics often needed to test measures to determine what data was missing, what was most important, and what should be included or excluded until they began using the measures and criteria they developed. Thus, an ongoing plan for updating, validating, and improving quality measures is critical. While most clinics found that there is no such thing as “perfect data”, the quality of data can be maximized through thoughtful, structured approaches to data cleaning and acceptance that some degree of trial-and-error will be necessary to achieve data that is usable for reporting.

There are many approaches to data validation, however the clinic must make a commitment to assess their data and decide how they will address issues as they arise. For example, the clinic can assign staff to identify errors and prioritize their importance, and to make priority changes in the appropriate systems on an ongoing basis. Clinics acknowledged that data validation is a continuous process and essential to achieve provider buy-in and assure CDMS produces valuable reports.

Regular, clear communication is required to achieve lasting and far-reaching QI results. Community clinics depend on strong communication to affirm their mission, strengthen their programs, and help teams work together to better manage chronic disease. A lack of dissemination of information across different departments or team leaders can produce efforts that are implemented in limited silos and do not have a broader organizational impact. Once clinics have determined the measures they will use for QI purposes, it is important to assure the data entry and measurement process is consistent across the organization. Quality improvement requires regular and clear communication amongst all levels of staff.

Many organizations established subcommittees dedicated to particular chronic disease areas of focus, and these subcommittees communicated uses and findings of CDMS to the larger QI committee and clinical and administrative leadership. Further, it is important to develop a path for sharing new information which impacts other departments’ data entry and use of CDMS, so that any issues can be identified

quickly and shared easily with all impacted staff. The most effective clinics employed formal, informal, traditional and innovative approaches to improving communication. For example, one clinic used an email listserv dedicated solely to sharing new information about diabetes in CDMS. Other clinics made sure that the CDMS implementation team consisted of a multi-disciplinary set of members representing all key departments within the clinic.

Leadership engagement is necessary for CDMS to register organizational impact. In order to maximize the benefits of CDMS implementation, the individuals and committees charged with managing implementation and use of the system must have both the support and the attention of clinic leadership at the highest levels. Support from this group is often provided initially at the time of pursuing funding or setting up business relationships. However, we found that it was important for top clinic management to stay engaged throughout the process of implementation and use. This is because ongoing attention from clinic management is required to determine how to take action in response to trends in clinic operations unearthed by the analysis from CDMS, and to marry this analysis with specific management functions, such as providing feedback and compensation for individual clinicians or teams. Moreover, if used effectively, CDMS software can be used to learn more about the organization broadly and to affect change.

Coordination of multiple resources reduces barriers to health IT implementation. Learning sessions, technical support and assistance provided by consortia or networks allowed clinics to further their QI capabilities, share knowledge around implementation issues and uses of health IT software, and build stronger relationships. As part of this program, community clinics that lacked significant infrastructure, expertise, support and staffing resources were able to successfully implement health IT software through use of a hosted solution. In all cases, clinics suggest that coordination and collaboration with networks and other clinics eased the burden associated with this process. These lessons are particularly relevant as clinics begin the EHR adoption process as many community clinics will be in a good position to benefit from group purchasing efforts or centralized software hosting, regional technical assistance and support programs, and peer-to-peer learning workgroups.

Introduction

NORC at the University of Chicago is pleased to present this final report on the evaluation of the Tools for Quality program to the California HealthCare Foundation (CHCF). The overarching objective of the Tools for Quality program is to improve the health outcomes of uninsured and underserved populations in California. To support this objective, the program offered funding to California community clinics to implement a chronic disease management system (CDMS), in order to help providers improve care of patients with chronic conditions. In close collaboration with CHCF and Tides Foundation, NORC led the evaluation of the program to determine critical opportunities and challenges associated with the implementation and use of CDMS by clinics, to assess their impact on quality improvement activities and health outcomes, and to identify lessons learned and implications for future efforts including EHR adoption.

Importance of the Study

Community clinics play a vital role in providing health care services to an underserved and largely uninsured patient population with a significant chronic disease burden. Currently, one third of Americans live with at least one chronic condition.^{iv} Furthermore, an estimated 11.4 million Americans with chronic conditions are uninsured, thus having diminished access to care.^v Treatment of chronic illnesses proves costly, accounting for three-quarters of total health care expenditures in the United States.^{vi} Given the high morbidity and mortality rates associated with these illnesses, experts agree that improving methods for managing chronic conditions among underserved populations to avoid co-morbidity and diminished quality of life is a priority.

CDMS software applications are designed to support organized care and management of patients through the use of functionality to capture, track, and monitor specific diseases.^{vii} More advanced CDMS can interface with a variety of other health care applications including practice management (PM) systems, clinical laboratory systems (labs) and pharmacy systems, and electronic health records (EHRs). Advanced CDMS often provide clinical decision support capabilities that allow automated identification of patients with undiagnosed chronic conditions, facilitate health status tracking; promote use of evidence-based guidelines; and enhance reporting capabilities.

In the last five years, California clinics have made significant progress in improving chronic disease management through CDMS use. Successful implementation can potentially lead to a number of improvements including a streamlined clinical workflow, enhanced tracking and management of patients

with chronic diseases, and more robust reporting of clinical measures, allowing clinics to ultimately build stronger quality improvement programs.

The Health Information Technology for Economic and Clinical Health (HITECH) provisions in the American Reinvestment and Recovery Act (ARRA) legislation have made Electronic Health Record (EHR) adoption and meaningful use of EHRs a significant priority for many providers, including community clinics.^{viii} Improving quality, safety, efficiency and reducing health disparities is one of the five health outcome priorities referenced as part of the EHR incentive programs. Moreover, reporting on a select number of clinical quality measures is a core requirement for providers to demonstrate meaningful use.^{ix}

While EHR vendors are beginning to focus on quality reporting, many EHRs still lack advanced functionality for chronic disease management.^x Community clinics have unusually high adoption rates of CDMS as a result of federal programs that provide funding and financial incentives to implement registries (e.g., the Health Disparities Collaborative program).^{xi} As a result, CDMS could potentially play an important role in helping clinics to meet the clinical quality reporting measures under meaningful use.

This evaluation report documents grantee experiences in implementing and using CDMS, assesses factors that led to a successful implementation, and identifies lessons learned to inform future efforts aimed at supporting the use of technology-enabled quality improvement activities. The intended audiences for this report are clinics, networks, community consortia, individuals and organizations involved in health information technology implementation and quality improvement initiatives in the safety-net, including federal agencies, policy-makers and foundations.

We begin with an overview of the Tools for Quality Program and the grantees that participated. We then discuss our research objectives and evaluation approach followed by a detailed review of grantees' implementation experiences building upon findings from our interim report. Next, we review current uses of i2iTracks (the CDMS application selected by clinics participating in this program) and finish the report with a set of conclusions and recommendations.

Background

In 2008, a consortium of six organizations² was formed to establish the Tools for Quality Program, with a shared goal of generating technology-enabled quality improvement for California community clinics through funding for the acquisition of a CDMS. A major barrier for clinics' successful implementation of health information technology (health IT) software is a lack of resources, including financial resources required to purchase software and personnel to provide managerial and technical expertise necessary to implement such software. The funding collaborative proposed a strategy to enable clinics to combine resources through networks in order to purchase, implement and use an application to facilitate chronic disease management and improve quality of care. The approach was designed to maximize impact of the program.

Two rounds of funding were designated for California community clinics in the form of matching grants to purchase and implement a CDMS, with funding provided to the first cohort in June 2008 and the second cohort in June 2009. The matching grants provided funding toward five critical areas:

1. purchase of a CDMS software application and up to 15 software licenses per clinic;
2. interfaces between CDMS' and practice management systems with the option of interfacing with major clinical laboratories;
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In 2008, an advisory committee was established to support and oversee the program, comprised of experts and leaders in chronic disease management, health IT implementation, and the needs of California's community health centers. The advisory committee met regularly and provided ongoing insight into program operations and evaluation activities.

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³ Incentives were provided to grantees that reported on a defined set of diabetes measures annually as part of the AQIC program.

Selection criteria for CDMS software inclusion in the program was developed by funders based on critical areas of functionality related to chronic disease management. The funders supported grantees' purchase of CDMS software of their choice that met these criteria, however i2iTracks was the only approved CDMS software for purchase as no other suggestions were submitted by grantees for inclusion in the program.

i2iTracks is a chronic disease management system that uses interfaces with practice management systems, clinical laboratory systems (labs), or EHRs to automate disease registry functions, allowing users to produce robust population-level reports to track and manage conditions, reducing duplicative data entry.

The software allows multiple users to simultaneously document care using the system, supporting a team-based care approach. Built-in report templates facilitate completion of federal and regional reporting requirements, including the Health Resource and Services Administration (HRSA) Uniform Data System (UDS) report and AQIC report, among others. Users can also conduct ad-hoc queries using simple or advanced search mechanisms, or set up custom reports based on any criteria desirable, such as chronic condition type, test results, date, provider name, or patient demographic information.

At the point-of-care, i2iTracks can be used as a reference tool through reminders, prompts and easy retrieval and entry of relevant patient data. The tool allows providers to enter data into a patient visit summary sheet, which is a form that each organization designs to track the most important information on patient care and chronic conditions, such as diabetes care measures. This data is then stored in the system and can be easily retrieved and manipulated for reporting.

Two types of grantees received funding as part of the program: 1) individual clinic grantees, and 2) a set of consortia or network grantees, which received additional funding to support in-network clinics through coordination of resources, hosting regional learning sessions, and providing training or implementation support. In February 2009, NORC was funded by CHCF and Tides to conduct an independent evaluation of the program. This report presents findings from this evaluation effort.

Overview of Grantees

Cohort 1 included 16 grantees representing a total of 33 individual clinic sites. A second cohort of nine grantees representing 11 clinic sites was selected to receive funding in June 2009. Subsequent to being funded, six cohort 1 clinics dropped out of the program, each for different reasons. One clinic decided to focus on alpha testing a different registry application for a regional health information organization, while a second clinic was unable to obtain an interface with i2iTracks and their EHR product, and a third clinic was dissolved in a merger with another organization that already used a different registry. A fourth clinic

could no longer participate due to significant delays caused by staffing changes, while a fifth and sixth clinic also experienced delays unrelated to the program which affected implementation and grant funding.

A total of three host consortia and 27 grantee clinics participated in cohort 1 for the full duration of the program. Almost all grantees selected diabetes as their first chronic disease module for implementation as diabetes reporting was incentivized through the AQIC program.⁴

At the time of this report, all cohort 1 grantees had completed implementation and most had established lab interfaces. Cohort 2 grantees however were in the process of implementing CDMS at this time, and thus little data could be obtained to investigate pre and post implementation experiences to capture best practices and lessons learned. Additionally, some cohort 2 grantee projects and timelines were affected by planning for EHR implementation as a result of meaningful use incentives. At the time of this report, four out of six cohort 2 grantees had implemented CDMS. Consequently, this report focuses on the experiences and lessons learned from the first cohort of grantees, with some information from cohort 2 grantees included to the extent that it provides new information compared to what was learned from cohort 1. A complete list of cohort 1 grantees and participating clinics can be found in Appendix A.

