PRIMARY CARE DEVELOPMENT CORPORATION

February 2012

TRANSLATING EVIDENCE INTO PRACTICE

A How-To Manual for Implementing Clinical Decision Support

Dear Friends and Colleagues:

PCDC is delighted to share with you our latest publication, Translating Evidence Into Practice: A How-To Manual for Implementing Clinical Decision Support.

The manual provides step-by-step guidance for medical directors and senior leaders at primary care organizations to implement quality improvement initiatives, with a special focus on using electronic health records to advance chronic disease management.

It was developed following a two year project with Open Door Family Medical Centers (Open Door), a federally qualified health center (FQHC) with four practice sites in Westchester county, NY serving over 40,000 underserved patients. The Open Door experience, described throughout the manual, demonstrates that hypertensive patients treated using a clinical decision support intervention were 1.5 times more likely to have controlled blood pressure than pre-intervention. Using this success as an on-the-ground model, the manual provides a systematic approach for designing, planning, implementing and evaluating a quality improvement initiative with a clinical focus. Specific goals of the manual include defining the project, setting quality improvement goals, assessing and understanding current data and technology capabilities, implementing change, and using data to evaluate and sustain improvements.

On behalf of PCDC's staff and Board of Directors, thank you for your support and interest in our work.

Kind Regards,

Ronda Kotelchuck
Chief Executive Officer

ABOUT PCDC

The **Primary Care Development Corporation (PCDC;** www.pcdc.org**)** is a nonprofit organization dedicated to transforming and expanding primary care in underserved communities to improve health outcomes, reduce healthcare costs and disparities. Our programs enhance access to primary care by offering flexible financing to build and modernize facilities, providing coaching and training to strengthen care delivery, and leading policy initiatives.

Since 1993, PCDC has partnered with more than 500 primary care organizations throughout the U.S. to adopt a patient-centered model of care that maximizes patient access, meaningful use of health IT, care coordination and patient experience, as well as build community health resilience through disaster preparedness and business continuity planning. Certified as a Community Development Financial Institution (CDFI) by the U.S. Treasury, PCDC has invested more than $390 million in over 95 primary care capital projects. This investment has improved 785,000 square feet of space and created more than 4,000 jobs in low-income communities.

PCDC's Performance Improvement Practice has helped more than 5,000 healthcare staff redesign workflows and processes, adopt new technologies such as electronic health records, to enhance the delivery of primary care services for millions of patients. PCDC's Performance Improvement unit is composed of 20 professionals with more than 90 years of collective experience in managing, implementing and evaluating quality improvement initiatives, including chronic disease management, medical home transformation, health IT optimization and primary care redesign.

Contact Us:
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What is the purpose of this manual?

This manual provides step-by-step guidance to help you develop and implement a clinical decision support (CDS) system for chronic disease management within your primary care organization. The Primary Care Development Corporation (PCDC), in collaboration with Open Door Family Medical Centers, Inc. (Open Door) and New York University College of Dentistry and School of Medicine, developed this manual as a practical resource for primary care providers seeking to improve the quality of care they provide. *Translating Evidence into Practice* takes you through the development and integration process using examples from our experience in adapting the use of electronic health record (EHR)-based clinical decision support tools at Open Door.

The quality improvement (QI) initiative we describe is multifaceted. Although the development and integration of clinical decision support are central to this initiative, your primary care organization's ability to use and to benefit from CDS will require you to be familiar with an array of QI concepts and methodologies. **To successfully develop and use CDS features, your organization must be able to draw upon earlier experience in implementing foundational QI projects within your practice setting.**

While the initial planning and implementation period for this project will require at least several months of intensive work, the integration of the CDS system will lead to permanent, sustained changes in the way your organization delivers care. Embarking on this project is part of a larger organizational commitment to QI.

Box 1: What is Clinical Decision Support (CDS)?

Clinical decision support, or CDS, refers to a system, application or process that helps health professionals make clinical decisions to enhance patient care. Clinical knowledge in the CDS could range from simple facts and relationships to best practices for managing patients with specific disease states, new medical knowledge from clinical research and other types of information. *(Source: HIMSS website accessible at http://www.himss.org).*

Note that CDS does not, by definition, refer to information technology; indeed, manual reminders can be considered CDS tools. However, for our purposes, we will limit our discussion of CDS to electronic health record (EHR)-based features.

For a list and description of CDS features, please refer to **Appendix 1.**

How was this manual developed?

Our recommendations are based on our experience in designing, implementing and evaluating CDS as part of a multi-faceted QI initiative at Open Door from October 2007 to October 2010. Open Door is a federally qualified community health center (FQHC) with four practice sites located in Westchester County, New York. These health centers serve a population of over 30,000 patients, primarily Latino immigrants.

Supported by a federal grant from the Agency for Healthcare Research and Quality (AHRQ Grant #5R18HS017167), PCDC and Open Door conducted an implementation research project to advance understanding of how clinicians use information technology (IT) to improve care. **Focusing on hypertension, we examined the role of EHRs and embedded CDS features in supporting quality improvement in a single large, multi-site primary care practice.** We implemented the CDS features within Open Door's existing EHR and care processes, trained providers and staff to use the new features and then assessed the results. We evaluated process and outcome measures related to patient care, and we interviewed providers and key administrative staff to gather detailed qualitative information about the factors that helped or hindered their use of the CDS features.

Ultimately, by comparing patients' blood pressure readings from 15 months *prior* to the implementation of the CDS features to blood pressure readings 15 months *after* implementation, we showed an improvement in patient outcomes. With a small number of exceptions, providers reported that the CDS system enhanced their ability to provide excellent hypertension care. For more information about our project at Open Door and its goals, please see **Appendix 2a** and **Appendix 2b**.

Integrating CDS into clinical practice entails two primary components. First is the **developmental** stage, which centers on the identification of which CDS features to establish in the EHR. As we developed our CDS system, we consulted *Improving Outcomes with Clinical Decision Support: An Implementer's Guide*, by Jerome A. Osheroff, MD, FACP, FACMI, et al. *The Guide* provided our team with a systematic approach to identifying those CDS features that would best support our clinical goals. We adapted the development process to our own setting, picking and choosing those elements we most needed. You can use *the Guide* as a companion to this manual, or consult other CDS development resources, such as those listed at the end of this section. The key point is to fit the method you choose to your practice setting and to whatever EHR is in use.

The second component of the CDS integration process is **implementation**, which includes the introduction of the new CDS features into the workflow of the health practice and the associated support activities. During implementation, we drew on change management principles, effective project management strategies, and the expertise of our team, which was comprised of IT implementation professionals from the clinical, administrative and technological spheres.

Our approach is applicable to many health conditions seen in primary care. Treatment guidelines and clinical best practices exist for many chronic conditions seen in primary care organizations, including diabetes, asthma and congestive heart failure. You may also consider using CDS features to assist with other interventions that are guideline-driven, including mental health screening, pre-natal care, flu shots, well-child visits and acute conditions such as otitis media and urinary tract infections.

Box 2: CDS Development Resources

Some key publications to support your CDS development work are listed below. For an additional list of publications cited in this manual, please see **Appendix 3.**

- Berner ES. Clinical Decision Support Systems: State of the Art. Agency for Healthcare Research and Quality, US Department of Health and Human Services. Publication No. 09-0069; 2009

- Friedberg MW, Coltin KL, Safran CD, et al. Associations Between Structural Capabilities of Primary Care Practices and Performance on Selected Quality Measures. *Ann Intern Med.* 2009;151(7): 456-563.

- Karsh B. Clinical Practice Improvement and Redesign: How Change in Workflow Can Be Supported by Clinical Decision Support. Agency for Healthcare Research and Quality, US Department of Health and Human Services. Publication No. 09-0054; 2009.

- *Improving Quality and Reducing Cost with Electronic Health Records: Case Studies from the Nicholas E. Davis Awards.* HIMSS: 2007. http://marketplace.himss.org/

- Osheroff JA, ed. *Improving Medication Use and Outcomes with Clinical Decision Support: A Step-by-Step Guide.* HIMSS: 2009.

- Osheroff JA, Teich JM, Pifer EA, et al. *Improving Outcomes with Clinical Decision Support: An Implementer's Guide.* HIMSS: 2005.

A few caveats:

- ***EHR systems vary in the feasibility, cost, and assignment of responsibility (i.e., the client or the vendor's) for changes.*** Be sure to find out early on what is required to implement CDS functionality in your EHR, who is responsible for implementing the features, and how much it will cost. For more information, see Section 5.

- ***For some conditions, a CDS integration project may not be the right solution.*** As an example, consider obesity. Because the treatment of obesity is not guideline-driven, it is difficult to automate a system of prompts for treatment within the EHR.

- ***Our approach is focused on providers.*** We made a strategic decision to focus specifically on providers' adherence to guidelines and use of technology, and identify ways that we could develop a successful IT solution to some of the challenges of chronic disease prevention and management.

- ***Our methodology was developed in a single multi-site practice.*** The recommendations presented here detail successful methods and lessons learned from our initiative at Open Door. Other settings may pose different organizational and technological challenges.

Who is this manual intended for?

We envision the audience for this manual as champions of quality-focused efforts at primary care organizations including quality improvement leaders, medical directors and other senior leaders, and implementation teams. Readers of this manual will be asked to design and implement the CDS system, which entails the following foundational components: carrying out a strategic planning process, committing financial and staff resources toward this project and its component quality improvement activities on a long-term basis, guiding the project's implementation and engaging the entire staff in a sustained effort to improve the processes of care at your organization.

We also envision that readers of this manual will have roles in primary care organizations that demonstrate the following characteristics:

- ☑ *A high level of organizational commitment* to quality improvement
- ☑ *Prior organizational experience* with QI projects
- ☑ *The involvement of key administrative, technology, and medical leaders* in prioritizing, designing, implementing and sustaining this project

Our approach assumes that readers are familiar with concepts and processes including workflow redesign and performance measurement. Your organization should also have experience in chronic disease management and care planning. Therefore, we encourage you to conduct an assessment of your organization's readiness to undertake this project.

- ☑ Does your organization have a strategic plan and mission statement that includes a commitment to quality?
- ☑ Does your senior leadership set quality-related goals and objectives for the organization? Are you able to commit resources (money, time and staff) toward achieving these goals?
- ☑ Have you fully integrated an EHR into practice?
- ☑ Do you have an experienced quality professional on staff leading your quality function?

