



CALIFORNIA  
HEALTHCARE  
FOUNDATION

# Findings from Provider Organizations Using Patient Registries

**Addendum to  
Using Computerized Registries in Chronic Disease Care**

**February 2004**

## List of Interviewees

### **Bellin Medical Group**

Green Bay, WI

Randi Burnham  
Team Leader  
Clinical Services

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Dr. Charles M. Kilo  
Internist

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### **Ideal Health of Brighton**

Rochester, NY

### **Cambridge Health Alliance**

Cambridge, MA

Dr. Gordon Moore  
Internist

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Irina Gruben  
Quality Data Analyst II

### **Intermountain Health Care**

Salt Lake City, UT

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Quality Systems Manager

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IHC Institute for Health Care Delivery  
and Research

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Dr. Hilary Worthen  
Director, Clinical Informatics

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### **Central Jersey Physician Network**

### **Luther Midelfort**

Dr. Jim Barr  
Medical Director

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Dennis Pope  
Vice President, Administration

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### **Deer Lakes Medical Association**

Pittsburgh, PA

### **Peace Health**

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Medical Director

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**Family Practice Center**  
**Sutter Medical Center, Santa Rosa**  
Santa Rosa, CA

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Medical Director, Florence Clinic

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Dr. Sean Gaskie  
Director of Special Programs

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**Physicians Medical Group, Santa**  
**Cruz**  
Santa Cruz, CA

**Greenfield Health System**  
Portland, OR

Dr. Wells Shoemaker  
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**Prairie Community Health**

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David Rollason, PA-C

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**Primary Care Networks, Premier Health Partners**

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**Quello Clinic**

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**Redwood Community Health Coalition**

Sonoma, Napa, Yolo, and Marine Counties  
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**Thedacare**

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## Bellin Medical Group

Bellin Medical Group, part of the Bellin Health System in northeastern Wisconsin, includes 75 primary care providers practicing in 18 clinic sites. Work on a new care model for diabetes began in 1999 in one clinic and has now grown into an organization-wide program led by a system-wide CMO and Clinical Excellence Team. Clinics from Bellin have participated in a number of IHI collaboratives addressing chronic care.

About 50 percent of Bellin clinic patients are members of the Touchpoint health plan, which is co-owned by the health system. The Bellin disease and wellness management program is closely linked with the quality program and incentives of Touchpoint.

## Registry

The registry, developed in Microsoft Access, is used today for preventive services, diabetes, coronary artery disease, and hypertension management. The registry sources data electronically from the Touchpoint claims system and the MEDITECH HIS at Bellin Hospital, which provides information about laboratory tests. More manual entry is required for members of other health plans.

<b>Patient Data Tracked by Source*</b>			
<b>Disease</b>	<b>Manual Entry</b>	<b>Hospital HIS</b>	<b>Health Plan Claims***</b>
All Conditions	Updates to PCP, Disease(s), Interventions not Reported from Claims Reasons for Noncompliance (Patient Refused)		Demographics, Disease(s),
Diabetes	Diagnosis of Nephropathy, Other Conditions	HbA1c,** LDL,** Testing for Nephropathy+	Office Visits,+ Eye Exam+
Coronary Artery Disease	Managed by PCP or Cardiologist, Cardiologist Name, Other Conditions	Cholesterol,** LDL,** HDL,** Triglycerides**	Office Visits,+ Medication and Dose
Hypertension	BP		Office Visits+
Preventive Services	Smoking Status		Mammogram,+ Pap Smear,+ PSA,+ Colon/rectal,+ Well Child Exams,+ Childhood Immunizations,+

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

+Test or visit date.

\*\*\*For Touchpoint patients; otherwise manual entry

The registry is hosted on a networked server at the central offices of Bellin Medical Group, and accessed by clinics over an intranet. Care teams submit information updates to a Disease Management Specialist at the medical group level.

## Workflow

With the assistance of the Disease Management Specialist, care teams periodically review patient lists that summarize the latest information about patients' status and care. Based on this review, the care team targets some patients for follow-up via telephone or correspondence. A special form, called the Universal Planned Care Form, is completed based on the care team's discussions and is filed in the patient's medical record for reference during the next visit. The form provides a snapshot of what interventions the care team should consider, including due dates for key interventions, as well as recommended intervals from the guidelines. While reviewing patient lists, the care team updates and corrects the registry information.

When a registry patient is seen in the clinic, the medical assistant checks to be sure the Universal Planned Care Form is up-to-date. Bellin Medical Group has developed protocol-based standing orders for screening and preventive interventions, which physicians in the clinics are encouraged to adopt. This procedure permits nurses and medical assistants to start addressing gaps in care before the patient sees the physician.