Evaluation Methods

In this section we discuss our research objectives and the key research questions and methods that we used to conduct the evaluation. The major goals of the evaluation and corresponding research questions are summarized below:

1. ***Assess Grantee experiences in implementing and using CDMS.*** To address this objective, we investigated staffing, procurement and implementation of software, interface development, training approaches, use of CDMS at the point-of-care, and new reporting activities. We also considered starting conditions and other non-program factors, such as HITECH and the EHR Incentive Program, which influenced implementation and outcomes. Specific research questions included:
 - ▶ What impact do existing resources and practices have on grantee clinics' implementation experiences?
 - ▶ What are clinics' experiences around implementation?
 - ▶ How effective were the consortia-hosted regional learning sessions, training, and technical support in assisting clinics in implementing CDMS and QI processes?
 - ▶ What are clinics' experiences with using CDMS?
 - ▶ What are community clinics' experiences with maintenance of CDMS and ongoing operations?
 - ▶ How does the implementation and use of CDMS prepare clinics for implementation of other health IT systems, such as EHRs?
 - ▶ What are the key enablers to a successful implementation, and what were common challenges?
2. ***Assess the effects of existing information technology (IT) and quality improvement (QI) resources, network participation, and learning sessions on implementation experience.*** We investigated the role of network support, hosted solutions and participation in the learning sessions as factors that contributed to the experience of implementing CDMS software. We also assessed the impact of existing practices and resources at grantee sites such as QI staff, use of other applications to support QI, QI processes, and the existing IT infrastructure. Specific research questions included:

- ▶ What impact do existing resources and practices have on grantee clinics' implementation experiences?
 - ▶ What are clinics' experiences with implementation?
 - ▶ How effective were the consortia-hosted regional learning sessions, training, and technical support in assisting clinics in implementing CDMS and QI processes?
 - ▶ What are the key enablers to a successful implementation, and what were common challenges?
3. ***Assess the impact of the program on a clinic's progress on quality metrics, generate reports and implement continuous quality improvement in their clinic.*** We evaluated how the use of CDMS contributed to grantees' ability to track and measure quality metrics and sustain continuous quality improvement efforts. We also reviewed participating clinics' ability to report on AQIC measures and, to the extent possible, assessed clinic quality improvements in diabetes care over time. Specific evaluation questions include:
- ▶ What are clinics' experiences with using CDMS?
 - ▶ How does using CDMS affect practice efficiency, initially and over time?
 - ▶ Does use of CDMS by clinics impact quality of care and adherence to quality standards?
 - ▶ How does the implementation and use of CDMS prepare clinics for implementation of other health IT systems, such as EHRs?
 - ▶ What are the key enablers to a successful implementation, and what were common challenges?
4. ***Identify key lessons learned.*** We synthesized lessons learned, including most successful approaches to implementation, major areas of technical difficulties, workflow and operational considerations, and impact on quality reporting capabilities. We also assessed how lessons learned from this project can prepare grantees for implementations of more sophisticated health IT systems, such as EHRs.
- ▶ How does use of CDMS by community clinics impact practice efficiency?
 - ▶ Does utilization of CDMS by clinics impact quality of care and improvement on quality?
 - ▶ What are clinics' experiences with maintenance of CDMS and ongoing operations?
 - ▶ How does the implementation and use of CDMS prepare clinics for implementation of other health IT systems, such as EHRs?
 - ▶ What are the key enablers to a successful implementation, and what were common challenges?

Exhibit 1 below lists the key research questions, how they relate to the major objectives, and the specific evaluation activities undertaken to inform each of the research questions.

Exhibit 1: Key Research Questions and Evaluation Activities

Evaluation Question	Objectives	Review Background Materials	Round 1 Survey	Round 1 Interviews	Round 2 Surveys	Round 2 Interviews	Site Visits
What impact do existing resources and practices have on grantee clinics' implementation experiences?	1, 2	X	X	X			
What are clinics' experiences with implementation?	1, 2		X	X			
How effective were the consortia-hosted regional learning sessions, training, and technical support in assisting clinics in implementing CDMS and QI processes?	1, 2		X	X	X	X	X
What are clinics' experiences with using CDMS?	1,3				X	X	X
How does using CDMS impact practice efficiency, initially and over time?	3, 4		X	X	X	X	X
Does utilization of CDMS by clinics impact quality of care and adherence to quality standards?	3, 4					X	X
What are clinics' experiences with maintenance of CDMS and ongoing operations?	1, 4				X	X	X
How does the implementation and use of CDMS prepare clinics for implementation of other health IT systems, such as EHRs?	1,3,4				X	X	X
What are the key enablers to a successful implementation, and what were common challenges?	1,2,3,4		X	X	X	X	X

NORC conducted a qualitative and quantitative evaluation of the program focusing on formative issues around grantee experiences with CDMS implementation through review of grantee materials, interviews, surveys and site visits. NORC consulted with advisory committee members regularly in the early phases of the project to obtain feedback on the evaluation framework and instrument design. Specific methods and instruments for each evaluation activity were vetted with CHCF and Tides Foundation.

We thoroughly reviewed grantee materials to obtain background information on grantees' existing resources and demographics, and to support study findings from site visits and interviews. Grantee materials for this project included grantee proposals, quality improvement plans, and regularly submitted grantee and consortia progress reports.

Primary data collection was conducted at two intervals: pre-implementation (round 1) and post-implementation (round 2). For both round 1 and 2 data collection activities we fielded a survey, reviewed consortia progress reports, and led semi-structured discussions with a small subset of clinics. We concluded our round 2 data collection activities with a select number of site visits.

The first round of data collection focused on grantee characteristics at the start of the program and their initial implementation experiences with CDMS. We also focused on the role of the learning sessions in supporting the grantees with their respective implementations, and determined early lessons learned. Round two data collection examined the use of CDMS by providers and support staff, the impact of CDMS on clinic operations and clinical outcomes, clinics' future plans for CDMS in the context of the EHR incentive program, and barriers and enablers of success. For additional information on evaluation activities and methods, please see Appendix C.

Findings

Below we present findings on pre-implementation conditions and implementation experiences, current uses of CDMS, and anticipated uses of CDMS.

Starting Conditions and Implementation Experiences

Our interim report for this project outlined starting conditions, including the IT infrastructure and IT setup at grantee organizations, level of staffing, level of outsourcing and software applications used prior to initiation of activities under the grant. Through the subsequent round 2 structured interviews and site visits, NORC investigated the impact of network support and utilization of a hosted solution. Evaluation results demonstrate that existing QI resources, IT experience and resources, and planning influenced implementation and experiences using i2iTracks. Below we describe key grantee characteristics at the start of the program and grantees' early implementation experiences. We also assess how pre-program grantee characteristics relate to their experiences in the program.

Decision to host software or not is based on grantee size, resources, network ties and experience with implementation. A total of 18 out of the 27 clinics chose to self-host CDMS software, while 12 clinics used an externally hosted solution through the consortia or consortia member clinic. We learned that those who relied on networks or member clinics to host their application also received support in the form of project management, technical support, training or system implementation assistance.

In subsequent data collection activities, we explored the factors that influenced the approach that clinics took to hosting software. We found that clinics' IT infrastructure and resources at the start of the grant period heavily influenced their decision to host CDMS internally or not. In most cases, the clinics with IT support in-house, the necessary IT infrastructure in the form of a robust local area network, internet connectivity, and building capacity to host servers in a secure manner opted to host the solution in-house. Grantees electing to host CDMS in-house cited the benefits of having local control over the application and the flexibility to set it up to best meet their needs. Conversely, grantee clinics that opted for a hosted solution in general were smaller, had fewer or no locally-based IT resources, may not have had prior experience in hosting any of their own applications, and had limited infrastructure to self-host. Pre-existing ties with a network also influenced grantee decisions; those with strong ties with their network opted for the hosted approach.

Consortia hosting and support is necessary for clinics with limited infrastructure and resources. Clinics that opted for an externally hosted solution cited several benefits to this approach during qualitative interviews and site visit discussions. Grantees reported significant savings from a centrally hosted model as networks purchased and hosted the software. In addition to cost savings, grantees suggested using a host consortia saved time and resources by eliminating the burden of regularly applying software upgrades and updates, and freeing up internal resources to invest time in improving QI processes, developing new measures, and expanding application use. Clinics further explained in discussions that working with consortia that had experience previously implementing interfaces resulted in a smooth and quick implementation overall. While most of the clinics spoke overwhelmingly positively of the hosted approach during interview discussions, a few of them did encounter problems. Some grantee clinics reported issues with the application running slower than expected, and this impacted user satisfaction and buy-in in early stages. In some cases, clinics with externally hosted applications had to go through the additional step of establishing a virtual private network (VPN) connection with their network. Clinics that needed VPN connections reported that it took time to get the initial connection established which added time to the implementation. Additionally, once the VPN was in place some grantees reported delays in seeing the most recently updated data in the system, including data on labs. Despite such challenges, most clinics that chose a hosted approach indicated in interviews that hosting support from the networks was a critical factor in success of implementations.

Addressing problems with interfaced applications requires coordination between multiple parties. Findings from interviews and site visits indicated that when clinics identified errors such as missing or inaccurate data, they had difficulty determining the source system responsible for errors. In some cases, clinics were unable to identify interface-related problems immediately. For example, one clinic encountered a situation in which some labs were not appearing through the interface and the team was unable to determine how long the issue had been going on and which patient records were affected. In other cases, clinics reported that when they experienced issues with their practice management systems interfacing with i2iTracks, they identified missing data in i2iTracks but could not determine which system was responsible for the error. Clinics thus may have ended up contacting both i2iTracks and the practice management system vendor to resolve the issue. Clinics using hosted solutions reported further frustrations as they did not have access to the servers and the network had control over how quickly issues were resolved. Consequently, there were often a number of parties (different vendors as well as the network) involved in assessing and troubleshooting interface issues, leading to inefficiencies.

Self-hosting i2iTracks may be preferable for clinics with health IT implementation experience, extensive resources and internal support. Clinics that chose to self-host their i2iTracks application

reported in interview and site visit discussions that this was convenient since they had the necessary resources to do this and were often hosting other applications. Self-hosting grantee clinics reported that it was critical for the IT team to collaborate closely with the administrative and clinical staff when configuring the application. Further, having i2iTracks hosted on-site allowed them to be more responsive to their user community. While grantee clinics self-hosting reported the same difficulties identifying the source of data loss or errors as clinics experienced using hosted models, self-hosting clinics did not rely on a network to relate to the practice management system, lab vendor, and i2iTracks for them, and felt they were able to resolve issues more efficiently. All these factors contributed to overall satisfaction with both the implementation and ongoing use of the application.