How is the manual organized?

Our approach includes guidance on how to effectively use QI methodologies and concepts to prepare your organization for the changes you are planning to make, as well as a step-by-step approach to building your CDS features and integrating them into your existing system.

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Icons

The following icons are used throughout the Manual to differentiate key elements:

Denotes tips on the topic

Denotes additional resources available on the topic

Denotes caveats or cautions

Denotes tools available on the topic

These boxes contain examples and more detailed information on key topics

SECTION 1: Prepare Your Organization for a CDS Integration Project

Developing an EHR-integrated CDS system is a significant undertaking. You will need to select a small team to lead this initiative, but you will also need to **engage your organization's entire staff in adopting and using the system**. In order to achieve this level of engagement, you must build enthusiasm for change all levels of the organization.

To set the stage for your improvement initiative, be ready to manage the change process. Be sure that you communicate your intentions with the entire staff and provide the rationale for your decision to pursue the development and integration of CDS features into your existing technology. Link this project to your broader QI strategy, and help staff understand how this CDS integration project relates to other QI initiatives that you may have already carried out, or that may be underway at your site.

Manage Change Effectively

Change management has been the subject of numerous studies and articles that identify reasons underlying the success or failure of various efforts to improve processes. Businesses of all kinds, including health care practices, face pressure to reinvent themselves due to external stressors such as competition, customer expectations and the evolution of new technologies. Your responsibility, as a leader of change, is to create an environment that fosters the changes that lead to sustainable improvement.

Based on your organization's previous experience in implementing QI projects, you already know how difficult change can be. **Use your staff's earlier QI experience as the foundation for the changes you are about to make as part of this new project, but also plan for the challenges inherent in launching any QI initiative.** Even in an experienced, quality-focused primary care organization, change is hard.

We found that three of the critical success factors identified in the QI literature made a real difference to our CDS integration initiative:

☑ *Provide Strong Leadership.* Success often hinges on strong leaders that craft and articulate a clear vision for the organization. Leaders should work to reduce inaccurate assumptions about the changes, remove obstacles, and encourage staff to "go for it". By communicating overall strategy and purpose of the initiative to staff, being available and willing to troubleshoot with the team when necessary, and allocating time to meet with the team, leaders can show their investment and confidence in QI and the associated changes. QI projects can be challenging, but are easier when leaders get the team and staff enthusiastic about working together to reach an objective.

☑ *Become a "Learning" Organization.* Quality should be anchored in the organization's culture. Enforcing accountability at all levels of the organization, establishing interdisciplinary teams, encouraging innovation and using data to make improvements should become "the way we do things around here."   Leaders reflect this culture of learning by monitoring progress and

performance results, providing a safe, non-punitive forum to discuss ideas, and encouraging hands-on involvement and training of all staff. Celebrate successes – even small victories – to encourage more innovation.

☑ ***Write QI into Your Organization's Strategic Plan.*** Aligning your QI initiative with your organization's strategic plan is critical: the changes you are pursuing must advance your organization along its pathway toward achieving its organizational goals. Moreover, because of the heavy resource investment required by technology-related changes like the development and integration of a CDS system, this alignment of goals becomes even more critical to your success. If you have not already done so, be sure QI is written into your organization's mission statement, and communicate expectations for executives and the Board of Directors. In fact, if possible, add QI accountability to your governance structure to increase the exposure and attention to QI initiatives.

Share the Evidence Base

As the leader of this project, it is likely that you have already familiarized yourself with the evidence base in support of integrating CDS in your EHR. **Ensure that your team is equally familiar with the rationale, and that you share a common understanding of both the advantages and the difficulties of embedding CDS features within your existing technology.** Acknowledge the limitations of CDS, and explain your reasons for choosing this QI project as your organization's next step.

Research suggests that CDS can, but does not always, improve provider performance and health outcomes. (Bryan 2008, Garg et al. 2005, Kawamoto et al. 2005). A systematic review of 97 studies of CDS found that 64% improved provider performance but only 13% reported having a positive impact on health outcomes (Garg et al. 2005). In a subsequent review of the literature, Kawamoto et al. reported similar findings; 68% of 70 studies showed that CDS significantly improved adherence to recommended care standards (Kawamoto et al. 2005). The reviewers (Kawamoto et al. 2005) found that four features were strongly associated with positive results from CDS use: 1) automatic provision of decision support as part of clinical workflow; 2) provision of recommendations rather than just assessments; 3) provision of decision support at the time and location of decision-making; and 4) computer-based (vs. manual or paper-based) decision support.

Selected key studies related to CDS are included in **Appendix 3**.

Link the CDS Project to Your Other QI Initiatives

Building an EHR-integrated CDS system is challenging. Make the most of your efforts by drawing on your past QI experience and linking the new development and implementation to your other projects, goals and objectives.

Present this project to your staff as an opportunity to put the QI principles that they have already learned into practice. For instance, this project may call upon staff to use the Model for Improvement and its Plan-Do-Study-Act (PDSA) cycles to integrate the system into existing technology and work processes. Your team will need to design and conduct practical training sessions for providers and staff

to facilitate their uptake of the new tools and comprehension of new data. You may also need to redesign the office, both in terms of its physical space and its virtual/electronic procedures.

In addition to putting your quality improvement skills and experience to the test, **this project will extend the value of the many other improvement initiatives that have already been completed, or that are underway at your organization.** Make the connections for your team and your staff by clearly describing specific ways in which this CDS integration project will support and expand the QI work that your staff has already accomplished. Use the launch of this project as an opportunity to affirm the value of that work, and explain that this project is a concrete activity by which the organization can address quality gaps.

Following are two examples of how you might link this CDS integration project to QI initiatives or align it with current policy initiatives and regulations such as:

- ☑ *Patient Centered Medical Home (PCMH) certification.* For organizations that are seeking or have received NCQA certification as a PCMH, this initiative can help your primary care organization:
    - o Select clinical conditions of interest;
    - o Monitor provider performance and patient outcomes; and
    - o Optimize reimbursement.

- ☑ *Meaningful Use.* As a technological tool engineered to improve quality, safety and/or efficiency, an EHR-integrated CDS can support compliance with Meaningful Use standards and assist your organization to:
    - o Standardize and facilitate ordering, medication management, and other processes of care;
    - o Improve care coordination; and
    - o Improve population and public health.

SECTION 2: Define Your Project

This section of the manual will guide you through project set-up, including defining expectations, selecting an appropriate team, setting clinical objectives and writing a clear Statement of Goals.

Don't rush this process: make sure to think through the grand plan for this initiative as well as the details of its execution. Spending the time to establish these fundamentals will facilitate your project's successful implementation.

Ask the Big Question: What Are You Trying to Accomplish?

You have now decided that integrating CDS features into your EHR is the right next step for your organization. Before you begin to set up its logistics, articulate your expectations of the initiative in as much detail as possible. **Defining expectations will help you select an appropriate team to develop and implement the project, and, in turn, allow the team to plan for implementation in a realistic way.** These expectations will form the basis of a clear statement of clinical goals and objectives, and will ensure that the team – and the entire organization – understands and agrees with the project's aims.

Below are some questions that relate to your organization's overall QI goals and previous QI experience, while others are more specific to this CDS initiative. The answers to these questions will help form the basis for your Statement of Goals.

1. What clinical area(s) would you like this project to impact?

    1. Are you seeking to improve management of chronic disease? Increase preventive services? Screen for illness or risk factors? Treat acute disease?

    2. Are relevant standards of care (community, national), clinical best practices, or clinical guidelines available for the condition(s) you have selected?

2. Make a list of the improvement projects that your organization has implemented during the past five years.

    3. What were the outcomes of each project?

    4. Overall, how would providers and other staff judge the organization's experience in implementing these projects?

3. How easy or difficult do you think it will be to get providers and staff on board with this project?
4. How adept are providers and staff at using the EHR?

    5. In your previous QI initiatives, have providers been willing to use new features of the EHR?

5. How does this project fit in with your organization's two-year strategy? Its overall vision?

6. Articulate the benefits that you hope the EHR-integrated CDS system will bring to the organization, providers, staff, patients, community

Your answers to these questions should guide your articulation of expectations in this project, and assist you in crafting the statement that defines the initiative. Consider these questions yourself, and then pose them to the senior leaders of your organization. Your statement of goals will allow you to announce or describe the project to internal and external stakeholders including the Board of Directors, employees, the press, vendors, and other agencies.

Boxes 3a and **3b** below describe how Open Door defined its project and developed its rationale.

Box 3a: Defining the Hypertension Project at Open Door

Selecting a Clinical Area. "Based on our current patient data, our health center identified a need to improve management of hypertension. Blood pressure control is a significant challenge for our diabetic patients as well as our non-diabetic patients. As a leading cause of stroke, heart attack and death, hypertension is also of serious concern to our patients and community. Furthermore, the treatment of hypertension is guideline-driven, so it is an ideal condition to use as the basis for an EHR-integrated CDS system."

Previous QI Experience. "Participating in the federal Health Disparities Collaborative helped us to improve patient outcomes in Diabetes. We have used PDSA cycles to improve processes and care in a number of clinical areas, and send monthly performance data to providers. Providers take pride in the improvements we have made, and in the culture of learning that we have developed here."

EHR / Technology. "Our providers all use the center's EHR. We have an embedded registry function, which we use to provide feedback to providers on how their patients are doing in various clinical areas. Not all providers are as "tech-savvy" as we would like, but we if we provide sufficient training and time for them to learn how to use new features, we can count on them to do so."

Organizational QI Strategy. "In 2008, as part of our work in the Health Disparities Collaborative, our Board of Directors endorsed a mission statement that prioritized improving chronic disease management and preventive services. We view the CDS project as a means toward that end."

Box 3b: Hypertension Project Rationale

Anticipated Benefits of EHR-integrated CDS features.

- "For our **organization**, the CDS features will help us achieve our goals in improving hypertension management. They will also enable us to use data from the EHR to learn about the care we give and make care decisions based on patient outcomes. Ultimately, we can expand the system to improve chronic disease management and preventive care for all patients."