Registry reports are distributed to physicians, clinic managers, and the Clinical Excellence Team. Quality data, unblinded, is also shared via a provider Listserv, and clinics are encouraged to include a "data wall" displaying results.

## Results

- In 2002, 87 percent of HMO patients with diabetes had an HbA1c test and 60 percent had a blood glucose level <8.
- Touchpoint Health Plan was named the Number 1 plan in the U.S. in 2002 by NCQA and Quality Compass for four HEDIS benchmarks.

"Our physicians do appreciate the help of the registry and patients really like the fact that we are proactive about their care."

Randi Burnham, NP  
Team Leader, Clinical Services  
Bellin Medical Group

## Future Plans

Planning is underway to add CHF to the conditions addressed in the registry. Down the road, a planned EMR may replace the registry altogether.

## Cambridge Health Alliance

Cambridge Health Alliance (CHA) is a regional health system comprised of three hospitals and more than 20 primary care practices in the Boston metropolitan area. CHA also operates the public health department of the City of Cambridge. Work on the disease registry started in conjunction with two grants provided by the Robert Wood Johnson Foundation to support a new care model for adult diabetes and pediatric asthma. A registry for tracking patients with depression was recently developed in the same application.

### Registry

A CHA web application programmer created its registries in ASP pages, which pull selected patient information from a data base fed by the CHA hospital information system (MEDITECH). Authorized providers can access the registry over the intranet from any CHA or remote location, and school nurses in Cambridge and Somerville have dial-in access to view patient information for CHA pediatric patients with asthma. Whenever a registry patient is seen in one of the CHA Emergency Departments, the encounter is recorded in the registry and the patient's care team is sent an e-mail notification with a link to the documentation.

“We call one version of our current registry for diabetes, ‘Reg-Lite.’ This reflects the realization that we had to stop obsessing about a large number of data elements (fancy fields like Body Mass Index that have to be entered in the clinics) and focus on the basics, most of which we can obtain electronically.”

Dr. Hilary Worthen  
Director, Clinical Informatics

<b>Patient Data Tracked by Source*</b>		
<b>Disease</b>	<b>Manual Entry</b>	<b>Hospital Information System</b>
All Conditions	Registry PCP, Care Team, Registry Status, Additional Demographics	Basic Demographics, Disease
Asthma	Exacerbation or Recent Trigger (Y/N), Allergies, Medicine,** Symptoms (daytime and nighttime frequency), B-2 Agonist Frequency of Use, Missed School Days, Home Peak Flow Rate, Triggers, Problems and Impact on Activity, Severity Assessment, Action Plan, Referrals, Documentation of Patient/Family Education, Treatment	ER visits in last month, Hospitalization in last year
Diabetes	BP,+ Smoking, Foot Exam,*** Eye Exam,**Candidate for ASA	HbA1c, Total Cholesterol, LDL, HDL, Triglycerides, Microalbumin+ Vaccinations ER Visits, Hospitalizations, Group Visits
Diabetes Reg-Lite		HbA1c, Total Cholesterol, LDL, HDL, Triglycerides, Microalbumin+ Vaccinations ER Visits, Hospitalizations, Group Visits
Depression	PHQ-9 Score, Risk of Suicide, Homicide Past Psychiatric History, Substance Use, Personality Difficulties with Staff, Family History Current Problems, Interpersonal Stressors Diagnosis Treatment Plan, Medication, Medication Side Effects, Education/Supportive Counseling Referral, Next Visit, Next Phone Contact	

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Dose and frequency for selected medication.

+Test value and date

\*\*\*Date

Records are created in the registry for patients with diabetes or asthma identified in the data warehouse (based on two diagnoses and at least one primary care visit), whereas patients with new episodes of depression are registered as they are identified. Care teams in the clinics access the registry over the intranet to clean patient panels (update PCP, disease registry status, and care team), register patients not already identified, denote patient/parent willingness to share data (for HIPAA), update patient information (if using the full registry), and view or print displays and reports.

The asthma registry is used in three large pediatric practices, the depression registry in five sites, and the diabetes registry in four clinics. Diabetes Reg-Lite is being rolled out to other primary care clinics.

## Workflow

From a sticker on the patient's chart, the receptionist checking in a registry patient knows to request a printed patient worksheet, which resembles a flow sheet and is attached to the patient chart. In clinics using the full diabetes registry or the asthma registry, the care team notes observations, care plan and patient self-management goals on the form for subsequent data entry and can


print a tailored patient self-management plan for asthma patients. In sites using Reg-Lite for diabetes, the worksheet is available for reference during the visit.