Setting up a practice management interface is a quick and largely painless process. In the round 1 survey and interview discussions, clinics cited very few or no issues in setting up interfaces between i2iTracks and practice management systems. All thirty round 1 survey respondents reported they had set up interfaces with practice management systems at the time of the survey, which was administered approximately 12 months after the Tools for Quality Program grants were awarded.

Lab interface implementation is greatly affected by setup of existing IT systems and cooperation of lab vendors. Eighty-one percent of the twenty-six round 2 survey respondents had interfaced their CDMS with lab systems. Many clinics experienced delays in setting up interfaces with laboratory systems as reported during site visits and interview discussions. In site visit discussions, one clinic indicated it took roughly six months to establish the lab interface. In many cases clinics were not able to isolate the source of the delay. However, some noted technical issues with implementing the interface or issues with laboratory vendor cooperation. Findings from site visits suggest that some clinics in Northern California had already established lab interfaces with practice management systems rather than i2iTracks, while a small number of clinics in other regions had not yet interfaced the systems yet due to significant delays.

Grantees use or plan to use additional interfaces. Our round 2 survey indicated that only 35 percent of respondents (9 out of 26) had implemented the Electronic Laboratory Interoperability and Connectivity Standard (ELINCS) for results reporting as part of their interface. The ELINCS interface is a highly constrained version of the HL7 interface and is meant to shorten the time for implementing exchange of lab results. In addition, six round 2 survey respondents had established interfaces with eyePacs, a clinical communication system which provides near real-time interpretation of retinal images for diabetic retinopathy screenings. In the future, 85 percent of clinic respondents (22 out of 26) plan to interface i2iTracks with EHRs.

In the paragraphs below we outline key features of the implementation experience that were common across grantees. Namely, we note that each grantee went through a process of documenting and learning their existing processes, learning about the capabilities and standard use of i2iTracks, and finally, adapting their processes to work with the new application. In going through this process, grantee clinics took on new QI activities and prepared for the more substantial effort of EHR implementation.

Workflow and process redesign is critical for optimal use. As they started down the path of planning and implementation and, usually prior to training and implementation, grantee clinics need to learn, re-learn and document their existing workflow and data entry processes. For grantees with limited experience implementing new systems that relied largely on outside vendors for IT services, examining workflows and processes was more challenging. Clinics that already had instituted special clinics and workflows specific to diabetic patients needed to evaluate how these should be modified to facilitate entry of key non-laboratory data on these patients (e.g., vital signs, foot exams, eye exams, immunizations) into the CDMS and how to incorporate the patient visit summary sheet into the patient's encounter with the treating clinician.

The approach used to identify and document existing processes varied across sites. In some cases grantees developed very detailed workflows for their current processes and in other cases workflows were not tailored to meet clinic needs or were not utilized to actively inform clinic processes. In a few instances, the networks played an instrumental role in assisting grantees with their workflow analysis. Grantee clinics that went through the workflow reassessment process uniformly reported that learning about and documenting their existing processes was a critical step in preparing them for i2iTracks implementation as well as future implementations of clinical applications such as EHRs.

Data cleaning is a necessary process to ensure accuracy and completeness of reports.

Another important step in planning and implementation often took place immediately following the initial "upload" of data from practice management systems into i2iTracks. For this step, grantees undertook an effort to learn about their data issues and improve the integrity of their data practices. Most grantees we spoke with in interview and site visit discussions noted a significant over-count of patients flagged as diabetics when a standard set of diagnostic codes used in the practice management system were used as inclusion criteria. This over-count resulted from various practices including coding women with gestational diabetes as diabetic or coding people with pre-diabetes or with intermittent blood sugar problems as diabetics. In this case, use of more stringent criteria such as presence of frequent HbA1c exams was important to distinguish true diabetics appropriate for tracking using the CDMS.

In addition, grantee clinics discovered a host of inconsistencies in the encounters and patient data entered into their practice management systems, including duplicate patients and encounters; inaccuracies such as items coded incorrectly; and difficulties in reconciling whether key procedures or tests were conducted for a particular patient at a particular encounter. Cleaning these data and setting new rules for data entry into all systems to ensure consistency in how items were coded was an important feature step in the i2iTracks implementation for many grantees.

Clinics also utilized i2iTracks on a semi-regular basis following initial data cleanup to identify inconsistencies in data entry practices and inaccuracies in existing data. Most clinics spent significant time going back to the source practice management systems to clean data based on issues identified in i2iTracks, partially in anticipation of the need to do so as part of planned EHR implementation projects.

Training Experiences

As part of this program, all grantees received a basic 3-day training from the i2iTracks vendor, while some grantee clinics also conducted more extensive training on site. Some consortia provided additional training for in-network clinics outside of the learning sessions. Below we highlight findings related to training activities.

Basic vendor-led training proved valuable overall, but smaller, more customized training sessions for different staff types is desirable. The initial training conducted by i2iTracks was held on-site at clinics and lasted three days. In cases where a network or consortia hosted an application for a grantee, clinic representatives from multiple sites participated in the same training. The training that grantees received involved three parts: configuration training, end-user training and technical training.

We received varying accounts of grantee clinic experiences with vendor-provided training through interview and site visit discussions. In some cases grantees were satisfied with the training and felt that they were well-prepared to go live. Many grantee clinics reported that the timing of the trainings was ideal as the trainings were typically scheduled immediately prior to go-live. Grantee clinics also reported that during their training they worked collaboratively with the i2iTracks trainer to ensure that the training was customized to their specific workflows and this attention to detail was helpful. Further, they received valuable feedback from i2iTracks staff on the pros and cons of the workflow they had mapped out.

In other cases, clinics were dissatisfied that the training structure required all staff to be trained together over a 3-day time period. Many suggested that separate training for different types of staff would be a more effective use of the time and would increase buy-in. For example, clinic staff received the same

training as IT staff and thus learned some information they would not need. Moreover, including all of the training in a single three-day session was overwhelming for some clinic staff. In one case a clinic noted that the condensed manner in which training was conducted resulted in staff anxiety around use of the application following the training, and they had to spend an additional three months convincing clinic staff that they had the required skills to use the application.

Some clinics further reported in interview and site visit discussions that the training session was problematic given the extended amount of time required of clinic staff that were already overbooked. Some clinics also reported that the training needed to be further customized for each clinic. This would require extensive coordination between project leadership from grantee sites and their consultants with the i2iTracks trainers in order to target trainings towards a specific data entry process, clinical workflow and intended approach to using the systems decision support capabilities. Moreover, cost was a prohibiting factor for many clinics in pursuing additional customized trainings by the vendor, and thus many clinics opted to forego custom training.

Grantees offered some valuable lessons on how to improve the vendor-led training:

- *Size.* Keeping the training groups relatively small to contribute to efficiency and ensure staff buy-in.
- *Timing.* Training should be conducted as close to go-live as possible.
- *Separate training sessions for IT and end-user staff.* Grantee clinics noted that separate trainings for different types of staff would help them retain the most important information and avoid information overload creating a more efficient training process and saving time and resources.
- *Customizations.* Grantees suggested a select group of clinic staff and leadership develop a training specific to their workflow and configuration and conduct a half to one-day training session with the users based on the customized system.
- *Needs of multiple clinics.* Group training with staff from multiple clinics can be effective but requires careful coordination. Clinics noted that training should consider the organizational/cultural diversity of each of the different clinics, timing of go-live and the differences in applications between the different sites.

Clinic-led training, while more time-consuming and resource-intensive than some anticipated, was critical to establish congruence amongst different users and departments within the same organization in terms of sophistication of use and consistency of use, and to secure staff buy-in. In addition to training offered by the vendor, interviews and site visit discussions suggest

that some grantee clinics also provided one-time and ongoing training for their own staff. Some clinics decided to provide additional training as they had users with different levels of familiarity and comfort with technology, while others provided training to reinforce vendor-led training or to train new users. In many cases, clinics followed the ‘train-the-trainer’ approach. In this particular model the medical assistants were trained first, and these individuals then trained the providers and other clinic staff.

In interview and site visit discussions, clinics emphasized that having a good understanding of the computer skills of the staff working with the system was important. In some cases they realized after the fact that staff-reported challenges using the system were a result of poor computer skills and not due to issues with the application itself. Grantees also reported that it was important to identify users that required more hand-holding sooner rather than later to ensure that they receive more intensive training.

Grantees used a variety of creative approaches to ensure that they adequately trained the staff. In some cases this project served as the impetus for clinics to set up a computer lab for training. Grantees reported that having a dedicated space to train staff was very important. Some clinics did not have the resources for setting up dedicated computer labs and conducted training after hours on an individual or small group basis.

Many grantees reported that it was important to do periodic refresher courses on the system. This was important at the initial stages of go-live as new staff came aboard and as the grantees moved to incorporate new i2iTracks modules into their work. Additionally, refresher courses provided an opportunity to assure consistent use of the application across departments and staff members. Some grantees were surprised to learn about variation in data entry and workflow processes for different modules of i2iTracks within the same organization. Several clinics also reported in site visit discussions that they had set up post-training tests or assessments to evaluate effectiveness of training and identify users in need of additional support.

Effective training was a critical factor in system adoption and use. The time and resources that were required to train staff initially and on an ongoing basis were often more than had been initially anticipated. However, grantees reported that perseverance paid off and often individuals that were initially reluctant and lagged behind became the most avid supporters of the application through ongoing support.

Consortia-led training provided additional value for in-network clinics. In some cases, host consortia provided in-network grantee clinics with additional training outside of the learning sessions. Some networks offered one-on-one training by going on site with each participating clinic to provide a

general training and to establish tailored workflows to meet their needs. Moreover, some networks provided additional forms of one-on-one support for clinics where needed, which in some cases included specific trainings, such as use of i2iTracks with new modules or interfaces. In-network clinics suggested in interview discussions that these services were particularly helpful.

Learning sessions offered a substantial source of implementation support. All grantee clinics participated in at least one of the learning sessions. Some consortia invited more advanced grantees to lead presentations to share their experiences with other attendees, and in other cases presentations were led by health network leaders and outside experts, such as i2iTracks staff, or organizations with considerable experience in particular areas of CDMS implementation and use.

The learning sessions covered a broad range of topics on quality improvement processes and how to effectively integrate i2iTracks into a clinical environment. In some instances, host consortia selected session content based on the reported interests of participating clinics rather than following a standard plan for each session. For example, one session focused on interfacing i2iTracks with a local immunization registry as some clinics indicated interest in this topic in the previous session. Overall, grantee clinics received training on topics such as project leadership, workflow and logistical aspects of implementation, data validation, panel management, and how to assess clinical outcomes, among others.