- "For **providers**, the CDS features will facilitate adherence to guidelines and will encourage appropriate treatment. Providers will have access to clinical data in real time, which will validate or prompt suitable actions."

- "For **staff**, the CDS features will systematize processes and reminders, and provide an opportunity for them to get involved in making improvements to the process of care and in impacting outcomes."

- "For **patients**, the CDS features will support better hypertension care for each individual. Necessary tests and procedures will no longer fall through the cracks, and we will be able to do a better job of planning care and monitoring our patients' progress."

- "For the **community**, the CDS features will help us reduce the disease burden associated with hypertension, including stroke and heart attacks."

Assemble a Project Team

When it comes to staffing, many primary care organizations feel challenged. Finding enough hours in the day for all the patient visits can seem daunting, not to mention the time necessary for follow-up and other tasks required to run a practice or health center. Special projects, like a QI initiative, may be seen as overwhelming. **However, provided that the organization's leadership is prepared to allocate resources, the QI project is an opportunity**. In fact, providers may jump at the chance to participate if they know that their schedules will be modified to allow them to work on quality improvement.

Select your team carefully – the team is critically important to the success of your project. The specific individuals assigned to the initiative will clearly depend on the project definition, as well as the skills, interests, availability, and competing demands on your staff. However, at a minimum, your project team must include a(n):

- Executive leader or sponsor, with the authority to make decisions about resource deployment and organizational policy, and remove barriers to progress when necessary;
- "On the ground" staff member who knows workflow and process details;
- IT system administrator;
- Clinician who is knowledgeable about the clinical area you have identified for improvement; and
- Manager to run the project.

Remember that a team member can wear more than one hat. You can deploy staff in whatever way works best for your organization, but be sure that assigned staff have the skills, time, and support to complete all that is asked of them.

Box 4 summarizes project staffing for the hypertension QI project at Open Door (note that research functions are omitted).

Box 4: QI Project Staffing at Open Door	
Area of Responsibility	**Team Member(s)**
▪ Project Administration	Project Director
▪ Executive Sponsor	Executive Director, Clinic
▪ Advise team on implementation in the clinic setting	CMO, MD Advisor, QI Director
▪ Develop policies and procedures re: management of HTN	CMO, MD Advisor, QI Director
▪ Design, develop, test, and implement CDS intervention	CMO, MD Advisor, QI Director
▪ Train staff	CMO, QI Director
▪ Ensure availability of HIT systems	System Administrator
▪ Develop EHR dataset	QI Director, Programmer (Consultant)
▪ Evaluate performance, present results	QI Director, Project Director

STAFFING TIPS

- **Consider and present the QI initiative as an opportunity for growth for staff.** Choose providers and staff who are particularly enthusiastic about QI, data management or analysis, or project work, and support them in developing competencies in these areas. These skills are crucial not only to this project, but also to the success of your organization's other technology-supported QI initiatives, including those related to Meaningful Use and PCMH.

- **Keep in mind that this project is user/clinician-driven.** Although it involves a strong technology component, the project is not a purely IT initiative. The project should be driven by end-users of the system working with IT or other staff who know how to make changes in the EHR.

- **Seek out expertise in *clinical informatics*.** Clinical informatics refers to the understanding and integration of information technology into healthcare to support the business objectives of clinicians in healthcare industries. *(Source: http://www.himss.org)* Due to the project's focus on data management and analysis, your primary care organization will benefit from developing this capability. A consultant, contractor, or intern may be able to provide clinical informatics know-how until your staff are up to speed.

Develop a Statement of Goals

The team's first activity will be to refer to your answers to the questions in the section above *("What do you want to accomplish?")* as the basis for identifying specific clinical objectives and the finite tasks that will help you to achieve them. Together, these objectives and actions will form a Statement of Goals.

While the team will likely agree to improve care in a general way, the task at hand is to **be specific.** How much will you improve care, and by what date? How will you measure this improvement, and what kinds of changes will you make to achieve your goal? The more specific you are in defining these objectives and the actions that will support them, the easier it will be to focus your efforts.

- ☑ **First, as a team, define the project's primary clinical objective**.

- ☑ **Next, identify additional clinical objectives.** For each one:
  - o *Describe tasks (relevant actions) associated with achieving the objective.* As you identify these tasks, be aware that they will eventually be supported by CDS features. The success of the features you develop will depend on identifying a limited, actionable set of clinical or administrative tasks.
  - o *Define at least one performance target and the timeframe for its achievement.* Be specific: use numbers, dates, and percentages. These parameters will later serve as your measures for assessing improvement.
  - o *Detail the rationale.* Defining a clear rationale for each objective will help you communicate the purpose of each of the project's activities to your providers and staff.

Identifying objectives, tasks, actions, targets can be challenging, especially since these are the very aspects of your care process that you want to change. **Table 1** (below) provides some suggestions on how to add detail your goals and objectives.

Table 1: Resources to Help You Develop the Statement of Goals

To Develop Your Clinical Objectives	To Identify Relevant Actions	To Set Targets & Timeframes	To Articulate a Rationale
Consult • Evidence-based guidelines or standards of care • Provider input via surveys, focus groups, interviews • Community needs or norms	**Evaluate** • Workflows • Staff Perspectives • Organizational Policies and Procedures	**Assess** • Current performance (Your Baseline) • Your experience with other QI initiatives • National benchmarks • Community standards • External mandates	**Refer to** • Alignment with organization's mission • Evidence-based guidelines • Organizational Policies and Procedures • Knowledge of population or other local concerns
Consider • **Feasibility** • **Expected Effectiveness**	**Consider** • Resources • Workload & Work Rules	**Consider** • SMART Rubric[i] • Data Availability	--

Be realistic. Your objectives should challenge the team, but still be attainable. Make sure to allow sufficient time and resources for the team to complete its work.

Table 2 presents examples from Open Door's Statement of Goals. (Our complete Statement of Goals is included as **Appendix 2b**.) Note that we identified hypertension control as the primary clinical objective of the project. All of the fourteen subsequent clinical objectives (excerpt only is shown) and relevant actions support this primary objective.

In our examples, Objectives 2 and 3 are derived from Joint National Committee (JNC) 7 guidelines[ii] and describe interventions that have been demonstrated to improve outcomes based on clinical evidence.

Table 2: *Excerpts from Open Door's Statement of Goals*

Clinical Objective	Relevant Action(s)	Target + Timeframe	Rationale
1. **Improve BP control among all adult patients with hypertension** *(primary objective)*	N/A	80% of hypertensive adults will have a BP < 140/90 By Dec 2012	Overarching objective is to control the BP of a large proportion of hypertensive patients
2. **Promote effective follow-up for patients with Stage 1 HTN by scheduling follow-up appointment to occur within 12 weeks**	a. Clinical support staff or provider schedules follow-up appointment b. Provider counsels patient on importance of keeping follow-up appointment	80% of initial Stage 1 HTN patients have a 12-week follow-up visit scheduled before leaving the clinic By June 2012	Effective management is achieved in part through regular follow-up; the team believes that having the provider schedule the visit and reinforce the importance of keeping it will improve return visit rates.
3. **Obtain annual blood tests for HTN patients**	Provider orders blood tests if due	80% of HTN patients with an PCP OV in last 12 mo. have a blood tests within last 12 months By June 2012	Capture potassium, creatinine; JNC 7.

A blank Statement of Goals Worksheet is included for your reference in **Appendix 4.**

TIPS ON SETTING GOALS

- **Plan on at least three meetings to develop your Statement of Goals:** one to brainstorm and organize ideas, one to set targets and timeframes, and one to refine and validate the Statement. Multiple meetings will allow the team to reflect, track down needed information, and take a step back before regrouping.

- **Use words carefully.** Do you want the appointment to be *scheduled* within 4 weeks, or to *occur* within four weeks?

- **Get the team's consensus.** Before finalizing your Statement, ensure that all of the team members have "ok'd" every entry on your grid. A lack of consensus in any area will be a barrier to successful implementation, leading to wasted efforts and eroded morale. If there is disagreement, now is the time to hash it out.

- **Watch for scope creep**. A well-defined, tightly run project is easier to implement than a broad effort. To keep the scope limited, put additional ideas in a "parking lot". Document important issues, as they may prove important as the QI project moves forward.

- **Run effective team meetings**. For guidance on creating and managing improvement teams, consult the *Team Handbook* (reference below).

ADDITIONAL RESOURCES

- Kotter, JP. *Leading Change.* Boston: Harvard Business Review Press. 1996: 96 – 103.

- Scholtes, PR, Joiner BL, Streiber BJ. *Team Handbook*, 3rd Edition. Madison: Oriel, 2003.

- White DB. Instituting Organizational Learning for Quality Improvement Through Strategic Planning Nominal Group Processes. *J Health Qual*. 2000; 22(5).

SECTION 3: Understand Your Setting

In developing the Statement of Goals, your team will have achieved consensus around clinical objectives and the specific steps you need to take to achieve them. Now it is time to take stock of your organization. As the team plans for change, what information about how your organization operates today will help you prepare your organization for the coming changes?

All of this information is critical to the planning of your CDS integration project. You may have carried out internal assessments as part of previous QI initiatives implemented in your site, and the list of steps we suggest below may be familiar to you. But be sure to note our examples of questions, and use them to guide your assessment process and tailor it to the needs of this initiative.

Listen to Your Providers

Developing a CDS system constitutes a provider-focused intervention, so begin by consulting your providers. In the table below, we suggest various lines of inquiry in four key topical areas: *clinical, technology, workflow* and *organization*.

Table 3: *Areas of Inquiry for Provider Input*

Topic	Suggested Areas of Inquiry
Clinical	• How important is managing the condition of interest compared to other conditions? • What types of support are needed to optimize care? • Are you familiar with treatment guidelines for this condition? Do they assist you or hinder you? • What types of guidelines would assist you if available electronically?
Technology	• How would you characterize your overall experience with the EHR? (usefulness, ease of use) • How has the EHR assisted you and your staff with various clinical tasks?
Workflow	• What are the reasons for getting behind in your schedule? How often does this happen? • What sources of information do you consult if you don't have an answer to a question about patient care? • How has the EHR affected your workflow?
Organization	• How do other clinical staff participate in improving patient care? • How would you describe the working relationships in the setting? • How would you characterize your organization's culture?

Use written surveys or conduct interviews to elicit this information.