**Massachusetts Asthma Action Plan** Thursday, July 24, 2003

Name: JACK TEST  
Date Of Birth: 8/23/1949  
Doctor/Nurse: \_\_\_\_\_  
Patient Goal: \_\_\_\_\_  
Personal Best Peak Flow: 0

**Important!** Avoid things that make your asthma worse:  
Triggers: URI  
URI: eee

The colors of the traffic light will help you use your asthma medicines.



**Green means Go Zone!**  
Use Your controller medicine.

**Yellow means Caution Zone!**  
Add quick-relief medicine.

**Red means Danger Zone!**  
Get help from a doctor.

**GO**  
You have all of these:  
• Breathing is good  
• No cough or wheeze  
• Sleep through the night  
• Can go to school and play

Use these daily preventive anti-inflammatory medicines:

MEDICINE	HOW MUCH	HOW OFTEN
Peak Flow from _____ to _____		

Continue with green zone medicine and add:

MEDICINE	HOW MUCH	HOW OFTEN
Peak Flow from _____ to _____		

**CAUTION**  
You have any of these:  
• First signs of a cold  
• Exposure to known trigger  
• Cough  
• Mild wheeze  
• Tight Chest  
• Coughing at night

CALL YOUR PRIMARY CARE PROVIDER

Take these medicines and call your provider now:

MEDICINE	HOW MUCH	HOW OFTEN
Peak Flow from _____ to _____		

**DANGER**  
Your asthma is getting worse fast:  
• Medicine is not helping  
• Breathing is hard and fast  
• Nose opens wide  
• Ribs show  
• Can't talk well

**Get help from a provider now! Do not be afraid of causing a fuss. Your provider will want to see you right away. It's important! If you cannot contact your provider go directly to the emergency room. DO NOT WAIT.**  
Make an appointment with your primary care provider within two days of an ER visit or hospitalization.

Doctor/NP/PA Signature: \_\_\_\_\_ Date: \_\_\_\_\_

I give permission to the school nurse, my child's doctor/NP/PA, the Health Department, Registry project personnel and the Immunization Action Project to share information about my child's asthma.  
I give permission to share information about my child's asthma by email or asthma registry Yes \_\_\_\_\_ No \_\_\_\_\_  
Parent/Guardian Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Consent for administration of medication in school:**  
I consent to have the school nurse or school personnel designated by the school nurse administer the medication as prescribed on the first page.  
Parent/Guardian Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Authorization for student self-administration of medication in school:**

<http://staffnet/apps/registry/regActionPlan.asp?registered=True&unitnumber=0000144666> 07/24/2003

The depression registry provides patient worksheets for the initial evaluation, follow-up visits, and telephone contacts to guide each interaction and capture registry information. At the initial evaluation and protocol-based times during the episode, a severity score is derived from patient responses to the PHQ-9 questionnaire. Currently a clinical nurse specialist in the Department of Psychiatry performs telephone follow-up at pre-determined intervals during and after a patient episode of depression. She also reviews patient lists periodically

to identify patients lost to follow-up and works with primary care teams on outreach. Social workers and nurses at the primary care sites are being trained as care managers and will assume this role.

Patient lists can be printed or viewed that identify patients with a gap in care ( HbA1c test > 6 months) or incomplete registry information (patient without documented asthma action plan). Online users of patient lists can click on patient entries to drill down to view more detailed information about an encounter. Some physicians view their own lists, others during a meeting with the care team. Paper lists are routinely printed, distributed to department chairmen, clinic leads, and individual care teams, as well as discussed at staff



meetings and posted in clinic lounges. The registry also produces population reports for the health system, clinics, and care teams.

## **Results**

Initial results for pediatric patients with asthma showed a significant decrease in ED visits 6 months before and after completion of a self-management action plan. Other studies of missed school days and inpatient visits are ongoing.

## **Future Plans**

CHA is implementing the Epic EMR, which will support patient tracking for disease management and eventually eliminate the need for the registry.

## Central Jersey Physician Network

Central Jersey Physician Network (CJPN) is an IPA for 33 practices (110 physicians, 40 primary care physicians practicing in 10 different office sites). At the direction of the IPA board several years ago, CPJN has been working on a disease management program for asthma and diabetes care as a strategy for differentiation in the marketplace. Eight primary care practices now participate in each program.

### Registry

Under the BridgingCare™ program of GlaxoSmithKline, CJPN uses a disease registry, PatientPlanner™ from DocSite. Authorized staff in practices can access the registry on a central server over a high-speed line also used for billing. At the point of care, physicians and other members of the care team use paper visit planners printed from the registry. Initially all patient information was entered manually. Recently procedures have been worked out to upload laboratory test results from data files provided by the two major commercial laboratories.