NORC assessed grantee clinic experience with the learning sessions from the round 1 survey, semi-structured discussions and site visits. In addition, lead staff from NORC attended some of the early sessions in person. In general, grantees found the learning sessions to be informative, and some viewed these sessions as an opportunity to get to know other grantees and learn from their experiences. We identified three areas in which the learning sessions provided critical value for grantee clinics:

- 1. Peer-to-peer learning.** These peer-to-peer interactions allowed grantees to share ideas on how to approach specific issues like data validation, manual data entry, and development of measures for QI purposes. They shared important information, discussed the details of how to go about key steps, and obtained insight into the common challenges as well as strategies to overcome those challenges.

Grantee clinics further offered that having more peer-to-peer sharing opportunities in small workgroups would increase the value of learning sessions. Suggestions for different workgroups included: 1) workgroups by topic areas, such as use of a particular function or measure; 2) workgroups for the different stages of implementation; and 3) workgroups for implementation of different modules, such as a women's health workgroup. While this applied to all of the learning

sessions, it was particularly relevant to some of the later meetings as grantees found themselves at different stages in their implementation. Grantees reported that this would have improved the learning opportunities at some of the later sessions and created more mentoring opportunities between different clinics.

- 2. Networking and building relationships.** In addition to learning from the experiences of other grantees, the learning sessions provided an invaluable opportunity for clinics to build relationships with others. Grantees reported that even outside of the learning sessions they contacted other clinics to discuss how to approach certain problems related to use of i2iTracks. While this was not the case for all grantees, in the specific instances where this occurred, the information gathered from peers was very helpful. Additionally, one consortium established bimonthly meetings with all the participating clinics. This group was a byproduct from the learning sessions that they hosted in 2008 and 2009. While the focus of these bimonthly meetings was to share best practices and lessons learned about i2iTracks, this has now been expanded to share information on QI efforts more broadly.
- 3. ‘Hands-on’ learning.** Sessions that allowed grantee clinics to interact with i2iTracks directly or view a presentation using the application in real time helped to reinforce some of the vendor-led training and in some cases provided additional detail on uses of interest to the clinics. Grantees suggested that demonstrations on how to generate specific reports, or interactive workgroups on panel management, interfaces and IT issues would be beneficial for inclusion in any future sessions.

While most clinics agreed that the learning sessions provided important support for their implementations, they also reported that the relative utility of the learning sessions depended on whether the grantee clinic was at an appropriate stage of implementation. The initial learning sessions had the broadest applicability for all clinics. However, given that grantees all progressed at different rates, some grantees that were further ahead indicated in interview discussions that the later sessions were less useful, while others that were lagging behind suggested that the later sessions may have been too advanced.

Review of the consortia progress reports confirmed that in planning for these sessions, consortia were challenged with coming up with the right level of sophistication of content and the appropriate mix of topics so that the trainings would offer something of value for all participants. Consortia reported that having a high degree of understanding of the timely needs and wants of the grantee clinics was critical to developing a curriculum that would be meaningful.

Grantees had a number of ideas on how to improve the learning sessions. Specifically, clinic suggestions focused on:

- More use of breakouts or workgroups so that grantees at similar stages in implementation are able to exchange ideas and lessons learned.
- Maximizing opportunities for peer-to-peer learning.
- Gather feedback from clinics on the specific topics that should be covered during the learning sessions.
- Organizing learning sessions in a location easily accessible for all grantees, or adding sub-region sessions in cases where clinics in a single region are geographically dispersed.
- Including a mix of in-person sessions and some sessions conducted virtually. This will allow a larger number of individuals to participate.

Incorporating i2iTracks into day to day clinic activities is a slow, deliberate process. We found that integration of i2iTracks into grantees' everyday processes occurred gradually over the first two months of implementation and early use. In a large number of cases, early use revealed important opportunities to improve workflow for more efficient use of i2iTracks. For example, site visit discussions revealed some grantees that intended to enter basic data into i2iTracks following the patient visit found that medical assistants could easily be trained to enter these data at the point-of-care, reducing data entry time on the back end. Furthermore, some clinics that had planned on point-of-care data entry for vital signs found that reconfiguration of their clinic sites to include stations equipped with computers for collecting vital signs around the clinic were necessary. For many clinics, it was only after initial use of the application that they realized that they had data integrity issues or that a broader group of clinic staff needed to be trained.

Another example of how i2iTracks was integrated over time involved the use of the patient visit summary sheets. Grantee use of i2iTracks patient visit summaries evolved over the course of their early use. The predominant model for using these patient summaries included printing out the summaries ahead of a visit from a diabetic patient and including these sheets as part of the medical record that the clinician reviewed during the encounter. The clinics also used flags and reminders that showed up on the sheet as part of the clinical encounter to determine instructions and key tests to order. However, most grantees modified the form to suit their own particular needs, including use of the form to facilitate data to be hand-entered by the clinician.

Current Uses of CDMS

In this section, we discuss the processes that grantees used to populate information into i2iTracks and the scope of use of the system.

Methods Used For Data Entry. In interview discussions and surveys, grantees reported utilizing a number of methods to populate data into i2iTracks. Results from round 2 data collection indicate that all clinics were entering data both manually as well as through interfaces with practice management systems or clinical laboratory systems. While most data is automatically populated in i2iTracks through interfaces with the practice management system and labs, other items required manual entry.

Manual data entry is necessary. All 26 clinics responding to the round 2 survey reported that some data must be entered manually into i2iTracks. An experienced member of the Tools for Quality program advisory committee indicated prior to initiation of major data collection activities that manual data entry was an important part of using CDMS, and results confirmed this was the case. Most commonly, clinics manually entered the following data: vital signs (height, weight, blood pressure); immunizations; labs which are not interfaced and thus not auto-populated; mammograms; Pap smears; medication lists or classifications; provider notes; referrals; behavioral health screenings; and self-management goals. Exhibit 2 below highlights some of the most common areas of manual data entry and provides examples of the types of data entered in each category.

Exhibit 2: Typical Areas of Manual Data Entry in CDMS

Education and Counseling Services	Preventive Measures	Tests and Results	Screenings	Items not otherwise auto-populated
Whether or not patients participate in health education classes Whether providers participate in focused provider education Whether any counseling was provided, such as dental counseling	Exercise status Smoking status Self-management goals	EKG Colonoscopy TB results Glucose Anemia Pregnancy test results Prenatal tracking Fecal occult blood test (FOBT) results PPD results Eye exam results Results from oral and behavioral health services	Retinal screenings Foot exams Behavioral health screenings (e.g. depression)	UDS clinical tracking data Office visit dates Exam types Problems/concerns Vaccinations

Use of interfaces presented unique operational challenges. Analysis of results from interviews and site visits demonstrate that an ongoing challenge in using i2iTracks was assuring the various interfaces were working properly. One clinic explained that from an operational standpoint, it is hard to verify if the interface is running correctly because it is difficult to reconcile orders with results reported and distinguish between delays in receiving data and the lack of data altogether. Thousands of records are interfaced daily, and the clinic may not discover missing records until a few days after the interface breaks down. Another clinic expressed, ‘If the interface is working at 95 percent it is hard to narrow down the five percent that is missing.’

Clinics also reported that matching patient data was challenging. One clinic noted that the practice management system interfaces demographics, procedures and appointments, and that the laboratory system sends its own demographic information with the result. There were inconsistencies between the way demographic information was stored in the laboratory and practice management systems (e.g., one system includes middle initials for a patient and another does not) and this resulted in interface errors and patient records not matching correctly.

Despite these issues, all clinics benefitted from interfaces once established. The interfaces decreased manual data entry and reduced opportunities to introduce errors, data was auto-populated into the CDMS more quickly, and invariably the data in the CDMS was more complete following initial data validation

activities, creating efficiencies for MAs and data entry clerks. One clinic noted during a discussion: ‘the data entry specialist is able to do things more efficiently and locate and access data more easily (now that the interface is in place).’

Scope of Use

Grantee clinics used CDMS in various ways to meet their needs for quality improvement. Each clinic tailored the patient visit summary sheet to meet the particular needs and concerns of their providers and the organization as a whole. For example, some diabetic patient visit summary sheets included additional measures for other chronic diseases, which allowed providers to enter information on comorbid conditions, and MAs were then able to track multiple issues using i2iTracks. Additionally, some clinics found they were able to use i2iTracks to track new conditions or enhance the data they already capture for conditions they track.

In interview and site visit discussions, almost all clinics reported using i2iTracks to conduct queries. Some clinics had not yet produced their own standardized reports for regular internal use, while others had progressed to a stage where they produced standard reports for quality improvement and continued to enhance and scrutinize measures or processes in conjunction with providers to improve care of their patients.

Overall, providers at grantee clinics used CDMS for four major functions at the point-of-care:

1. To assure that diabetic patients who would otherwise fall through the cracks receive key diagnostic tests such as an HbA1C or a foot exam if they are overdue;
2. To identify and track high risk patients as a second step in the process after tracking patient visits and diabetes management;
3. To track measures specific to special diabetic populations such patients with both diabetes and cardiovascular disease and communicate effectively with those patients on these measures and necessary steps; and
4. To track other conditions such as asthma and women’s health.
5. Key overall findings on uses of i2iTracks are listed below.

The categories of staff members that are most likely to enter data also use the system most frequently. When asked to list all the categories of staff that were the most frequent users of i2i tracks in the 2nd round survey, 20 out of 26 respondents listed MAs (77 percent) and 15 listed chronic care coordinators (58 percent). Approximately half of clinic respondents also listed data entry clerks (46

percent) and clinicians (46 percent) as among the most frequent types of staff users of CDMS. A significant minority of respondents also listed health educators as primary users (35 percent).

Results indicate that clinicians may use the patient visit summary form for note-taking and reminders at the point of care, but interviews and site visit discussions indicate that overall providers had less direct interaction with i2iTracks than other staff. Further, survey results suggest that many other types of staff regularly interact with i2iTracks, such as program coordinators, case managers, referral clerks, and QI leaders. During site visits, a few participating clinics chose to include diabetic counselors or nutrition specialists in the discussions as these staff utilized i2iTracks for health maintenance, counseling and prevention.

Overall, MAs were most likely to conduct data entry according to round 2 survey results (69 percent), with clinics also reporting a large share of manual data entry conducted by chronic care coordinators (50 percent) and data entry clerks (50 percent). Health educators were reported to conduct manual data entry by 35 percent of clinics, while only 13 percent of clinics indicated that clinicians conduct manual data entry. A few respondents also noted that referral clerks were responsible for manual data entry.

Little variation exists in how each clinic's different sites use i2iTracks. We asked clinics in the 2nd round survey to discuss any variation in the types and number of users at different sites. Results indicate that most clinics use i2iTracks for the same purposes and in the same manner across sites, while some anticipate different users and uses as they expand to more sites, such as school-based settings, or sites with limited staffing resources which would require modified workflows.

Clinics use i2iTracks to accomplish many tasks around tracking and managing patients with chronic conditions, requiring different types of staff to interact with the system. Results from interviews and site visits indicate that many different staff categories use i2iTracks for a broad range of tasks. Exhibit 3 below demonstrates the types of CDMS users and typical uses associated in each case based on findings from surveys and interviews.