☑ *A written survey* provides the opportunity for providers to weigh in anonymously. The data produced by surveys is quantitative, so that results are systematic, scaled, and can be analyzed with relative ease. A survey may also be helpful in establishing a baseline against which you can re-survey participants later in the project, and in identifying areas that may be further explored in interviews.

☑ *In-depth Individual interviews* allow respondents to be more expansive in their responses to questions. In depth Interviews can yield unexpected information and a more in-depth understanding of potential barriers to change. Interviews can also be used to answer questions raised by the written survey.

Depending on your timing, resources, and preferences, choose whichever technique seems most appropriate, or combine them. You may find that after conducting a written survey of your providers, you have a host of follow-up questions to pose via interviews. **By providing opportunities for your providers to contribute to this process, you will engage them in the development of the CDS system facilitating their adoption of the new CDS features later.**

The survey we used at Open Door is included in **Appendix 5**. Choose questions from this survey to help you develop your own tool, tailored to your organization's needs. We also offer an example of how we interpreted the results of our provider assessment at Open Door in **Box 5,** below.

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Box 5: Assessing Providers at Open Door

Our project team used a survey to assess providers because we wanted to measure their attitudes on a scale, and establish a baseline for post-implementation comparison. Results of our survey showed that providers generally believed in the value of clinical practice guidelines, and, specifically, that they had confidence in JNC 7 guidelines for hypertension treatment. Providers were satisfied overall with the EHR, which was judged to facilitate clinical tasks. Our team interpreted these findings as a green light to use the EHR as a tool to promote the use of clinical guidelines in hypertension treatment.

</div>

Analyze Workflows

To take maximum advantage of the functionalities in your EHR, workflows in your health center should be examined and enhanced prior to the launch of the CDS. Map out current processes, following the path of a *patient* as well as the flow of *information* through the health center. If you are in a multi-site primary care organization, you may need to create site-specific maps for each practice site. Address bottlenecks in the process and remove as many obstacles to the flow of patients or information as you can.

Your workflow maps should:

☑ Identify the staff member who performs each function;

☑ Mark decision points (e.g., indications for procedures such as an ECG or blood draws);

☑ Highlight delay points and bottlenecks; and

☑ Estimate volume peaks and valleys, if applicable (e.g., busy Monday mornings).

A sample workflow map appears in **Appendix 6**.

Brainstorm with Your Staff

When it comes to assessing how things run in a health center, staff observations about their own daily routines will prove invaluable to you. Invite clinical support staff and administrative staff to share their experience and reflections. **Schedule several brainstorming sessions with staff, and create a safe environment for staff to voice their thoughts**. Ask questions that will generate discussion among the group. For instance:

- What are the day-to-day realities of managing the clinical area of interest?
  - In the case of hypertension, are the cuffs in good condition?
  - Are measurements reliable?
  - Are providers responsive to staff notes and requests?
  - Are there problems with scheduling follow up appointments?
  - Are patients able to get timely appointments with the nutritionist?

- Are there unique challenges associated with any subpopulation of patients?
  - Does the health center have cuffs large enough for patients who are obese?
  - Are patient education materials available in multiple languages?

- How easy or difficult is it to use the EHR to record clinical information?

Box 6: Unexpected Discoveries at Open Door

At Open Door, we set aside several team meetings for brainstorming. We quickly realized that in order to improve hypertension care, we would need to accompany the CDS with a number of other interventions. For example, we learned that staff were not obtaining blood pressure (BP) in a consistent manner: patients were not always positioned properly when their blood pressure (BP) was taken. In addition, staff occasionally rounded readings (e.g., a reading of 138 was recorded as 140). We realized that correcting these inconsistencies was essential to improving the quality of care and the accuracy of the data. Accordingly, we retrained staff on measuring and recording BP at the outset of the project.

Inventory Your Technology & Your Reporting Capabilities

To develop and use CDS features effectively, your team should have a solid functional understanding of the information systems you currently have in place. This system includes your EHR, practice management system, and any other information or communication systems you use.

It is essential that you work from a full understanding of the quality, reliability and stability of the system and its interfaces. Be sure to include lab interfaces, medical devices and other components that are connected to the system.

To assist you to conduct the inventory, a *Clinical Information System Inventory* grid is included in **Appendix 7**.

Use or adapt this grid to document and review the technology environment into which your CDS will be introduced. While the team does not need detailed technical knowledge, you should aim to gain fluency in the following:

- ☑ Basic Computer Features
    - o Hardware and Software
    - o Network Connectivity
    - o Wireless & Remote Systems
    - o Medical Devices Generating Patient Data (e.g., BP cuffs)
- ☑ Clinical Information Systems (Pharmacy, Laboratory systems)
- ☑ Billing and Administrative Systems

Once you have inventoried your technology, determine what information you can get out of your systems, especially your EHR, and what the gaps are. Talk to your vendor to determine what capabilities already exist within your system. Some EHRs generate reports directly, while others employ add-on report-writing software to extract data and produce reports. To assess whether your EHR can generate the reports and measures you need, ask your vendor:

- What reports already exist within the EHR?

- How are the reports generated?
    - o Are the reports already defined within the system, and available to the user via point and click?
    - o Must the user enter reporting criteria? Write queries?
    - o What special training is required for users to run reports?
- For calculations (counts, percentages, proportions, frequencies), what cases are included? Excluded? Can this be modified?

- What is the process to create new reports? Can we tailor reporting functions to our site's needs?

Most importantly, **if your vendor tells you that the EHR can produce the measures you are seeking, ask for a demonstration using *your live* EHR to produce them**. Use your Statement of Goals as a checklist to ensure that you can pull the data you need.

Examine Your Current Performance Data

If you can obtain data from your EHR to measure your current performance related to hypertension control, immunization rates, or whatever clinical area you chose to work on, you are at an advantage. Not only have you met an important QI milestone – obtaining data from the EHR – but you also have a baseline against which you can set goals and measure progress.

This is an important time to address issues with reporting or measures. Review initial reports with the QI team and providers, and find out if the data accurately reflects the current state. For example, are the right patients being captured in the numerator of your measure? The denominator? Are staff entering data in the right place so it can be picked up for reporting? Discussion of reports at baseline can head off problems in measuring improvement down the road.

If, at this time, you cannot obtain this information from your EHR, you can estimate your performance in other ways. Uniform Data System (UDS) and Healthcare Effectiveness Data and Information Set (HEDIS) reports, registries or patient lists from other initiatives or from chart reviews may be ways that you can approximate your current outcomes for patients with the condition of interest.

SECTION 4: Develop Your EHR Dataset and Extract Your Data

Because you have set quantifiable performance targets, you can use the EHR data to reasonably calculate whether you are successful in improving the process of care or patient outcomes. If you found that important data is not readily available through existing report features, you (or a programmer) will have to write special programs to access the necessary data. Your organization may not have the expertise to extract and analyze EHR data, and this initiative presents an opportunity to develop this competency.

The basis for your analysis is a **dataset**. A dataset is an electronic file containing the information you need to measure your progress against performance targets. Relevant data is extracted from your EHR, and saved in a separate file against which queries can be run. The queries generate outputs – reports – that show your results.

Creating a Dataset for Your Initiative, Step by Step

Step 1:   **Identify Your Variables.** The targets you identified in your Statement of Goals will determine the types of information, or variables that will be in your dataset. If you are looking at blood pressure control, then you will need BP measures from the medical record, among other variables. If you are looking at flu shots among seniors, you will need flu shot date and patient age.

To identify your variables, start with your performance targets. You can also consult experts or other sites that have done similar work, review the academic literature on your clinical area and the guidelines themselves. Common data elements used in analysis are:

- Demographics (age, race/ethnicity, income, zip code)
- Diagnoses, lab and other test results
- Medications ordered/filled
- Service Dates
- Provider

Let's use the hypertension example. **Figure 1** shows variables in the column headings: patient identifier, encounter date, encounter #, provider, patient age and ethnicity, hypertension yes/no, diabetes yes/no, taking Med A, B, and C yes/no, BP, BMI, and date of next appointment. Each row is a separate record; most EHRs generate a record for each visit (or "encounter"), not for each patient.

Figure 1: Sample Analytic Dataset

Pt ID	Enc Date	Enc #	Provider	Age	Race	Ethnicity	Hypertens.	DM	MedA	MedB	MedC	BP	BMI	NextAppt
12345	4/1/2009	10046	9097	37	W	Hispanic	N	Y	Y	N	Y			
87399	4/2/2009	10099	9117	41	W	Non-Hispanic	N	N	N	N	N	104/62	27	4/15/2009
94610	4/2/2009	10184	9105	49	B	Hispanic	Y	Y	N	N	Y			4/16/2009
39903	4/3/2009	10288	9097	23	W	Hispanic	Y	N	N	Y	N	112/60	19.9	
89834	4/4/2009	10376	9103	31	B	Hispanic	Y	N	N	Y	Y			
49198	4/5/2009	10449	9097	49	A	Non-Hispanic	Y	Y	N	Y	N	122/70		5/13/2009
58957	4/5/2009	10777	9117	49	W	Hispanic	Y	N	N	Y	Y	110/60		4/11/2009
94736	4/5/2009	11003	216879	21	W	Hispanic	N	N	N	N	N			

Notice that there are several fields that are not valued – the data is missing. Figuring out why may require examining workflow. (It may also require checking your query, see Step 3.) In the case of BP, it may be that it is not consistently a) taken, b) recorded in the proper field, or c) recorded at all, resulting in a null value for the field. Seeing your data this way will tell you a lot about how well data is being captured, and whether training or workflow changes are necessary.

Encourage users to think about the patient information as *data*. If you find that the data values are being recorded in varying formats, with typos, etc., then it will be difficult to analyze the information you collect. Issue a policy about recording blood pressure, retrain the staff, or consider restricting fields to accept only valid entries.

Data Types. Common data types are numeric (e.g., BMI, age), categorized (ethnicity, race), and date (encounter, next appointment date), and text (progress notes). Understanding data types is important because data types influence data entry procedures at the point of care, as well as the generation and interpretation of results later in the project. Be careful! 'Provider' looks like a numeric field because this clinic assigns provider's IDs using numerals in its EHR, but when you conduct analyses of the data, the IDs don't function as numbers.