“Without the electronic feeds of data from commercial laboratories, it would have been very difficult to add diabetes to our program.”

Dr. Jim Barr  
Medical Director

Patient Data Tracked by Source*		
Disease	Manual Entry	Laboratory Systems
All Conditions	Demographic Information, Disease(s)	
Asthma	ED visits, Hospitalizations Missed Work/School**+ Date of Diagnosis SABA use/week Rx prescribed (med, dose, frequency)	
Diabetes	Height, weight, BP, Eye Exam, Foot Exam, Monofilament Exam*** Self-monitoring (Y/N) Antitobacco Counseling Medications (med, dose, freq for all diabetic meds, ACE/ARB, lipid meds, ASA, antidepressants, beta-blockers)	HbA1c,***LDL,***, HDL,*** Triglycerides,*** Microalbuminuria***

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\* Per last 12 months

+Since last visit

\*\*\*Test date and result

## **Workflow**

As clinics are added to the program, clinic staff use patient lists from the billing system to identify asthma or diabetic patients based on ICD-9 coding. For identified patients, they file a baseline visit planner in the chart, which is utilized to capture initial registry information during the next patient visit. Once a patient is in the registry, a sticker is affixed to the chart.

When any patient with a chart sticker checks in for a visit, the receptionist prints a visit planner to accompany the chart. Each care team allocates responsibility for documenting information provided by the patient and results of assessments. Physicians and nurses can print patient education materials for many conditions from Programs to Go. A clinical coordinator in each clinic batches visit planners with handwritten documentation, reviews them for completeness and accuracy, and either enters the information into the registry or supervises data entry.

Each month, the medical director prints patient lists for each physician identifying patients with an apparent gap in care and discusses tactics for follow-up with the care team. He also produces reports showing trends in care and comparing clinic performance. These are distributed to the medical staff and discussed at staff meetings.

## **Results**

- Patients with uncontrolled asthma (using a controller more than twice a week) have declined from 42 percent to 29 percent over 18 months.
- The IPA has also convinced local employers and health plans to negotiate more favorable contracts because of the disease management program.

## **Future Plans**

Implementation of the program continues in additional practices. High on the wish list for enhancements is the ability to import electronic information about patient prescriptions.

## Deer Lakes Medical Association

Deer Lakes Medical Association (nine physicians and one physicians assistant) provides family practice in four locations in and around Pittsburgh, PA. Deer Lakes participates in the Blues on Call™ program of Highmark Blue Cross Blue Shield (Highmark), which includes Health Coaches and the SMART™ Registry, both provided by Health Dialog. About 40 percent of Deer Lakes patients are covered by Highmark.

“The registry is giving us the information we need to contact patients with gaps in care, as well as to examine and rework how we care for our patients with chronic disease.”

Dr. Joel Diamond  
Medical Director

## Registry

The SMART™ Registry tracks patients with asthma, coronary artery disease, congestive heart failure, chronic obstructive pulmonary disease, chronic obstructive pulmonary disease and diabetes as identified in coding in claims processed by Highmark. Except for physician-reported updates to patient information, all of the data tracked in the registry are obtained from claims. Physicians can call or fax information updates to the Highmark Clinical Program Department.

Patient Data Tracked by Sources		
Condition	Manual Entry	Health Plan Claims
All Conditions	Corrections to PCP and Diagnosis Coding, Services Not Identified via Claims, Services Not Appropriate for the Individual Patient, Health Coach Referrals	PCP, Patient Demographics, Diagnoses, ER Visits, Hospital Admissions, Specialist and PCP Visits
Asthma		Medications
Coronary Artery Disease		Lipid Test,* Medications
Congestive Heart Failure		Medications
Chronic Obstructive Pulmonary Disease+		
Diabetes		HbA1c,* Lipid Test,* Microalbumin Test,* Dilated Retinal Eye Exam*
Diabetes and Hypertension		Medications

NOTE: The universe of possible sources includes manual entry and a number of different systems: laboratory, hospital information system, practice management, claims, and pharmacy claims. Only those sources used by this organization are included in the table. Core data are in plain text, optional and other in italics.

\*Test or procedure date or date of last pharmacy fill.

+Presence of COPD is included in patient lists, but no additional information is tracked.