Exhibit 3: Typical Uses of CDMS by Staff User Type

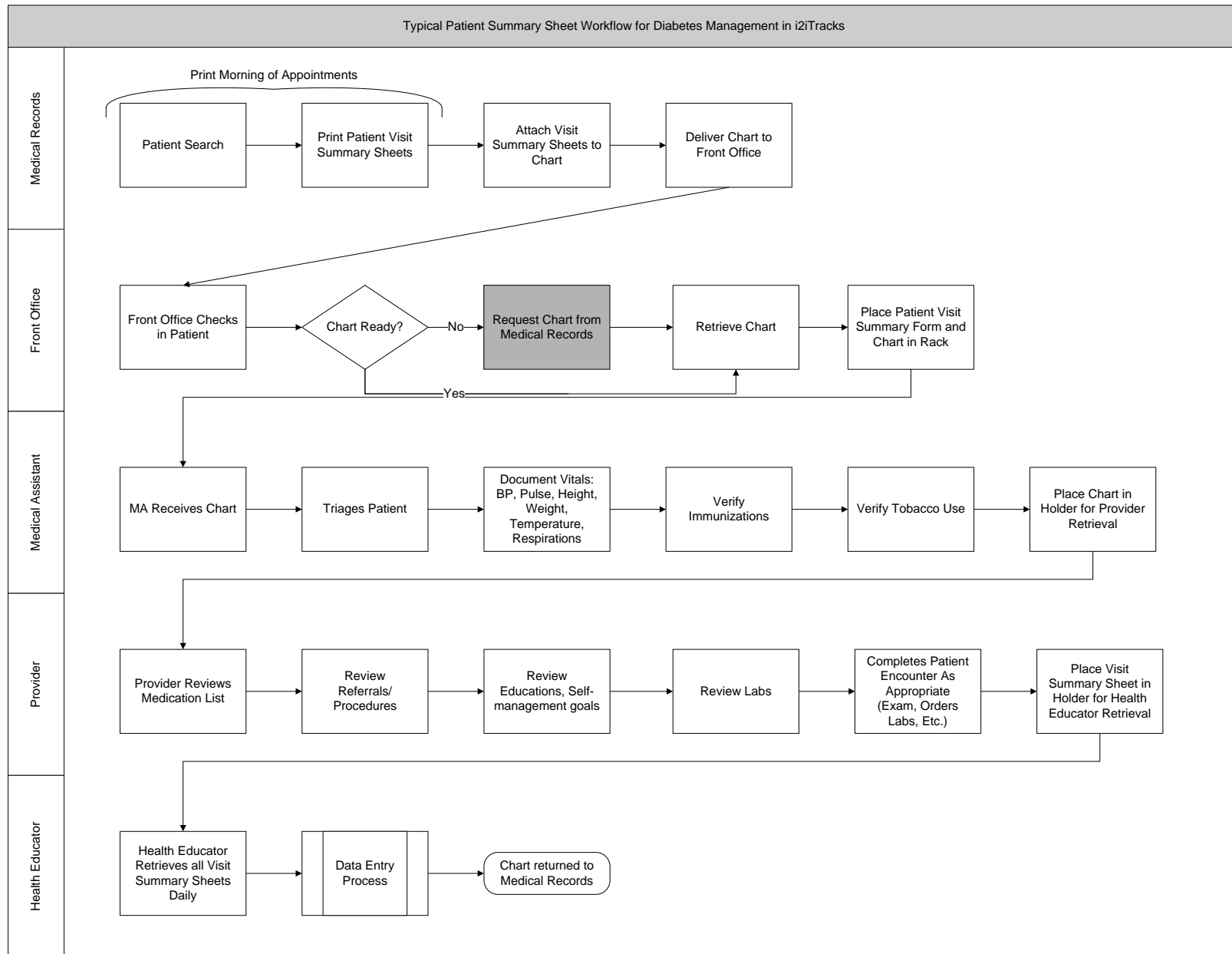
Chronic Care Coordinators	Data Entry Staff/Program Managers	Medical Assistants	Clinicians	Referral Clerks	Diabetic or Nutrition Counselors
Daily use for tracking and managing patients and test results	Map labs Print normal test result letters Print reminder letters Problem-solve daily issues Data validation Quality indicators Reports	Print patient visit summary sheet Data entry of clinician notes, vitals, preventive measures	Reference printed visit summary sheet Note-taking on visit summary sheet Data entry at point-of-care	Track patient referrals Manage follow-ups	Preventive screenings Counseling and education reminders Entry of key clinical indicators

Use of CDMS as a point-of-care reference tool. Most clinics continue to use the patient visit summary sheet at the point of care as a reference point for providers to review before and during the visit. The patient visit summary sheet contains much of the same information as the health maintenance form; however some clinics are still using both forms, while some have stopped using the paper health maintenance form (a checklist form for providers to review critical indicators of significance for chronic disease and preventive measures).

While there were variances in the point-of-care use of i2iTracks, most clinics followed a typical workflow. Eighty-three percent of round 2 respondents indicated that a medical assistant or other support staff prints the summary sheet prior to the patient visit. Then the medical assistant enters vitals and other data onto the sheet, and attaches the sheet to the chart for the provider’s use at the point-of-care. After the visit the support staff enters the data, which 21 out of 26 survey respondents (80 percent) suggest is done directly following the visit, or at the point-of-care (50 percent) in batches at the end of the day (38 percent) or at the end of the week (27 percent).

Survey results suggest that 85 percent of clinics are using patient visit summary sheets at the point-of-care, with 77 percent of clinicians entering the progress note directly onto the patient visit summary sheet. One clinic survey respondent indicated that providers enter data electronically into i2iTracks at the point-of-care, while another clinic noted that MAs and chronic care coordinators make notes on the visit summary sheet at the point-of-care. Typically, handwritten notes at the point-of-care are then entered by support staff into both the paper chart and in i2iTracks. Exhibit 4 below provides a typical workflow for the use of the CDMS at the point-of-care.

Exhibit 4: Typical CDMS Point of Care Workflow



CDMS can be used to reinforce a chronic care model which emphasizes utilizing the whole team in the care process. In interview and site visit discussions, some clinics reported having established workflows which require diabetic patients to be seen by a nurse prior to a physician at each office visit. The support staff utilizes the time to record current medications, usage and dosages in the patient visit summary sheet. The nurse then prints the sheet for the provider who can chart directly on the sheet. In other cases, clinics have a diabetic counselor, health educator, or nutritionist meet with the patient prior to the visit, and any new information obtained is entered in i2iTracks and printed for the clinician.

Use of CDMS for population management. A central value of CDMS is its ability to produce population-level reports by specific condition. In addition to supporting ad-hoc queries, CDMS also provides a number of canned reports such as the UDS reports that many community clinics need to produce and send to HRSA as a requirement of the funding they receive. Virtually all clinics used i2iTracks to produce reports for internal quality improvement purposes and to meet external requirements, and various approaches were taken to the development of reports and sharing these reports with providers and others.

CDMS allowed clinics to produce reports they were previously unable to generate using basic registries and to expand on existing QI activities. In interview and site visit discussions, clinics agreed that a major benefit to use of CDMS was the ability to create new reports that they could not have created using PECS or another registry system. For example, one clinic created a report to track how many test results were pending in the system for more than two weeks to help move forward key processes.

While CDMS is touted for its ability to produce new reports using custom measures and data inputs, it was also highlighted as an important tool to expand existing quality improvement activities. Many community clinics build custom reports, and the staff is trained to run queries. In practice management systems or traditional registries, clinics did not have the same flexibility with the types of reports that they would like to produce and had limited capability to run ad-hoc queries. One clinic noted that while they were able to use PECS for diabetes management in the past, the nature of using the program only allowed them to track high risk patients, limiting the total population view to a subset of diabetics, whereas i2iTracks allows them to more readily track all diabetics.

Validating information in reports may be time-consuming. Site visit and interview discussions revealed that data validation, while critical to quality improvement, was time-consuming in some cases. One clinic reported in a site visit discussion that they required eight hours of a staff member's time to generate and validate a report for all their diabetic patients, and a significant amount of that time was attributed to

pulling charts to validate the data in i2iTracks. Others reported in interviews that less time was required to generate reports, and that their sites either pulled charts at random or did not pull charts for validation. Clinics also reported that once they get more comfortable with the accuracy of the data in i2iTracks, the time for producing and validating reports is likely to go down. Overall, production of population-level reports has proven to be a highly valuable function of the CDMS for participating clinics.

Clinics still utilize other systems to generate reports. Round two survey results indicate that 83 percent of clinic respondents also generated reports using other systems. Of the clinics using other systems for reports, 83 percent used their practice management systems, 17 percent used a separate registry, and 17 percent using another product for reports, such as an immunization registry or report writer connected to the practice management system. Most commonly, clinics used immunization registries to produce immunization reports, while practice management systems were used for business and productivity reporting. In some cases, the practice management system or other registry was used for UDS reports or grant writing. Despite these additional uses for reporting, tracking and management of chronic conditions was largely complete using CDMS.

Below we provide a detailed review of grantee clinics' experiences with various types of reports available using i2iTracks.

- **AQIC reports.** Findings from the round 2 survey indicate that 83 percent of clinics are using i2iTracks for AQIC reporting. In discussions, some community clinics that were using the Merritt practice management system had trouble using the canned AQIC report in i2iTracks. In this case, i2iTracks required them to manually enter in Current Procedural Terminology (CPT) codes being used at the clinic in order to produce the first AQIC report. Some clinics entered the information with assistance from the network and had no trouble going forward, while others preferred to produce AQIC reports using their practice management system or other systems to avoid the burden of data entry. This issue seemed reserved to those clinics using Merritt as their practice management system as some other clinics used i2iTracks for AQIC reporting without any issues. As part of the round 2 survey, the small number of clinics that indicated not using i2iTracks for AQIC reporting suggested they had either a preference for using the practice management system, or that they were still working out data validation and issues around timing of manual data entry for items such as blood pressure data. Clinics reported that having the AQIC format available as a canned report was valuable and saved time in generating the report.
- **UDS reports.** Fewer clinics are using i2iTracks to produce UDS reports, with only 39 percent reporting the use of i2iTracks for UDS reports in the round 2 survey. In discussions, some clinics

suggested that UDS reports are easier to produce using their practice management system as they have done in the past. Others indicated additional manual entry is required for data that is not captured in the practice management system or through the laboratory interface (e.g., when patients entered into prenatal care: 1st, 2nd, or 3rd trimester).

- **Ad-hoc reports and queries.** Almost all clinics use CDMS for ad-hoc querying and reporting, and find this feature easy to use and useful for a variety of needs. Findings from the round 2 survey indicate that 91 percent of clinic respondents use i2iTracks to produce population-based reports. In interviews and site visit discussions, many clinics indicated they are generating diabetic reports on subpopulations, such as all patients with no foot exams, all patients that need HbA1Cs that haven't had the test in the last 3 months, or all patients due for appointments, and they use this data to find out who the patients are and contact them. Searches are conducted regularly for other indicators related to diabetes.