It is also important to differentiate between **structured data** and **free text.** Structured data resides in a fixed field in a record or file, and can be searched and analyzed. For example, when a user enters a patient's gender as "Male," the information goes into a field specified to hold gender information. Unstructured data fields, or "free text," allow users to freely type in information, but those values cannot be easily searched or analyzed. Progress notes, for example, are typically unstructured, and cannot be analyzed via programming.

Step 2:

Define Your Variables. Some variables are self-explanatory, and others need careful consideration. Encounter date (the date the patient received services) for instance, is not especially hard to define or use. Others from our example are similarly self-defining:

☑ Patient ID (text) – unique identifier for each patient; assigned automatically by EHR

☑ Encounter # (numeric) -- uniquely identifies that visit; assigned automatically by EHR

☑ Patient Race (categorical) – provided by patient at registration

☑ Patient Ethnicity (categorical) – provided by patient at registration

☑ Next Appointment (date) – generated from EHR/PMS appointment system

Let's turn to the more complicated variables. At first glance, they too can seem unambiguous. However, their definition may require the team to carefully consider the project's objectives, targets and rationale. Remember, each record represents an encounter.

Provider. The clinic assigns each patient to a primary provider in the EHR, but s/he doesn't see the patient at every visit. Sometimes someone else is covering. There are also "supervising providers" for patients who receive their regular care from a nurse practitioner.

- *Which provider do you want in the dataset?*

Patient Age. Age is automatically generated by the EHR based on the date of birth. If your initiative focuses on adults only, you may need to exclude certain patients based on age.

- *Do you want patients 18 and over? 21 and over?*

- *What about people who are 100 years old? 99? Is there an upper cutoff?*

- *What if the patient's age appears as 129?*

Hypertension Status. Hypertension can be defined in many ways. ICD9 codes are used for billing and also show diagnosis information in the EHR's progress note. However, in the hypertension literature, elevated blood pressure is often used to define the disease, and so is the use of certain medications. Conversely, people without hypertension can have elevated BP on a given day for other reasons.

- *How are you going to define hypertension?*

- *Are you going to further refine it by stage (severity)?*

Diabetes Status. Like hypertension, billing codes, clinical findings (lab values), and/or medications have been used to define diabetes.

- *How do you want to define diabetes?*

Meds A, B, and C. The guidelines call for the use of medications to manage hypertension for many patients. The medications fall into various classes, are sometimes combined, and are dispensed in generic or brand name form.

- *How do you want to define and group these medications?*

- *Do you want to differentiate between a diuretic administered alone and/or in combination with an ACE inhibitor?*

Blood Pressure. Target blood pressure for adults is 140/90, but for patients with diabetes or renal disease, it is 130/80. At some encounters, BP is taken more than once, especially if it is elevated.

- *How will the differing thresholds be managed?*

- *If multiple BPs are recorded, which one do you want to use? The highest? Lowest? Last one taken? An average?*

BMI. The calculation of BMI requires a valid height and weight, both entered on the same visit. But most adults do not have their height measured at every visit. Also, BMI data has to be formatted uniformly for analysis, and, when entering height into the system, some staff type: 5'6", others type 66".

- *How can you ensure that valid BMI data is made available to the project?*
- *If height and weight not measured at same visit, which value should we use to measure BMI? (e.g. heights and weights from most recent visit)*

As you define your variables, the significance of data types, proper data definition, robust data entry procedures, and solid staff training becomes more apparent. Whatever is entered at the point of care is what gets pulled from the EHR.

It is important to document carefully the data definitions as you finalize them. A data definition document will be a resource to your team and leadership as the data is analyzed and results made public.

 Please refer to **Appendix 8** for a sample *Data Definition Grid*.

Step 3:

Pull Data from the EHR and Create the Dataset. The patient information users see in the EHR resides in an underlying relational database. **Pulling data from that underlying database into a separate dataset for use in this project is a multi-step process that requires knowledge of the EHR's data tables, a solid understanding of the variables sought, special programming expertise to write and run the queries, and the ability to recode data and create the desired variables.**

Once extracted from the EHR, the data must be transferred to an application that can be used for analysis. Desktop software programs such as Microsoft Access™ or Excel™ are good options, but other statistical, database or spreadsheet packages can also be used.

The data extraction process can require significant processing power depending on the size of the files you are working with, and seriously impact the EHR's response time. Run the data programs off-hours at first as a test. Also, consider obtaining a dedicated server for data extraction, report generation, and other data management functions.

Step 4:

Perform a Quality Check of Your Dataset. Credibility is important for ensuring continued support for the initiative from providers and leadership, and confidence in the accuracy of data is important for keeping momentum and morale up for the team. Guard against producing reports with inaccurate data by implementing a quality assurance process. **Perform a quality check by comparing the entries in your dataset to a sample of the patient records in your EHR.**

Let's look at the hypertension data set again.

Pt ID	Enc Date	Enc #	Provider	Age	Race	Ethnicity	Hypertens.	DM	MedA	MedB	MedC	BP	BMI	NextAppt
12345	4/1/2009	10046	9097	37	W	Hispanic	N	Y	Y	N	Y			
87399	4/2/2009	10099	9117	41	W	Non-Hispanic	N	N	N	N	N	104/62	27	4/15/2009
94610	4/2/2009	10184	9105	49	B	Hispanic	Y	Y	N	N	Y			4/16/2009
39903	4/3/2009	10288	9097	23	W	Hispanic	Y	N	N	Y	N	112/60	19.9	
89834	4/4/2009	10376	9103	31	B	Hispanic	Y	N	N	Y	Y			
49198	4/5/2009	10449	9097	49	A	Non-Hispanic	Y	Y	N	Y	N	122/70		5/13/2009
58957	4/5/2009	10777	9117	49	W	Hispanic	Y	N	N	Y	Y	110/60		4/11/2009
94736	4/5/2009	11003	216879	21	W	Hispanic	N	N	N	N	N			

To check the accuracy of this data, each patient record in the EHR (searchable via the Patient ID), must be accessed to ensure that for that encounter date, the information displayed is accurate. Looking at the first record (Pt ID 12345), the **live EHR** should show that on 4/1/09 this patient:

- Saw provider 9097

- Was 37 years old

- Is white, Hispanic

- Had not been diagnosed with hypertension

- Had been diagnosed with diabetes

- Was prescribed Meds A and C, but not B

- Had no BP or BMI recorded that visit

- Had no follow-up appointment scheduled

Any error or discrepancy with the original patient record can indicate a problem in the data definition, query, programming, or data transformation processes and must be investigated.

In addition to verifying the accuracy of the individual patient records, your quality check should confirm your inclusion and exclusion criteria. That is, **be sure that there are no missing cases.** All expected encounters should be included in the dataset. For example, if only records for the month of April 2010 are to be included, ensure that for every working day in April, there is the expected number of encounters. Additionally, **make sure that there are no invalid cases in the dataset**. No excluded encounters should appear. In the same example, ensure that no encounters occurred on any day outside the 4/1/2009 – 4/30/2009 date range. Again, errors must be identified, the cause tracked down and rectified, and the data rerun and rechecked until it is validated. Otherwise, you compromise your findings as well as your credibility.

In general, for small datasets (30 records or less), all of the records must be checked. For larger sets of data, a sample of 10% (or more) can be checked. The data quality assurance process we used at Open Door is included for your reference in **Appendix 9.**

SECTION 5: Identify and Build Your CDS Features

At this point, you have completed the groundwork for your QI initiative and are ready to develop an effective CDS system for your organization:

☑ You have selected a team of key individuals to lead the project.

☑ You have written a Statement of Goals that clearly expresses the project's purpose and performance targets, and you have obtained the support of your Board and staff to proceed with implementation.

☑ You have taken stock of your organization's operational and administrative strengths as well as its challenges.

☑ You have created a dataset for this project that will allow you to measure improvement.

Different decision support tools use different mechanisms to impact providers at the point of care. The task now is to match the appropriate tool(s) to the clinical objectives you have set.

Some Overarching Themes to Keep in Mind

The research literature and examples from our practical experience provide ample evidence of the possibility of success using CDS. But this potential is greatly enhanced by the presence of several success factors. Keep these in mind as you identify what features you want to implement.

First, let's revisit the research. As we stated in the introduction, many CDS-based initiatives have proved successful in improving care processes, as found by Kawamoto et al (2005) in the systematic review of studies. To reiterate, his study found success was associated with CDS features that:

- Automatically provided of decision support as part of clinical workflow;

- Provided recommendations rather than just assessments;

- Provided decision support at the time and location of decision making; and

- Were computer-based tools (versus manual or paper-based tools).

Second, consider our experience at Open Door, the results of which have also been validated in the literature.

- ***Design a multifaceted initiative***. Consider the need for variety and flexibility as you build your CDS tools and allow for individuals to utilize onto or skip features according to their needs, skills and preferences. Open Door's system included a variety of CDS feature types, such as reminders and pre-loaded medication lists. Each feature had different types of supporting information, and varying degrees of automation. In some places, alerts were automatic; in others, they were user-driven.

- *Integrate the CDS features into current EHR workflows.* Even though different providers at Open Door had their own ways of managing hypertensive patients, CDS features were fit into standard workflows. Data from our provider interviews indicated that if providers found the CDS features to be burdensome, they would not use them; therefore, integrating features into existing workflows was deemed critical. CDS features appeared at the time and location of decision-making (e.g., when ordering medication), occurred in multiple locations in the EHR and promoted taking action, rather than only providing assessments.

- *Design changes that fit into your organizational culture.* Introduce the new features in a way that fits with your staff's usual way of doing business. In our setting, there were no mandatory actions: providers were not required to use the CDS features, but were strongly encouraged and given support to do so. The Chief Medical Officer served as the clinical champion, inspiring colleagues to make changes.

> ## Box 7: Voices from the Field
>
> One of our project team members noted, "really involving the people whose behaviors you're trying to change" was key to our success: we should never "just shove things on them."
>
> An Open Door Physician Champion added, "[Ownership is] really a leg up in the implementation… everybody knows what they're [going to] see; they've had a chance to test it out; they've had a chance to give feedback, so that we have every hope and expectation that by the time we go live there's [going to] be a very high level of, not just acceptance, but effectiveness."