Participating physician practices receive patient lists, member reports, and population reports twice a year. Patient lists for each physician identify the registry patients in their panel; the chronic condition(s) for each patient; visits for primary care, specialty, emergency, and hospital care in the last year; and the number of each type of

recommended service or medication. Potential opportunities to address an apparent gap in care are flagged. Reports are also provided with graphs of trends in delivering recommended care and displaying performance for each physician's patient panel compared with peers. Using an individual patient report, physicians can communicate corrections to information in the Registry or refer any patient for additional telephone follow-up or support by a Health Coach.

### **Operational Model**

At Deer Lakes, the medical director receives a CD-ROM from Highmark twice a year, from which paper copies of patient lists and reports can be printed or viewed. The clinical team in each practice site is encouraged to review their lists as a group. The first time the information was available, medical records were pulled for every patient so that the specifics of each case could be reviewed in detail. Patients with a gap in care and without a scheduled appointment were contacted, and notes were filed in some medical records to ensure that identified issues were addressed during the next patient visit.

Results from each cycle of reporting are also discussed at staff meetings to review procedures used. This has already heightened staff awareness and resulted in some improvements such as less reliance on dipstick testing for blood sugars.

### **Results**

Deer Lakes has been participating in the program for about a year. The medical director believes use of the registry has probably assisted physicians in delivering recommended care, but is waiting for the next round of reporting to validate this impression.

### **Future Plans**

The registry continues to be refined based on physician feedback.

## Family Practice Center Sutter Medical Center of Santa Rosa

The Family Practice Center is a safety net clinic, staffed by 36 residents in training at Sutter Medical Center of Santa Rosa. Since 2000, the staff has worked to adopt for patients with diabetes the Chronic Care Model developed by Wagner and colleagues at Group Health.

“We realized we had to know the patients of interest and critical information about them both when they came in for care and when they didn’t. Our inability to do so with current records and procedures was humbling.”

Dr. Sean Gaskie

### Registry

Initial plans to build a registry were scrapped when the team obtained public domain software called the Diabetes Electronic Management System or DEMS. The Center currently uses an upgraded version of that software, called CVDEMS (Cardiovascular & Diabetes Electronic Management System), which has more advanced features and integrates support for the two chronic conditions.

Patient Data Tracked by Source*	
Disease	Manual Entry
All Patients	Disease and Patient Demographic Information
Health Profile	Type of Diabetes, Risk Factors, Comorbidities
Other Health Issues	Self monitors BG, Exercise (x/week), Smoker, Foot Risk
Tests	HbA1c, Alb/Cr, Creatinine, Cholesterol, Triglycerides, HDL, LDL, 24hrUP, ALT, AST**
Referrals	DM Education, Self Management Goal, Nutrition Education, Dental Exam, Retinal Exam, Smoking Cessation, Foot Check, Depression Screening
Adult Immunizations	Pneumovax, Influenza+

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test date and value

+Referral date, Received date

The registry is maintained on a password-protected network server and accessible on PCs in the clinic. Residents and other members of the care team use paper visit planners during patient visits to view registry information and record updates to patient information and care plan. All data entry is manual.

### Workflow

Charts of registry patients have purple tags, which alert the nurse seeing a patient to look for a visit planner in the chart. The nurse checks for new information such as laboratory results and consult reports and updates the document as necessary. The resident also consults the visit planner, entering additional observations, orders, referrals, and a target date for the next visit. Visit planners are collected and returned to a front-desk clerk who

enters registry updates into the patient's record and prints a new visit planner to be filed in the patient's record.

Every few months, the program director exports data from CVDEMS into Excel and produces patient exception lists for distribution to care teams. Teams are encouraged to take prompt action in contacting patients via letters and telephone calls.

## **Results**

The effectiveness of the new registry-supported care model has been shown in steady improvements on a number of measures. Many different immigrant populations receive care in the Family Practice Center. Staff are particularly proud of the results achieved with a group of Laotian patients. After six months of the new care model and group visits, average HbA1c levels for the group dropped from 10.5 to <7.

## **Future Plans**

Next steps in furthering the care model are to involve office directors more in registry management and factor patient motivation into patient education on self-management.

## Greenfield Health System

Greenfield Health System is an evolving network of physician practices that approaches care delivery based on models developed at the Institute for Healthcare Improvement. The registry for disease and wellness management is used at the initial internal medicine practice, the Barnes Road Clinic in Portland, OR, to supplement an EMR also used in the practice (GE Logician).

### Registry

Greenfield's registry was built by one of its providers in Microsoft Access. It is used for all patients to provide more granular patient risk groupings than is possible through the EMR and to manage the list of active patients. Preventive services are tracked for all patients. Additional information is maintained for active patients with diabetes, hypertension, coronary artery disease and myocardial infarction, hypothyroidism, osteoporosis.