One clinic indicated generating reports on diabetes control, blood pressure, medications, and patients with certain conditions who are not taking medications indicated for their conditions. Another clinic noted using reports for anemia, positive pregnancy tests, lead, and specific programs, while others generate reports on cancer screenings and FOBT (fecal occult blood tests). In addition, a clinic suggested they use the health registry report to give a sense of the total number of patients a center has, and they are able to pull all patients whose vitals are of concern and add them to a medication adherence program for follow-up.

- **Other reporting.** Interview and site visit discussions revealed that some clinics optimized i2iTracks to meet local reporting requirements. In one case, a grantee revealed that they utilized i2iTracks to create reports on Chlamydia prevalence. Another clinic noted during an interview that other departments within a clinic can pull reports from i2iTracks. The pediatric department at this clinic utilized i2iTracks for the ABCD program, which requires providers to report results for infant well child visits. Another clinic utilized i2iTracks to produce health disparities reports and reports to determine types of counseling the patient was provided. While most clinics use i2iTracks for diabetes and women's health monitoring, many are beginning to use it for other purposes.
- **Immunizations.** Some clinics utilized CDMS to provide immunizations reporting data to local and state immunization registries, such as the San Diego Immunization Registry (SDIR) or the California Immunization Registry (CAIR). In the San Diego region, a focus for clinics was establishing a link to the SDIR in order to pull data bi-directionally to enhance both providers' information and the state registry information. Other clinics found that some data in their state

registries was not included in i2iTracks and utilized the state data to validate their own vaccinations data.

- **Meaningful Use Reporting.** While clinics have not yet produced reports for meaningful use, some grantee clinics reported they anticipate using i2i for these reports. It should be noted that i2iTracks plans to become a certified EHR module for meaningful use.

Use of CDMS for panel management. Another critical function of CDMS is to provide clinicians with actionable data on the group of patients they treat as a primary care provider (their panel) in order to target quality improvements. Some clinics had begun panel management activities at the time of this evaluation report, however most clinics were not using i2iTracks for panel management yet.

Of the clinics using i2iTracks for panel management, one clinic noted they regularly give feedback to providers on their diabetic patient care based on indicators for diabetic health which are used to create provider-specific reports. This clinic added that the data is more accepted by providers because i2iTracks is a structured interface and this leads to more trust in the data. Another clinic reported running individual reports for providers, but these reports were not shared with a larger group.

Some clinics were able to create panel management reports which were used internally to review providers' progress and follow-up with patients. Findings from the round 2 survey suggest that 22 percent of participating clinics use i2iTracks to generate provider report cards. One clinic's i2iTracks team noted that they are sharing regular provider reports with their medical director at monthly meetings to identify anomalies. Another clinic indicated that they print reports for each provider that includes all patients that have an HbA1C level over 9. These reports are then reviewed to identify patients that had not come in for a visit for more than two years. The clinic then actively follows up with those patients to bring them back for their relevant tests.

CDMS can also be used by providers themselves to track their own progress, and some clinics are considering encouraging providers to use the program. In one case, a clinic started training a select group of providers to run reports themselves to assess their status overall and relative to other providers at the clinic. The grantee clinic plans to pilot test the process with a few providers before inviting all providers to use it, as this will help them to identify issues with the data early on.

Clinics cited various reasons for refraining from sharing results from CDMS with providers for panel management. Most prominently, clinics wanted to ensure that the data being captured by i2iTracks was accurate. Many clinics had completed their implementation but were still in the process of validating the information in i2iTracks. Clinic leadership reported that in order to win provider support and buy-in,

building trust in the accuracy of the data was critical. Additionally, some grantee clinics noted that sometimes patients were assigned to the wrong provider in the practice management system, and as a result a given provider's report card may end up including data from another provider's patient panel. In some instances, new providers were not entered into the system immediately, which also contributed to inaccuracies with patient assignments in the system.

Further, some clinics had only been using i2iTracks for 6 months and thus did not have sufficient data to produce relevant reports for providers, while others suggested they had not yet developed panel-level reports as they were not far enough along in the process yet. Once ready to establish these reports, clinics agreed this would enhance their ability to communicate with providers and more efficiently address any patients of concern, improving the QI process overall.

Use of CDMS for follow-up and outreach. Results from the round 2 survey suggest that almost all clinics are using CDMS to conduct follow-up and outreach with patients. Most frequently, clinics reported using CDMS to help provide reminders to patients due for exams (83 percent), to provide referrals for outside services (52 percent) and to provide reminders to patients due for lab tests (52 percent). Typically, clinics will run queries and reports to determine which patients are high risk or have not had a visit in six months and use this list to call patients or send letters reminding them to set up appointments. A few grantee clinics were able to purchase the i2iTracks letter-printing software, which allows them to easily send follow-up letters to a list of patients identified in i2iTracks by printing the letters and addressing, folding and sealing the envelopes for each patient in the list. Clinics that purchased this software use it regularly as they suggest it has made them more efficient in conducting necessary follow-up. One clinic grantee used i2iTracks to track influenza follow-up. The clinic sends flu letters to all diabetics, asthmatics, or other groups advance of their flu clinics in order to enhance participation.

Referrals are another function which is commonly used in CDMS. If a new patient enters the clinic and first time labs are ordered, this will display in i2iTracks, and a search can be set up to flag if the HbA1C is over 6.5. Staff can then produce a list of all patients with HbA1cs over 6.5 and use this to monitor referrals. In one clinic, following a new patient visit, the care coordinators prepared paperwork for referrals for the next visit or set up an additional appointment in advance of the patient's next scheduled visit to assure proper follow-up.

In order to conduct follow-up and outreach most efficiently, grantee clinics emphasized strong training and a focus on consistency in data entry. One issue with follow-up and outreach noted is that staff may be entering in the wrong action date for follow-up by putting in the default as the current date, and as a result

the follow up list shows many patients as overdue, which can be overwhelming to sort through and correct. In another case, a chronic care coordinator was trained on how to start a recall for a group of patients but a procedure was not established for how to deal with a patient who did not respond following the first mailing. To address some of these issues, clinics found it helpful to develop and write up the specific procedures to be used for follow-up which can be used to train staff in advance of starting to use these functions.

Other uses of CDMS. CDMS offers clear benefits for tracking and managing diabetic patients, however we found many clinics used the software creatively in order to improve care for other patient populations at their clinics or to improve other processes at their clinics. According to data from the round 2 survey, 78 percent of clinics used i2iTracks to track other populations. Overall, clinics most frequently used CDMS to track other chronic conditions (61 percent), women's health (57 percent), and prenatal care (43 percent); while behavioral health (22 percent) and pediatrics (4 percent) were tracked by fewer clinics. Clinics also noted tracking colorectal cancer screenings and follow-ups, asthma, oral health, and tetanus/flu shots using i2iTracks.

A notable benefit of CDMS software is the ability to design and produce reports using the full spectrum of data which allows clinics the freedom to use the software in unique ways customized to their needs and interests. Some clinics utilized the software to revise administrative or IT processes in place, and many used i2iTracks to monitor additional populations or measures.

While most clinics focused on using i2iTracks to track and manage diabetic populations, CDMS can also be used to develop and enhance rewards and positive reinforcement programs for patient improvement. In one notable case, one clinic organization used i2iTracks to identify patients who had previously had a HbA1c value of above 9 and had successfully reduced it to less than 7, and then used the software to generate congratulatory letters to each patient for their efforts to manage diabetes, inviting them to join a patient advisory council and participate in a luncheon.

Use of CDMS to improve quality. All clinics saw process improvements and suggested that over time their ability to better manage patients would lead to improved health outcomes. Clinics have seen improvements in the number of diabetics who have had HbA1C tests and foot exams. One clinic was able to report direct improvements in the HbA1C levels of diabetic patients at the clinic, suggesting use of i2iTracks may have helped them to keep diabetics under control.

In addition, communication and coordination between providers and care coordinators improved follow-up for some clinics. One clinic changed their workflow for diabetic tracking because in the past the

diabetic care coordinator could not identify when the patient would come in for their next visit. Using i2iTracks, the care coordinators are alerted prior to an appointment involving a diabetic patient. This approach allowed the diabetic care coordinators to maintain better contact with the patient. This process resulted in better follow up and hand-off between providers and care coordinators compared to prior to the implementation of i2iTracks.

Moreover, another clinic suggested that they were able to connect with noncompliant patients faster and could respond quicker than when using a paper log in the past. An advantage was that any staff member could use the software and correspondence with patients was not limited to one particular staff member, which helped staff to stay on top of follow-up and manage patient care more effectively. In another case, the clinic was able to get nearly all their diabetic patients to come in for a visit in the last year, and suggested this was a huge improvement that was largely due to efficiencies created in follow-up processes through CDMS. Finally, CDMS offers process efficiencies through decreased time required to run diabetes reports.

While improvements in these areas were cited in discussions, many clinics suggested that the major demonstrable improvements in health outcomes would take time to develop as they continue to improve their data and expand upon the ways they use CDMS in their practices.

Future use of i2iTracks

The Tools for Quality Program was initiated prior to the American Reinvestment and Recovery Act (ARRA) and HITECH. Approximately ten months after the evaluation started, the EHR incentive program and ‘meaningful use’ was introduced. To ensure that we captured the impact of these external factors on the program, we assessed how the EHR Incentive program influenced grantee implementation experiences and future use of their CDMS. Below we highlight some key findings:

Clinics will adopt EHRs and continue using CDMS in the short-term. Results from our round 2 survey indicate that 85 percent of the Tools for Quality program grantees plan to continue using i2iTracks in the next two to five years. Discussions with clinic staff revealed that grantees do not feel that EHRs have the ability to perform equivalent population health management functions. Grantees that had evaluated EHR systems for comparable functionality reported that EHRs do have the ability to identify a cohort of patients, such as all diabetics presenting on a given date. However, EHRs do not provide functionality to manage data on an entire cohort of diabetics over time and create reports that monitor their progress, nor do they offer the flexibility to self-select cohorts and time frames for inclusion in customized, user-friendly reports. Clinics specifically noted that the referral tracking functionality in

i2iTracks is significantly more advanced than in any EHR system. Grantees also reported that the availability of canned reports for both UDS and AQIC as well as enhanced ad-hoc reporting functionality makes CDMS more useful for reporting than EHRs. While some EHRs offer reporting modules, many of these are less sophisticated and less user friendly.

Grantees were undecided as to whether they would continue using a registry beyond five years into the future. It was believed that, with the meaningful use requirements related to clinical quality measures and population health management, many EHR vendor products are likely to mature significantly. Clinics indicated that they would reassess the use of i2iTracks in the future, but would continue to use i2iTracks until EHRs offer a more comprehensive alternative for quality and disease management reporting purposes.