Choose the *Right* CDS Features

Different CDS features use different mechanisms to impact providers at the point of care. Refer back to the overview of decision support tools presented in **Appendix 1**; use this overview as a reference as you look back to your Statement of Goals. Note the column of actions that you identified as steps toward the clinical objectives you have set. *Which CDS features would support those actions?*

You will need **several team meetings** for the purpose of making an initial list of possible CDS features, and then narrow that list down to a final selection. Below, we describe a four-step methodology derived from *The Guide* that will help you to select the right CDS features, based on your clinical objectives.

Step 1:   **Classify the objective.** Identify what kind of improvement you seek from one of three categories: *reduce errors*, *improve care processes* or *optimize decision-making*.

Step 2:   **Identify possible CDS features and workflow steps in support of the improvement.** For example, alerts have been shown to reduce errors, and templates can facilitate documentation and care coordination. Some features fit into the patient visit better at the beginning, others while ordering medications or labs and still others toward the end

of the visit. Identify the most appropriate CDS features based on the outcomes you hope to achieve and the logistics of your current workflows.

Step 3: **Select features from the list you made by evaluating the feasibility of each possibility.** The skills and preferences of your providers and staff, and the resources available to you within your practice, will determine which features will work best. How easy or costly will the CDS feature be to build? Will the feature be accepted by providers and/or staff? How easy will it be to use? How great will its impact be on clinical workflows? On patient outcomes? Go around the room with your team, and discuss the pros and cons of each possible feature.

Step 4: **Specify and validate the selected features, asking and answering detailed questions to clarify how the features will be used.** What will the recommendation look like on the screen? What triggers it? What users will see it?

To demonstrate the application of these four steps, review the diagram in **Figure 2** below. This example was taken from our Statement of Goals for improving hypertension care at Open Door.

- The **clinical objective** that we will address is *"Promote effective follow-up for hypertensive patients by scheduling follow-up appointment to occur within 12 weeks"*

- One of the **actions** we identified to achieve this clinical objective is *"Clinical support staff or provider schedules follow-up appointment"*

Figure 2
Example from Open Door: Choosing the Right CDS Features
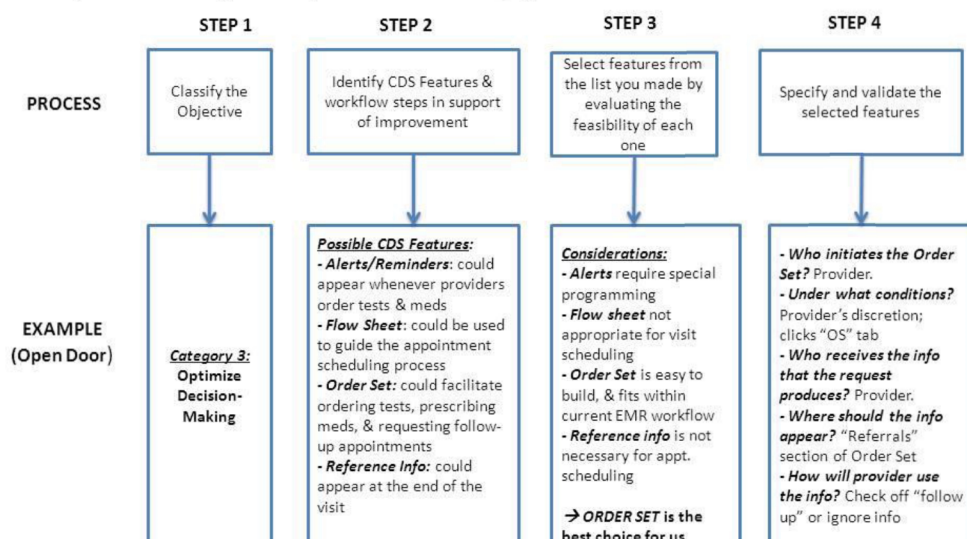
As **Figure 2** illustrates, we selected the Order Set as the most feasible and appropriate CDS feature to help us achieve our goal of improving patient appointment scheduling.

Some reminders:

☑ Account for all of your clinical objectives:

   o One feature can be used for multiple purposes (e.g., an Order Set can be used for medications, laboratory tests and follow up visits).

   o Some objectives may not be reached via technology. Consider making other types of changes to reach your goals.

☑ Allocate enough time to work through all the details. You do not want to sort them out on implementation day.

☑ Utilize use case scenarios and revised workflow maps to illustrate the new processes you envision for your organization.

Specifications are key documents in this endeavor. They are the blueprints for the changes to the EHR and can be used for training, providing to the vendor, policies and procedures, and other purposes.

Please refer to **Appendix 10** for a *CDS Intervention Specification Form.*

Modifying the EHR: Your Job or the Vendor's?

Now that you have identified the CDS features you would like to include, who will build them? Does your EHR already include generic CDS features, which your team can modify and integrate easily, or will you need to build everything from scratch? A key question is whether your own users or IT team will be making modifications to the EHR, or whether you will ask the vendor to make these customizations.

☑ ***Working with the Vendor.*** Custom product development adds cost and complexity to the project, and requires a well-functioning partnership with the vendor to create functionality according to *your* specifications.

   If you have this relationship in place, there are a number of advantages to working with the vendor. Vendors may perceive the customizations you request as being valuable to the product and its marketing potential as a whole, so that they may be willing to work with you at little or no extra cost. Furthermore, vendors can change any part of the product's back-end programming code – or even its front-end look – to accommodate your request.

   However, if you decide to partner with your vendor to develop your CDS functionality, keep in mind the following considerations:

   o ***Differing priorities.*** Vendors often have different priorities than your clinical team, such as product differentiation, market share and profitability. They may perceive the

cost/benefit ratio of your one-off request as too minimal to merit timely consideration and execution.

- o *Financial considerations.* Vendors may charge additional fees to modify the product.

- o *Time horizon.* Successful collaboration between your organization and the EHR vendor requires a substantial investment of time. As the project moves along, you will find that the development of customizations, version upgrades and enhancement requests typically take longer to implement than planned.

☑ *In-House Modifications.* Assigning your own IT and/or quality team to develop the CDS features has one key advantage: you will remain in control of the CDS development process.

However, keeping the process in-house means that the customizations you decide upon will be constrained by your EHR's existing capabilities. Your EHR may already have CDS features that can be customized or activated by your team, or it may allow you to develop something new. You will need to assess the limits of the user-driven customizations and account for these as you develop your CDS and the associated workflow.

Box 8: Working Within the Constraints of In-House Customizations

Our project team recognized early on that it would not be possible for us to work with the EHR vendor to develop our new CDS features and that our initiative would include only those CDS features that users could develop and implement. Our technology inventory (Section 3) yielded a list of available CDS features, which we integrated into the 4-step development process described above. The CMO and Director of QI, both super users, built and tested the CDS features.

One of these features was the Order Set for hypertension. We found both advantages and disadvantages to building our own Order Set. For example:

PRO: It was easy for us to add elements to the Order Set template already available in our EHR.

CON: We were not able to build in all of the desired functionality. For instance, we wanted to allow providers to link directly from the Order Set to patient appointment scheduling, in order to facilitate the process of calling the patients back within 12 weeks. However, this linkage was not possible.

TIPS ON CHOOSING CDS FEATURES

- **Keep the CDS features simple.** When possible, keep interventions straightforward and easy to implement. In our study, based on the providers' need for standardized patient education

information, we obtained appropriate hand-outs in English and Spanish and made them readily available in the EHR.

- **Be specific.** If you can't describe exactly how you envision a CDS feature working, leave that feature out of your plan.

- **Use patient visit scenarios and revised process maps** to illustrate the new workflows you envision as a result of implementing the CDS features.

- **Allocate ample time** to work through all of the details of the CDS features during this planning period.

SECTION 6: Implement Your Changes

With your CDS features built and integrated into the EHR, you are now ready to make the system work for your providers, staff and patients.

Make a Plan

Just as you did at the outset of the project, take some time to think about how you want to introduce this new tool to your providers and staff. Your original time estimates and interim objectives may have changed since you first starting the project. There may be new areas that require your attention, or aspects of the project that no longer seem as relevant to your implementation process as they did when you began.

A sample roll-out plan is included in **Appendix 11.** Use this guide to develop your own approach to rolling out the CDS system in practice and using PDSAs or other pilot tests to try out the changes you have made.

Key elements of your plan will include:

- ☑ *Timeline for implementation.* Use project calendars and include:
  - ○ Regular meetings
  - ○ Deadlines

- ☑ *Resource needs.* Consider what types of resources you will need to roll out the changes to the EHR, including:
  - ○ Documentation
  - ○ Technology, Equipment, Space, Furniture, Supplies
  - ○ External assistance – vendors, suppliers, contractors, partners, etc.
  - ○ Financial Support
- ☑ *Tasks and Action Items.* Consider necessary steps and how you will complete them, including:
  - ○ Staff roles and availability. Assign tasks to individual staff members who will be able to complete them within a specified time frame.
  - ○ Decision points
  - ○ Document assigned tasks and responsible individual(s)

- ☑ *Key Deliverables and Milestones.* Identify your expectations and goals.

Test the New Features

Before going live with the changes you have made to the EHR, you must thoroughly test all of the CDS features to make sure they work as intended. This is primarily the job of the clinical informaticist (if you have one), but it is wise to have another clinical user do some testing as well. Do not rely on the vendor to do user-acceptance testing (or "usability testing") for you.

Some organizations have more than one EHR environment: typically they are called "development," "training," "test," or "production." These duplicate EHR systems provide a way to work in the EHR without impacting the live system. (The exception is the production environment, which IS the live system.) If your organization has a test or training environment, it is a good place to experiment with the specifications you have created. However, once you have decided on what new features you put in the EHR, they must be tested in the <u>live</u> EHR. That is the environment you operate in, and that is the environment in which your CDS must function.

To test your CDS system:

Step 1: **Create scenarios** based on patient cases and simulate the patients' visits through the clinic; you can create test patients in the system to do this (remember to delete them later or exclude them from the dataset)

- In the case of hypertension, we created scenarios for newly diagnosed as well as existing hypertensive patients

- Create complex as well as simple cases

Step 2: **Test a full range of scenarios**, using several patients. Remember you want some cases to "fail."