Many data are uploaded via Access queries from patient information documented in the EMR, which providers use during patient visits and while engaging in telephone and electronic mail communication with patients. The registry is used each month to identify patients in need of follow-up treatment and to measure the reliability of the systems and processes in place to deliver the recommended care and improve patient status.

Patient Data Tracked by Source*		
Disease	Manual Entry	EMR
All Conditions	Registry Status, Reasons for Noncompliance; Services obtained elsewhere	Demographics, Problem List (ICD-9)
Diabetes		HbA1c,** Blood Pressure,** LDL,** Urine Microalbumin,** Rx for ACE Inhibitor, Eye Exam,+ Smoking Status
Hypertension		Blood Pressure**
Coronary Artery Disease and MI		Rate of aspirin and Beta blocker use, aspirin and Beta blocker allergy, Blood Pressure,** LDL,** Smoking Status
Hypothyroidism		TSH+
Osteoporosis		Bone density+
Preventive Care		Lipid Risk Group, LDL, ** Mammogram,+ Family History of Breast Cancer, Pap smear,** Hysterectomy, Pneumovax,+ Colonoscopy,** Bone density+

\*The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test date and value

+Test date



New patients with one of the chronic conditions are automatically identified from the problem list maintained in the EMR and, in the case of diabetes and hypertension, from laboratory results or elevated blood pressure in the absence of a documented problem. The registry is maintained on a PC and updated in batch.

## **Workflow**

Patient lists can be run to identify many different subgroups of patients with a care deficiency. Physicians work with the health coordinator to determine appropriate follow-up for each patient. One of the operational principles of Greenfield is that care teams reach out to patients not seen in the last 6 months via letter, telephone call, or electronic mail. The registry is critical to identifying any care deficiencies to incorporate in that communication.

“Our registry prevents patients from falling through the cracks. It’s our way of knowing what they need.”

Dr. Charles M. Kilo  
Internist

Population reports are also run to track success in delivering recommended care.

## **Results**

The practice has not yet accumulated enough experience to analyze improvements in population management.

## **Future Plans**

Current plans include expanding the data tracked for patients at risk of cardiac disease, adding asthma to the registry, and storing the registry database on a central server so that appropriate clinic staff can access the registry online.

## Ideal Health of Brighton

Dr. Gordon Moore established his solo practice in Rochester, NY, modeled after the Idealized Design of the Clinical Office Practice, an IHI collaborative in which he participated. To help in achieving process reliability, equity, and evidence-based practice, three of the core principles of the care model, he implemented an EMR (Alteer) to support point-of-care patient management and a registry (PatientPlanner™ from DocSite) to provide the information needed to identify patients for outreach.

### Registry

Dr. Moore obtained a registry so that he could identify lists of patients who had fallen outside of the parameters of the care management guidelines he uses for hypertension, hyperlipidemia, diabetes, colorectal cancer and mammography screening, and adult immunizations. Dr. Moore uses PatientPlanner™, a commercial registry that was initially developed during the IHI collaborative and made available to participants. He stores the registry on his PC, setting up and updating patient records through manual data entry.

Patient Data Tracked by Source*	
Disease	Manual Entry
All Conditions	Demographic Information, Disease(s)
Hypertension	Blood Pressure,**
Hyperlipidemia	All of the Above HDL,** LDL,** Triglycerides,** Total Cholesterol**
Diabetes	All of the above HbA1c,** Urine Microalbumin,** Foot Exam,** Eye Exam** Aspirin (Y/N)
Adult Immunizations	Influenza and Pneumovax (date or reason for noncompliance)

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Last value, last test date, patient target, and next test date

### Workflow

Whenever a patient calls or visits the office, Dr. Moore consults the patient information and documents care in the EMR. Patients who are also tracked in the registry are designated by a flag (“registry condition”) in the patient header in the EMR. This visual cue reminds him to print a copy of the visit summary from the EMR and set it aside. Several times a week he works through the stack of visit summaries and updates relevant information in the disease registry.

Every 2 months, Dr. Moore runs registry reports listing patients who haven't received care in the appropriate interval or haven't reached their personal goal.

Because of the design of the registry, gaps in care are integrated for each patient with multiple diseases, rather than appearing in separate lists.

After reviewing the list, he calls the patient or sends a card or letter to encourage him to come in for the appropriate treatment.

“The ability to tailor a personal goal and interval for next visit is critical. One-size-for-all guideline criteria don't work for individual patient management.”