Clinics plan to expand their use of CDMS. In the near-term, grantees plan to use i2iTracks to focus on improving existing processes, conducting panel management, expanding the reports that they produce, and continuing to refine measures for quality improvement. Additionally, findings from our round 2 survey indicate that grantees plan to add new modules over time. These include cardiovascular tracking, prenatal care, dermatology tracking, behavioral health, oral health, women's health, asthma tracking, adult immunization, patient physicals, obesity tracking and prenatal care. Grantees also plan to expand the use of their diabetes modules to include special panels, such as mothers with gestational diabetes. Finally, many grantees reported that they would like to use the referral tracking module.

The Tools for Quality Program will help clinics and networks implement EHRs. While 97 percent of grantees did not have an EHR in place today, grantees reported that they were in the process of evaluating or acquiring EHR systems and will likely have these in place within the next year. Most of the grantees we spoke to also indicated that they would integrate i2itracks with their EHR. Grantees noted that the EHR incentive program had accelerated their timeline for acquiring EHRs. Additionally, many grantees felt that the experience they had gained from implementing i2iTracks would be very valuable for their EHR implementation. Specifically this project was instrumental in preparing clinics for EHR implementations in the following ways:

- *Developing strategies for getting stakeholder support and buy-in.* Grantees learned when and how to engage with their providers to gather relevant and timely input.
- *Getting clinics to realize the value of workflow analysis, strategies for optimizing and refining processes, and integration of technology into the clinical work processes.* In many cases this was

the first time that grantees were reviewing their workflows and they developed valuable insights into how they currently do work and how these can be improved.

- *Preparing clinics to conduct effective user training sessions and refine methods to ensure that staff receives the necessary training initially and on an ongoing basis.* In many cases, i2iTracks was the first computer application that clinical staff had to work with and this project served to improve the general computer skills of clinic staff as well as pave the way for future clinical applications.
- *Helping clinics understand how to plan for and stage the go-live.* Grantees learned valuable lessons about how to conduct a phased roll-out with their provider community and work through critical issues before opening up the system to a large number of users.
- *By improving the quality of the data in the practice management system.* This project uncovered numerous issues with the accuracy of the data in practice management systems which resulted in clinics refining their coding and data entry procedures, removing duplicate records and correcting other inconsistencies in the data.

Conclusions and Recommendations

CDMS' are important software applications that play a critical role today in helping community clinics track and manage uninsured and underserved patient populations with a high presence of chronic disease.

They help by

- Managing data to effectively track care processes and outcomes for patients with chronic illnesses and reaching out to those patients for the purpose of improving their care
- Assisting grantees meet federal, state and regional reporting requirements
- Helping clinical and administrative leaders produce ad-hoc reports and queries specific to clinics needs
- Serving as a critical tool to improve quality of care and enhance care processes
- Helping enhance communication on quality issues within the organization
- Serving as an important learning opportunity and stepping stone for EHR implementation

We suggest areas for consideration in implementation and use of CDMS below. Many of these areas also offer practical lessons applicable to EHR implementation in community clinic settings.

It is important to establish a 'culture of quality'. Effective technology-enabled quality improvement projects typically require strong support for quality improvement as an organizational priority. The project must be supported by all levels of staff, including administration, provider leaders, medical assistants, IT staff and outreach staff. Clinics with this level of support across the organization experienced a cleaner implementation and were able to derive more benefit from use of the CDMS product. Particularly, provider and staff input for key initial steps such as the design of visit summary sheets (outputs from the CDMS designed to provide a template to providers on the status of key indicators for an individual patient) is important to ensure that the CDMS will meet the needs of the individuals who will be critical to make it a useful tool.

The most effective implementation follows a stepwise plan with distinct phases which build upon one another. While it may be tempting to implement more than one technology at a time, such as implementing a new practice management system and CDMS simultaneously, this caused significant delays and created problems with staff buy-in for some clinics in this study. Adjusting workflow patterns and accommodating a new technology takes time and effort, and clinic staff benefitted from focusing efforts on one technology at a time. Additionally, some clinics implemented multiple chronic disease

modules at once to increase efficiency, but measures and reports developed for each module were often less sophisticated than staff would have liked because of the time required to attend to ongoing implementation issues associated with other modules. Results indicate a slow and deliberate approach to implementing modules may be important for EHR implementation as well, as clinics adopting integrated systems may prefer to implement new practice management systems first, then implement basic EHR functionality and implement more complex features such as clinical decision support last.

Updating, validating and improving quality data is an ongoing process. The most successful clinics are those that establish a mechanism to continually improve upon existing measures, mechanisms and processes. Some suggested that determining what to measure was a difficult phase of the project, as clinics may not realize what is missing or relevant until they begin using the measures and criteria they develop. Thus, an ongoing plan for updating, validating, and improving quality measures is critical. While most clinics found that there is no such thing as “perfect data”, the quality of data can be maximized through thoughtful, structured approaches to data cleaning and acceptance that some degree of trial-and-error with data cleaning processes will be necessary to achieve data that is usable for reporting.

Further, while there are many approaches to data validation, the clinic must make a commitment to assess their data and decide how they will address issues as they arise. For example, the clinic can assign staff to identify errors and prioritize their importance, and make specific changes in the appropriate systems on an ongoing basis. Clinics acknowledged that data validation is a continuous process essential to achieving provider buy-in and assuring that their CDMS produces valuable reports.

Regular, clear communication is required to achieve lasting and far-reaching QI results. Community clinics depend on strong communication to affirm their mission, strengthen their programs and help teams work together to better manage chronic disease. A lack of dissemination of information across different departments or team leaders can produce efforts that are implemented in limited silos and do not have a broader organizational impact. Once clinics have determined the measures they will use for QI purposes, it is important to assure the data entry and measurement process is consistent across the organization. Quality improvement requires regular and clear communication between all levels of staff.

Many organizations established subcommittees dedicated to particular chronic disease areas of focus, and these subcommittees communicated uses and findings of CDMS to the larger QI committee and clinical and administrative leadership. Further, it is important to develop a path for sharing new information which impacts other departments’ data entry and use of CDMS, so that any issues can be identified quickly and shared easily with all impacted staff. The most effective clinics employed formal, informal,

traditional and innovative approaches to improving communication. For example, one clinic used an email listserv dedicated solely to share new information about diabetes in CDMS. Other clinics made sure that the CDMS implementation team consisted of a multi-disciplinary set of members representing all key departments within the clinic.

Leadership engagement is necessary for CDMS to register organizational impact. We found that, in order to maximize the benefits of CDMS implementation, the individuals and committees charged with managing implementation and use of the system must have both the support and the attention of clinic leadership at the highest levels. Support from this group is often provided initially at the time of pursuing funding or setting up business relationships. However, we found that it was important for top clinic management to stay engaged throughout the process of implementation and use. This is because ongoing attention from clinic management is required to determine how to take action in response to trends in clinic operations unearthed by the analysis from CDMS, and to marry this analysis with specific management functions, such as providing feedback and compensation for individual clinicians or teams. Moreover, if used effectively, CDMS software can be used to learn more about the organization broadly and to affect change.

Coordination of multiple resources reduces barriers to health IT implementation. Learning sessions, technical support and assistance provided by consortia or networks allowed clinics to further their QI capabilities, share knowledge around implementation issues and uses of health IT software, and build stronger relationships. As part of this program, community clinics that lacked significant infrastructure, expertise, support and staffing resources were able to successfully implement health IT software through use of a hosted solution. In all cases, clinics suggest that coordination and collaboration with networks and other clinics eased the burden associated with this process. These lessons are particularly relevant as clinics begin the EHR adoption process as many community clinics will be in a good position to benefit from group purchasing efforts or centralized software hosting, regional technical assistance and support programs, and peer-to-peer learning workgroups.

Appendix A

Grantee Clinic Demographic and Program Participation Data

Clinic	Demographics			Program Participation		
	Sites	Number of Encounters	Health Services Offered (in addition to Primary Care)	Interfaces and data Input	Targeted Populations	Who is hosting i2iTracks?
Asian Health Services	3	95381	Dental, Mental Health, Dermatology, GI, Gynecology	Lab System, Manual Entry PM System	Diabetes	Self-hosting
Asian Pacific Health Care Venture	3	46438	Mental Health, Community Outreach and Education	Lab System, Manual Entry PM system, Provider Sheets	Diabetes, Depression, Breast and Cervical Cancer Screenings, Women's health, Referral, Prenatal, Cardiovascular Disease	Self-hosting
Axis Community Health	2	27331	Mental Health, Social Services, WIC Nutrition Program	PM, Lab System, Manual Entry, Provider Sheets	Diabetes	Self-hosting
Borrego Community Health Foundation	6	57863	Dental, Mental Health, Medical Specialty Care	Lab System, Manual Entry, PM System	Diabetes, Breast Cancer Screening, Prenatal Care, Referrals, Behavioral Health, Coumadin Clinics	Community Clinics Health Network
Clinica Msr. Oscar A. Romero	3		Dental, Mental Health	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Women's Health	Central Valley Health Network
Clinicas de Salud del Pueblo	9	181679	Dental, Mental Health, Social Services	Lab System, Manual Entry, PM System	Diabetes, Women's Health	Self-hosting
Clinicas del Camino Real	1	198404	Dental, Mental Health, Social Services, Podiatry, Optometry, Neurology, Orthopedics, Cardiology	Lab System, Manual Entry PM system	Chronic Disease Patients, Perinatal Care, Immunizations, Women's Health	Self-hosting

Clinic	Demographics			Program Participation		
	Sites	Number of Encounters	Health Services Offered (in addition to Primary Care)	Interfaces and data Input	Targeted Populations	Who is hosting i2iTracks?
Community Health Centers of the Central Coast	20		Dental, Mental Health, Social Services, Infectious Disease, Orthopedics, Podiatry, Pain, OBGYN	Lab System, Manual Entry, PM system	Diabetes, Women's Health, Asthma	Self-hosting
La Maestra Community Health Center	4	112898	Dental, Mental Health, Social Services	PM System	Diabetes, Asthma, Prenatal Care	Self-hosting
Lifelong Medical Care	6	130751	Dental, Mental Health, Social Services, Podiatry, Optometry	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Cardiovascular Disease, Women's Health	La Clinica de la Raza
Livingston Medical Group	1	49330	PC only	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes	Self-hosting
Mission City Community Network, Inc.	4	39912	Dental, Mental Health, Social Services, OBGYN	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Women's Health, Asthma, Immunizations, Mental Health	Self-hosting
Northeast Valley Health Corporation	6	217686	Dental, Mental Health, Women's Health	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes	Self-hosting
South Bay Family Health Center	3	64299	Dental, Mental Health, Social Services	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Women's Health, Immunizations	Self-hosting
South Central Family Health Center	2	22989	PC only	PM, Lab System, Manual Entry, Provider Sheets	Diabetes, Cardiovascular Disease, Women's Health, Immunizations	La Clinica de la Raza
St. John's Well Child and Family Center	9	124117	Dental, Mental Health, Social Services, Podiatry, OBGYN, Health Education	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Women's Health	Community Health Center Network