- For example, if your system sends an alert when BP is elevated, enter a normal BP and ensure that no such alert appears

Step 3: **Document expected and actual results** for each step. Did the EHR or CDS perform as expected?

- If your test failed, are there workarounds?

Step 4: If your **intervention entails the use of interfaces, faxes, medical devices, wireless, or other add-ons**, make sure to **test them** as well

- For example, if your sphygmomanometer interfaces directly with the EHR, test it with a staff volunteer

Step 5: **Test the features at peak time** for the system to check system response time and any impact on network traffic

- You may not be able to do anything about response time, but at least you'll know about it and can make a plan

If any feature fails your testing, do not try to implement it. Either modify the feature (and retest) or back it out of production.

Revise and Communicate Procedures

Changing staff behavior cannot be left to the CDS alone. If it is to be your policy to obtain annual ECGs on hypertensive patients, be explicit in setting that expectation. Review your organization's current policies and procedures and draft and institute new ones where necessary. Use the Statement of Goals, workflow analysis, and the CDS specifications to map out new procedures and processes, including "what if?" scenarios. You may also want to add new responsibilities to job descriptions, if the revised procedures warrant it. Policies and Procedures should be reviewed as necessary, but at least annually.

Train the Providers and Staff

Training is critically important to the success of your implementation. The EHR and CDS can be working perfectly, but if the providers or staff are not trained well, they may not realize that the helpful information is right in front of them. Worse, they may think the EHR, CDS, computer, or all of the above are "not working", skip the new process altogether, and report that the changes are useless.

Remember that you are training providers and staff not just on the CDS, but on a larger quality improvement initiative. Provide a context for the changes you are introducing; explain why these changes are occurring and what the organization hopes to achieve. Logistically, it usually makes sense to train groups; if you do, group your trainees by function or site. Note that providers and clinical support staff will likely utilize different aspects of the system, but also have some overlap. We found that several providers would have preferred one-on-one training because training computers are not always identical to their own, and by the time they get back to their office, they don't see the same options.

Refer to **Appendix 12a** for a sample training outline, and **Appendix 12b** for a sample training schedule.

Busy practices are challenged in finding time to set aside for training. However, based on our provider interviews, we recommend:

- ☑ For new EHR or CDS workflow, provide trainees with their own workstations to train on if feasible.

- ☑ Allocate enough time and protect it; get everyone to attend and turn off their cell phones and don't allow interruptions.

- ☑ If possible, follow up group training sessions with brief one-on-one sessions preferably when the provider is managing a hypertensive patient.

- ☑ Train the trainers or identify super users. Each department should have someone available during the workday to assist users who get stuck. Make sure users know who the point people are; consider special t-shirts to designate staff in a large organization on roll-out day.

Remember that successful implementations often hinge on minimizing user frustration with new technologies and processes. The earlier these irritations can be identified and headed off, the smoother the implementation will go.

Refine Your Intervention

Research suggests that an iterative refinement process may influence the ability of CDS features to improve clinical practice (Kawamoto et al. 2005) – a finding we experienced at Open Door.

☑ *Plan for an Acceptance Period.* Consider establishing a period during which providers and staff can acclimate themselves to the new tools. By instituting an acceptance period of 60-90 days, you will indicate that you understand the difficulties inherent in adopting a new system and you will allow your project team time to evaluate the successes and challenges of implementation.

Note: Just because you build in an acceptance period at the outset of the implementation doesn't mean you can't modify your intervention at any time. The acceptance period just provides a well-defined opportunity for users to weigh in.

☑ *Seek Input.* Encourage providers and clinical support staff to provide feedback on how the new features are working. Create opportunities for discussion in staff meetings, and ask questions of staff as you walk around the health center. You may also want to implement formal mechanisms to elicit feedback, through surveys or questionnaires.

Designing and implementing quick tests of change is an excellent way of finding out how things are going. Some questions you may want to explore using PDSAs include the following:
- Are providers and staff using the new features?   How do they like them?
- How efficient is the system's response time?
- Is the practice running smoothly and on time?
- Are new procedures being followed?
- Is follow-up training needed?

Box 9: Ongoing Refinement at Open Door

- After implementation, we found that several providers were simply not in the habit of using these kinds of EHR-embedded features. When reminded, these providers began using the CDS features more.

- We discovered that the Order Set did not contain all of the medications that the providers prescribe for hypertension. We updated the Order Set several times to accommodate usage patterns by the physicians.

- For some providers, we found that a significant barrier to using the CDS features was the slowing or freezing of their computers due to the increased processing power needed. As a communications infrastructure issue, this is not easily resolved. System response time remains a factor in user satisfaction with the CDS features.

☑ ***Addressing Problems.*** If providers and staff report problems with the system, or if PDSA cycles highlight challenges in the design of the CDS features or the system as a whole, you have three choices:

- ***Modify.*** Rework the feature or process to accommodate users' needs. In some cases, necessary modifications may be minor and straightforward.   More significant modifications may require a test/user acceptance cycle. For any changes you make, be sure that project documentation is updated to reflect the new procedures.

- ***Eliminate.*** Some features may prove simply too disruptive or ineffective to use in practice. In such a case, remove the feature. You can always revisit these features at a later time and attempt new configurations. If you remove any CDS features, update project documents to reflect their elimination and describe any new processes you put in place.

- ***Maintain.*** You may assess unpopular features and deem them to be necessary to the system. Furthermore, some problems that surface may be temporary. Contextualize the feedback you receive before modifying or eliminating features. Is the problem related to users leaving their "comfort zones"? Are staff members overwhelmed by workload? Maintaining an unpopular or challenging change will require leadership to promote the change, and get everyone excited and on-board again.

Don't forget to communicate to all involved staff about changes to or elimination of features. Staff will appreciate the openness and you will send the message that the QI team is responsive.

IMPLEMENTATION TIPS

- **Use an incremental approach.**   Space your changes out if that makes sense. You can introduce a policy to obtain annual ECGs on hypertension patients without waiting for the EHR to be upgraded to prompt providers. (But be careful! The reverse is not also true: avoid introducing prompts in the EHR before the policy is put in place.) Alternatively, roll out your intervention by service or site.

- **Keep your patients in the loop.** Letting patients know that your practice is going through some changes will prepare them for any slowing or disruption in the EHR availability. In turn, keeping the patients informed will help providers and staff to feel more comfortable when trying new features. One approach is to post a banner in the waiting room explaining that your health center is upgrading its technology so that providers and staff are able to serve patients better.

- **Huddle.** If a problem comes up, don't wait for a scheduled meeting to discuss it. Your team can huddle at any time to troubleshoot.

SECTION 7: Use Your Data to Evaluate Improvement

In Section 4, you developed a dataset against which queries can be run, and you confirmed as best you could the accuracy of the data. Use that dataset to help you evaluate your progress toward your improvement goals. Start the process of evaluating your work now, and continue to monitor data over time. By assessing your data on a continual basis, you will be able to pinpoint successes as well as challenges, facilitating effective reporting on the CDS intervention to your staff, senior leaders and the Board.

This section will guide you through the process of quantifying your progress and reporting on improvement to your providers, staff, Board and other stakeholders.

Consult Your Key Measures and Tabulate the Results

The first step in evaluating your work is quantifying the progress you are making toward your improvement goals. The performance targets set in your Statement of Goals will determine what measures you calculate and report. **Counts, percentages and frequencies tend to be the most common measures in QI initiatives.** However, you might also use means, medians and other measures as well.

For instance, in our hypertension example, we set our hypertension control goals as:

"80% of hypertensive adults will have a systolic BP <140 and diastolic BP <90 by Dec 2012"

To determine progress toward this goal, we calculated the percentage of patients in the dataset that had reached the goal.

$$\frac{1513 \text{ controlled BP}}{1513 \text{ controlled} + 520 \text{ uncontrolled BP}} = \frac{1513}{2033} = 0.744 \text{ x } 100 = 74.4\%$$

Here, the numerator is the number of patients with hypertension with BP under 140/90, the denominator is the TOTAL number of hypertensive patients, controlled and uncontrolled alike. The resulting proportion, expressed in terms of 100 is the percentage 74.4% – approaching but not yet reaching our goal of 80%.

Some reminders:

☑ A **percentage** is a proportion in which a numerator is included in the denominator, and the result is expressed per 100 (above). Usually, the numerator represents the number of cases, and the denominator, the number of patients at-risk, or, the total population. It depends on what you performance target is addressing.

  o *74.4% of hypertensive patients were controlled by December 2010*

☑ A **count** a simple tally of cases. Counts can be used for describing the number of patients to receive a particular health service, or educational information. They are valuable for assessing service levels at your organization.

  o *492 patients received hypertension education information in Spanish between January 2010 and December 2010*

☑ **Frequencies.** A frequency distribution tells you about cases related to a single variable. For example, let's say you want to know how many uncontrolled hypertension patients were scheduled for a follow up visit. You can report frequency as follows:

Follow Up Visit Timeframe	# of Patients
No visit scheduled	107
<2 weeks	255
2 to <4 weeks	65
4+ weeks	93
Total	**520**

For more guidance on measurement, consult the resources cited at the end of this section.

Interpret and Present Your Findings

Running your queries on this dataset will produce a set of results that you should review with the team. What do these results tell you about how you are doing?

Refer to your Statement of Goals to assess your progress toward performance targets. In all likelihood, you will see that you are making greater progress toward some of your clinical objectives than others. Use this information to focus efforts for the next phase of your project on one or two performance targets, and think about how to present your decisions to the organization, using the data in support of your plan.

Consider lag time. Some measures—especially patient outcome measures – need to time to show improvement. BP control in patients won't change overnight, so be sure to allow enough time, or cases, to occur before you try and measure changes.

Make sure each member of your improvement team fully understands the data and how the results were generated. For instance, how did you handle missing data? Are you comparing your progress in this dataset to baseline or benchmarks? How do the methodologies differ? When you move beyond the team to present the data to providers and organizational leaders, you will need to speak to the strengths and weaknesses of the data, so be sure that everyone is able to do so competently, and in a unified voice.

As you prepare to move beyond the team, **tailor the presentation of your results to the interests and needs of your audience, and link the results to the initiative's primary objective and to the performance targets that you identified at the project's outset.** For instance, if you are presenting to the Board, you may want to focus on broad trends, using graphs and other visual tools to show overall progress toward clinical objectives. Conversely, if you are presenting to clinical support staff, you may present only a few key indicators that show the progress they are making in their role (e.g., blood pressure measurement).