Dr. Gordon Moore

## Results

Despite the time it takes for double entry of information in the EMR and the registry, Dr. Moore views a registry as the only way to deliver planned care to his patients. He has achieved the following improvements in care management:

- 75-80 percent compliance rate for hypertension patients
- 60 percent of patient with diabetes have HbA1c of 7.5 or less
- 60 percent of patient with lipid disorders treated to goal

## Future Plans

Dr. Moore plans to integrate information captured through the electronic tool “How's Your Health,” which provides the patient's perspective on their status and self-management, with information in his registry. He expects this to provide additional insight into areas where patients could benefit from additional help managing their disease.

“Other physicians sometimes question the time I spend in data entry. My response is that the time is minimal and this is the only way I can do a good job managing my patients. It's necessary because it's the right thing to do.”

Dr. Gordon Moore

## Intermountain Health Care

Intermountain Health Care (IHC) is an integrated health system including 22 hospitals in Utah and Idaho; the 500-physician IHC Physician Group practicing in health centers, physician practices, or IHC hospitals; and a health plan. Many IHC patients are also members of the health plan.

IHC has a long history of quality improvement over the last two decades. The Primary Care Clinical Program (PCCP) manages quality improvement in primary care delivery, alongside other programs focused on more hospital-based care. A patient registry developed at IHC supports diabetes care management and also captures information for physician feedback and population reporting regarding asthma and otitis. A stand-alone registry is used to support a hospital-based CHF clinic.

### Registry

The IHC registry was designed to support measurement and care management without requiring new information capture or chart data extraction at the care sites. In accomplishing this, IHC uses information from the health plan claims system to supplement electronic information from systems used in the provider organization.

Patient Data Tracked by Source*				
Disease	Manual Entry	Practice Management System	Health Plan Claims	Laboratory System
All Conditions	Registry Status, Corrections to PCP and Registry Data	Patient Demographics, Visit Dates	PCP	
Diabetes			Eye Exam,+	HbA1c,** LDL,** Microalbuminuria**
Asthma			Diagnosis, Medications, Visits,+ ER Visits,+ Hospital Admissions+	
Otitis			Diagnosis, Medications	

\* The universe of possible sources includes manual entry and a number of different systems: laboratory, hospital information system, practice management, claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test value and date

+Date

Patients are added to the registry based on coded encounter information in the claims system when appropriate diagnostic codes appear twice for any patient who also has at least one primary care encounter.

The registry is maintained centrally and can be accessed electronically via the IHC intranet from any practice site. Care teams fax in changes to registry information, which

program leaders consider essential to maintaining credible information in the registry. A small portion of physician compensation is tied to care management performance as measured by the registry. Regional care management teams are responsible for identifying and managing “orphan patients” (those without a designated PCP).

## **Workflow**

Multi-disciplinary teams in each health center and physician practice receive support in redesigning their workflow from a facilitator in PCCP and regional QI implementation staff. A set of provider support materials for each program also provides guidance about clinical guidelines, care models, and tools to use in incorporating new activities into the clinic routine. Typically receptionists and the entire care team play a role.

Active registry patients are identified by special flags in the scheduling system (e.g., “DM”) and stickers on patient medical records. Disease management flow sheets are also maintained in charts. When a registry patient calls for an appointment, the scheduler reminds patients to bring self-management records and follows a protocol in arranging pre-visit testing.

As medical records are assembled for the day, receptionists pull appropriate visit forms and other documents according to the chronic disease(s) of each registry patient. When registry patients check in for the visit, the receptionist asks them to complete a pre-visit self-assessment.

Medical assistants pre-fill some information on the visit form from the chart and their pre-visit assessment as they room the patient. Physicians make notes on the visit form, which includes recommendations about care, ordering appropriate testing, follow-up care, and referrals for patient education or case management, as appropriate. As they dictate a note, physicians refer to a template that helps to ensure documentation is complete.

Periodically care teams print or view lists of patients with apparent gaps in care or management to determine appropriate outreach. As part of this process, they typically also check for appointments already scheduled. Registry reports showing group and individual care team results are distributed and reviewed in regional medical staff meetings, practice staff meetings, and by the local care management improvement team. Regional medical directors provide additional follow-up.

## **Results**

Key metrics for diabetes management have demonstrated significant progress. For example, since 1999 the percent of patients with HbA1c levels of 9.0 or more has dropped from 20.5 percent to 13.9 percent.

## **Future Plans**

IHC is rolling out an EMR (Clinical Workstation) to physician practices, which provides additional registry support at the point of care via a condition-specific worksheet listing relevant patient information and providing guideline-based advisories.