Clinic	Demographics			Program Participation		
	Sites	Number of Encounters	Health Services Offered (in addition to Primary Care)	Interfaces and data Input	Targeted Populations	Who is hosting i2iTracks?
The Los Angeles Saban Free Clinic	4	89381	Dental, Mental Health, Social Services, Gynecology, Optometry, Dermatology	Lab System, Manual Entry, PM System	Diabetes, Vitals for all Patients, Women's Health, Obesity, Prenatal Care	Self-hosting
Tiburcio Vasquez Health Center, Inc.	16		Dental, Mental Health, Social Services, Community Health Education	Lab System, Manual Entry, PM System	Chronic Disease, Women's health, Immunizations	Self-hosting
Tri-City Health Center	3	71775	Dental, Mental Health	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Mammograms, Pap smears, Referrals	Central Valley Health Network
UMMA Community Clinic	1	6692	OBGYN, Dermatology	Lab System, Manual Entry, PM System	Diabetes, Women's Health, Immunizations	Community Clinics Health Network
Valley Community Clinic	1	51501	Dental, Mental Health, Social Services, Optometry, Nutrition	Lab System, Manual Entry, PM System, Provider Sheets	Diabetes, Asthma, Women's Health, Chlamydia, Immunizations, Special Referrals	Self-hosting
Valley Health Team, Inc.		37302	Optometry	PM System	Diabetes, Asthma, Behavioral Health, Women's Health, Pediatrics, Prenatal Care	Self-hosting
Westside Family Health Center	1	22141	PC only	Lab System, Manual Entry, PM System, Provider Sheets	Pap smears, Mammograms, Prenatal Care	Self-hosting

Appendix B

Clinic Participation in Evaluation by Region and Consortia

Region	Consortia/ Network	Clinics	Completed Round 1 Survey	Participated in Round 1 Interviews**	Completed Round 2 Survey	Participated in Round 2 Interviews**	Site Visits**
Bay Area	CHCN	Asian Health Services	X		X	X	
	CHCN	Axis Community Health	X		X		X
	CHCN	La Clinica de la Raza	X		X		X
	CHCN	Lifelong Medical Care	X	X	X		
	CHCN	Tiburcio Vasquez Health Center	X		X		
	CHCN	Tri-City Health Center	X		X		
Central Coast	CVHN	Clinicas del Camino Real, Inc.	X		X	X	
	CVHN	Community Health Centers of the Central Coast	X	X	X		
	CVHN	San Benito Health Foundation	X		X		
Central Valley	CVHN	Clinica Sierra Vista*	X				

Region	Consortia/ Network	Clinics	Completed Round 1 Survey	Participated in Round 1 Interviews**	Completed Round 2 Survey	Participated in Round 2 Interviews**	Site Visits**
	CVHN	Inland Behavioral & Health Services	X	X	X		
	CVHN	Livingston Medical group	X	X	X		
	CVHN	Valley Health Team	X	X	X		X
San Diego	CCHN	Borrego Community Health Foundation	X		X	X	X
	CCHN	Clinicas de Salud del Pueblo	X	X	X		
	CCHN	La Maestra Family Clinics	X	X	X		
	CCHN	Mountain Health & Community Services	X				
Los Angeles	CCALAC	Mission City Community Network*	X				
	CCALAC	Asian Pacific Health Care Venture	X		X	X	
	CCALAC	Central City Community Health Center	X		X		
	CCALAC	Northeast Valley Health Center	X	X	X		X

Region	Consortia/ Network	Clinics	Completed Round 1 Survey	Participated in Round 1 Interviews**	Completed Round 2 Survey	Participated in Round 2 Interviews**	Site Visits**
	CCALAC	Saban Free Clinic (The LA Free Clinic)	X		X		
	CCALAC	South Bay Family Health Center	X	X	X		X
	CCALAC	Valley Community Clinic	X		X		
	CCALAC	Westside Family Health Center	X		X		
	SCCHC, CCALAC	T.H.E. Clinic, Inc.*	X				
	SCCHC, CCALAC	Clinica Msr. Oscar A. Romero	X		X	X	
	SCCHC, CCALAC	South Central Family Health Center	X	X	X		
	SCCHC, CCALAC	St. John's Well Child & Family Center	X		X		
	SCCHC, CCALAC	UMMA Community Clinic	X		X		X

*Clinic did not participate in round 2 activities.

**Only a small number of clinics were selected for interviews and site visit discussions.

Appendix C

Evaluation Activities: Round 1 Data Collection

The first round of data collection focused on the grantee characteristics at the start of the program and their initial implementation experiences with their CDMS. We also focused on the role of the learning sessions in supporting the grantees with their respective implementations and early lessons learned.

Review of grantee materials. NORC reviewed all 16 proposals to assess background information on each grantee clinic, including demographic information, QI efforts, IT infrastructure and health IT capabilities prior to i2i Tracks, and grantee plans for implementing and using i2i Tracks. For some clinics, NORC was also able to review Quality Improvement Strategy Plans, which included detailed plans for QI processes and workflows.

Discussions with Advisory Committee and Funders. In the early phases of the evaluation, NORC conducted informal 60-minute telephone discussions with members of the advisory committee as well as select Tools for Quality Program funders. The discussions informed development of an overall logic model for the evaluation, which was finalized following these interviews. Discussions with funders also focused on their perspectives of program goals and desired outcomes.

Round 1 Survey. The round 1 survey was designed to assess background and pre-implementation conditions (resources and technical applications currently in place at the grantee site), goals for participating in the program, grantee experiences implementing i2iTracks, lessons learned, and the role of the learning sessions. NORC designed the round 1 survey in collaboration with Tides and CHCF. The instrument was subsequently pilot tested with five grantees and distributed to all clinics. Following the initial mailing of the survey, NORC followed up repeatedly with non-responder clinics by sending emails and placing phone calls. To improve grantee response rates, CHCF and Tides also emailed clinics that had not responded. Through these collective efforts, NORC received a total of 30 completed surveys from an expected total response of 30. Appendix B lists the clinics that have submitted their round 1 survey.

Review of Consortia Progress Reports. Consortia grantees were required to produce annual progress reports to the consortium of funders. NORC designed progress reports for data collection in round 1 and

in round 2 in close consultation with the funders. Progress reports offered grantees the opportunity to describe in detail their progress at a consortia level hosting learning sessions and providing clinic support, and to address any issues which impacted clinics' implementation. Progress reports were developed and submitted in electronic format. NORC reviewed the progress reports for all four consortia grantees. The progress reports were used to validate and clarify information that had been gathered from each of the individual clinics from the round 1 survey. In addition, these reports were reviewed in preparation for the round 1 semi-structured interviews.

Review of Grantee Clinic Progress Reports. In addition to consortia reports, as part of the round 1 data collection grantee clinics were required to submit a progress report after the first year of the project. NORC developed the progress report in close consultation with funders using a standard electronic format. Progress reports asked grantees to describe their experiences with implementation, detail specific challenges faced and how these were addressed, and discuss any anticipated challenges. Results of the progress reports were used to inform round 1 data analysis and contributed to development of the interim report.

Semi-Structured Interviews. To supplement the information gathered from the round 1 survey, NORC conducted semi-structured discussions with key staff from select grantee sites. We selected 10 clinics to interview based on geographic region, size, network affiliation and participation, implementation approach and overall project goals. The discussions were conducted as 60-90 minute telephone interviews and led by a senior member of the NORC team. Appendix B includes a list of the ten grantee sites that participated in round 1 interviews.

Round 2 Data Collection

Round two data collection focused on actual use of CDMS by providers and other clinic staff, the impact of CDMS on clinic operations and clinical outcomes, future plans for CDMS in the context of the EHR incentive program, and barriers and enablers to success.

Round 2 Surveys. The round 2 survey was used to assess who were the most frequent users of CDMS; variations in practices for entering data into CDMS; and use of CDMS at the point-of-care, for panel management, and for reporting. NORC designed the round 2 survey in close collaboration with CHCF. To minimize burden on clinics, the survey could be submitted electronically and required only 15-20 minutes to complete. NORC sent emails to all clinic leaders which included a letter from CHCF, a letter from NORC, and a copy of the survey. Following the initial emailing of the survey, NORC followed up repeatedly with non-responder clinics by sending emails and placing phone calls to designated staff. To

improve grantee response rates, CHCF also emailed clinics that had not responded. Through these collective efforts, NORC received 26 completed surveys from a total of 27 expected responses. Appendix B lists the clinics that submitted their round 2 survey.

Review of Consortia Progress Reports. Consortia grantees were required to produce annual progress reports to CCI. In close consultation with funders, NORC designed the progress report forms in electronic format, each consisting of no more than 15 questions. Progress reports offered grantees the opportunity to describe in detail their progress at a consortia level hosting learning sessions and providing clinic support, and to address any issues which impacted clinics' implementation. NORC reviewed the progress reports for all 4 consortia grantees. The progress reports were used to validate and clarify information that had been gathered from each of the individual clinics from the round 2 survey. In addition, these reports were reviewed in preparation for the round 2 semi-structured interviews.

Semi-structured Interviews. The round 2 discussions were used to gather contextual information on the factors that influenced the use of CDMS at the point-of-care, processes used by grantee sites to populate data into CDMS, the impact of CDMS on grantee operations, and future plans to expand the use of CDMS or integrate with EHRs. The team also used these discussions to gather implementation lessons learned and identify any ongoing challenges grantees reported. Discussion protocols were developed in close consultation with CHCF. Six clinics were selected for discussions based on a number of factors, including size, region, whether or not they were using a hosted solution, level of QI experience, and modules implemented. The discussions were conducted as 60-90 minute telephone interviews and led by a senior member of the NORC team. Appendix B includes a list of the grantee clinic sites that participated in the round 2 interviews.

Site Visits. To complete our data collection, NORC conducted on-site discussions with seven clinics. The selection criteria for the clinics included size, whether or not they had a hosted solution, relative level of QI sophistication, representativeness relative to other clinics in the program, and how much information we had gathered from the clinic based on prior data collection activities. Site visits were conducted with clinics located in three regions: Bay Area, Los Angeles, and Central Valley.

The site visit discussions were conducted with both clinic senior leadership and clinic support staff involved in the use of i2iTracks on a regular basis. Specific topics covered during site visits included: point-of-care use of CDMS; use of CDMS for reporting, panel management and patient outreach; the impact of CDMS on quality improvement overall; future uses of CDMS in the context of the EHR incentive program; and grantee plans for EHR adoption. Each site visit discussion was approximately 90

minutes in duration and allowed us to engage with both leadership and front-line staff, including administrative, clinical and IT leaders. Appendix B lists the clinics where we conducted site visits.

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