Below are some ways to ensure that your presentation is successful:

☑ *Be concise and use simple language*. Identify the primary results and present the numbers that best reflect the initiative overall. Individuals who want more information can be briefed later.

☑ *Use clear variables and calculations that are easy to understand and work with*. The initiative's goals and results should be readily understandable to the entire staff and to external parties – not just to QI experts.

☑ *A picture is worth a thousand words*. Use charts, figures and graphs to display results visually.

☑ *Highlight key facts*. Include a descriptive title and label the data carefully. Note relevant timeframes and locations to ensure that the data is accurate and can be easily interpreted. Indicate data sources, and display totals when appropriate.

☑ *Remove or mask patient-specific information.* Present only de-identified patient data. *(See the HIPAA privacy rule for more information about de-identification, at http://www.hhs.gov.)*

☑ *Be prepared to address the strengths and weaknesses of your data.* Staff and leaders will have questions about the data. Be sure that you can answer inquiries about methodology as well as results.

Generate Provider Feedback Reports

As an adjunct to using CDS to advance your organization's progress toward clinical objectives, consider using your EHR data to develop monthly or quarterly performance feedback reports for your providers. Sometimes called *report cards*, performance feedback reports present a quantitative picture of each provider's individual performance as compared to:

☑ The organization's performance goal for any given measure;

☑ The national (or community) benchmark for that measure;

☑ The performance of other providers in the organization; or

☑ A combination of all of the above.

Some EHRs can readily generate provider-level reports as part of the registry function. In other cases, desired reports may need to be custom written.

Figure 3 below presents an example of the provider feedback report we used at Open Door. Open Door adopted this format for hypertension because it was aligned with other performance reports already in use for other conditions. We created and distributed provider reports on a quarterly basis. The figure displays Dr. Doe's quarterly report card, in which hypertension control rates for his patients are compared with the rates calculated for patients of the other providers (C and D) in the organization.

Figure 3: *Sample Provider Feedback Report*

Measure	Provider ID	Dr. Doe	C	D		
No. of Patients with HTN, No DM		213	15	148		
No. of Patients with HTN, No DM, Controlled		116	11	58		
Percent Controlled		**54%**	**73%**	**39%**		
No. of Patients with HTN and DM		157	0	126		
No. of Patients with HTN and DM, Controlled		57	0	39		
Percent Controlled		**36%**	**n/a**	**31%**		
Notes						
Report includes any patient seen by PCG between May 1, 2007 and February 28, 2009						
Controlled defined as most recent BP measurement <130/80 or <140/90 for patients with and without DM, respectively						

Provider Feedback Challenges. The clarity and quality of data presents a challenge to performance measurement. Before generating report cards for your providers, be sure to define which patients "belong to" each provider. As we saw in the development of the dataset for performance improvement, defining which patients are members of any given provider's panel is difficult. In community health centers that use open access scheduling, this challenge can be even more daunting. If possible, engage providers in conversations about how best to empanel providers and patients. The goal of these conversations is to *establish a method of reporting patient results that will be perceived as fair by individual providers or by care teams.*

Even flawed data can influence behavior. Our analysis showed that despite their qualms about the reports, providers thought that the reports instilled healthy competition, and motivated them to want to perform as well as or better than their colleagues.

Box 10: Provider Feedback – Pros and Cons

At Open Door, some providers found that feedback reports included data for patients that they did not consider to be members of their panel. Alternatively, some "covering" providers were treating hypertensive patients who were showing up as belonging to other providers' panels.

Despite these deficiencies, provider performance reports proved to be effective tools in improving care because **we ensured that they fit into Open Door's organizational culture.** Specifically, the reports were:

- Developed and distributed as part of an overall *provider feedback process*, with its own policy, procedures, and report specifications that were documented and transparent;

- Presented at dedicated provider meetings during which hypertension care could be discussed;

- Used by the CMO and Director of QI to understand better the providers' challenges, not to criticize them;

- Enlisted to serve a complementary purpose of improving data quality vis à vis provider panels; and

- Introduced into an environment where providers were already accustomed to receiving feedback to improve quality.

Overall, if generated and distributed in a manner that fits with the organizational culture, provider performance reports can be a powerful tool to assist your organization in its improvement work.

ADDITIONAL RESOURCES

- Langley GL et al. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd Edition).* San Francisco, California, USA: Jossey-Bass Publishers, 2009. A textbook of improvement fundamentals, including performance measurement, extraction and use of data.
- The **National Quality Forum** offers guidance on understanding and using performance measures at **http://www.qualityforum.org/Measuring_Performance/Measuring_Performance.aspx.** See the tab "ABC's of Measurement." Also, additional resources on CDS and measurement are offered in the *Publications* section of the website.
- Refer to the **National Commission on Quality Assurance** for an explanation of HEDIS measures and how to interpret your performance data at **http://www.qualityforum.org/Measuring_Performance/Measuring_Performance.aspx**
- The **Joint Commission** hosts a *Performance Measurement Network* Use; a forum where users can ask and find answers to measurement questions from colleagues nationwide at: **http://manual.jointcommission.org/bin/view/Manual/WebHome**

SECTION 8: Monitor and Sustain Improvements

Once you have achieved some, any, or all of your quality improvement goals, you still have to work to *sustain* those gains. Even after your initiative is stable and your results positive, you need to maintain the changes you implemented to reach your goals. Remember, there is no endpoint to improvement projects.

Fortunately, many of the factors associated with sustained improvement are the very same that brought about the change in the first place. PCDC's own research into the sustainability of improvement efforts show that factors such leadership, a well-functioning team, an organizational culture of quality, and the use of data underpin sustained improvements. (Judge et al. 2007)

Review Results Regularly to Monitor Improvements

Reviewing results should become fully integrated into your administrative procedures. Every month, quarter, or on some other regular basis, produce and review the reports that measure the processes and outcomes you are monitoring.

You may already run data reports to assess improvement for other QI initiatives conducted in your organization. If so, add the results of this project to your standard set of reports.

☑ **Disseminate the Results throughout the Organization.** Sharing the results of the initiative throughout the organization has several benefits, not least fostering an understanding among staff of how their actions can impact outcomes. It adds a degree of transparency to the initiative, which supports ongoing buy-in by staff. Post progress towards goals in break rooms, share successes – or challenges -- in staff meetings, and use other ways of creating awareness of the value of maintaining the changes you have made.

☑ **Use Reports to Educate Staff – and Leaders.** Some staff may be savvy about data and reports, others less so. Sharing the results of this initiative – and how they were created -- is an opportunity to educate the staff on how clinical information in the EHR is used to measure performance and make decisions. Data entry clerks, support staff, as well as providers will see how the information they enter in the EHR shows up in the results you generate. Another opportunity for education lies in examining the results of the process of care measures. Results from measures such as timely follow-up visits can lead to useful conversations: leaders can ask staff why the percentage of timely follow-up visits levels off, and staff can respond with their ideas and experience.

Continue to Engage Leadership
Leadership plays a key role by maintaining the momentum established when the QI initiative was launched. Although the initiative is in a new phase, leaders still need to be involved and visible, set expectations around ongoing improvements, and remind providers and staff of the vision for quality articulated at the outset of this project.

☑ **Allocate the resources necessary to sustain the changes.** CDS *development* resources may no longer be needed, but someone has to maintain the system and generate the reports. It could be useful to keep the project team in place to identify and handle any issues that come up over time.

☑ **Evaluate your technology.** Increased use of and reliance on the EHR and CDS can impact the load on your technology infrastructure. Incorporate the need for better connectivity, more processing power, back-up systems, and robust support into your plans and budgets.

☑ **Secure <u>ongoing</u> buy-in for the improvement goals.** Check in with providers and staff. Elicit ideas and even criticism to find out, what about the project is most helpful? Least helpful? What gets in the way of success? But be sure to accompany casual conversations with more structured opportunities for input. Set aside time within provider and staff meetings for discussion of the effectiveness of the CDS features.

Maintain the CDS

Your CDS features should be viewed as a work-in-progress. Feedback from providers and clinical support staff, as well as any updates to the EHR, external regulations, organizational policies, or best practices should guide an ongoing refinement process that continues throughout the life of the CDS system.

☑ **Update Content.** The knowledge base upon which the CDS depends must be kept accurate and up-to-date. Changes in clinical guidelines must be identified promptly, and appropriately reflected in your CDS. Note that this can be a big job for certain conditions or if the treatment protocol is particularly complex, however, it is critical that the information presented to providers is accurate for safety as well as user-acceptability reasons.

☑ **Offer Technical Assistance and Support.** Even providers and staff who are enthusiastic about using CDS features will hit bumps along the road. Designate super users or members of the improvement team as resources to provide ongoing technical assistance when problems arise. When you introduce new or modified features, be sure to plan for formal retraining of providers and staff.

☑ **Be Vigilant When Updating Functionality.** If you add a new feature to the CDS (or EHR) or modify an existing one, or if you make a change to your dataset, test them thoroughly before using. Even some upgrades to the EHR can impact your initiative. Problems even after a successful period of CDS use can set you back and impact credibility.

☑ **Train New Providers and Staff.** As new providers and clinical support staff join the organization, it is essential that they be trained on the use of the CDS features. Be sure that the CDS features are presented as a priority area for the organization.

Share Your Experience

Consider sharing your work with colleagues through local, regional and national conferences. Write about your experience. Include a project description on your own website, and request inclusion on the websites of any professional associations with which your organization is affiliated. Submit articles to academic journals, professional newsletters and other publications.

The integration of CDS features within electronic health records is still relatively new among primary care providers. As your initiative gains traction, share your experience with colleagues in your immediate network. Not only will others benefit from your advice, but you will also bring professional recognition to your improvement team and to your organization as a whole for the excellent work that you have accomplished. This recognition can go a long way toward encouraging ongoing organizational attention to the project, and sustained commitment of resources to its success.

[i] Specific, Measurable, Attainable, Realistic, and Time-Bound. Peter Drucker, *The Practice of Management*, 1954.

[ii] Chobanian AV, Bakris GL, Black HR, et al. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Heart, Lung, and Blood Institute; National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42(6):1206-52.