## Luther Midelfort

Luther Midelfort, part of the Mayo Health System, includes three medical centers and 13 primary care practices in west-central Wisconsin. Teams from Luther Midelfort have participated in a number of quality improvement collaboratives at IHI, including the Idealized Design of the Clinical Office Practice, which incorporated the Chronic Care Model as one element. A corporate program has now evolved, targeting congestive heart failure, diabetes, and adult preventive care in the first year. Following a pilot this spring, the program is being rolled out initially to “the coalition of the willing.”

“The biggest challenge is the transition to the planned visit in an environment designed for the acute visit. A registry is critical to making that feasible without adding staff.”

Dennis Pope  
VP, Administration  
Luther Midelfort

## Registry

Luther Midelfort is employing PatientPlanner™ from DocSite as the registry application, hosted on a local server and accessible from primary care practices via the corporate intranet. Every patient is in the registry in order to manage preventive services, and each patient record tracks the appropriate information for those services plus any of the additional registry-supported conditions. Expert teams responsible for the care protocols made a conscious effort to identify a small number of data elements for each condition that would trigger the desired care and meet three different external benchmarks used to set clinical goals and measure progress.

Patient Data Tracked by Source*			
Disease	Manual Entry	Laboratory System	Practice Management System
All Conditions	Registry Status, Conditions, Patient Goals, Weight, Height, Blood Pressure, Respiration Rate, Latex Allergy, Follow-Up Visit		Demographics (Name, Provider, Medical Record Number)
Diabetes	BMI, Eye Exam,+ Foot Exam+	HbA1c,** HDL,** LDL,** Triglycerides,** Creatinine,** UA/Creatinine**	
Congestive Heart Failure	Ejection Fraction,+ Ejection Fraction Method, Low-Sodium Diet, Activity Status, Fluid Restriction Status Medications (ACE, ARB, Beta-Blocker based on EF), Medication Intolerance	HDL,** LDL,**Triglycerides**	

<b>Patient Data Tracked by Source*</b>			
<b>Disease</b>	<b>Manual Entry</b>	<b>Laboratory System</b>	<b>Practice Management System</b>
Prevention	Tetanus, Flu, Varicella Flexible Sig,+ Colonoscopy,+ Mammogram+ Tobacco Use,+ Counseling+	Lipids-fasting, Cholesterol, HDL, Fecal Occult Blood	

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Date and value

+Date

New patients are initially identified from the practice management system. Nursing staff in primary care departments work with receptionists to manage registry information for the team’s panel of patients and ensure that new patients are enrolled for the appropriate chronic conditions in the registry, not just for preventive care. Staff from Health Information Management (HIM) enter information into the registry.

## **Workflow**

A visit planner is printed for each adult patient seen in the practice, to be available along with the medical record during the visit. The nurse on the care team updates the form with information about vital signs taken during rooming and also uses standing orders to initiate preventive services that are due, taking cues from the calculated due dates displayed on the visit planner for each service. Physicians also refer to the visit planner as they see the patient and develop the care plan, updating the form as appropriate. A space is available to record a comment to be displayed on the visit planner the next time the patient comes in for care. Visit planners are collected and new information entered into the registry application by HIM staff.

Outreach reports and displays are available in the registry. Departmental or HIM staff can create outreach letters or scan the database for patients with missing or overdue clinical needs. As the program rolls out further, population reports will be distributed monthly to the Expert Teams overseeing the programs, medical leadership, and individual care teams.

## **Results**

The program has not been in place long enough to demonstrate results.

## **Future Plans**

Programs for 3-4 additional conditions will be rolled out each year. The next batch will include asthma and depression management, protocols for which are already under development.



## Peace Health

Peace Health operates six hospitals in Alaska, Washington, and Oregon. The diabetes program is operated in Peace Health clinics, which employ approximately 200 physicians, with sponsorship and support from the corporate Healthcare Improvement Division.

## Registry

Peace Health and IDX Corp. co-developed an electronic diabetes registry within Last Word, the clinical system, which physicians and care managers use in every clinic for prescription writing, documentation, and results management (paper charts are rarely used). The registry is now another screen within the EMR for patients with diabetes, advising the care team of the interventions to consider during a diabetes wellness visit and providing latest results for all of the information tracked.

Patient Data Tracked by Source*		
Disease	EMR	Manual Entry
All Patients	Demographics, Diabetes on Problem List, Visit Date, Age at Visit	Registry Status, Problem Status
Diabetes	HbA1c,** HDL,** LDL,** Cholesterol,** Triglycerides,** Microalbuminurea,+ BP ACE (Y/N), ARB (Y/N)	Patient Refused Foot Exam (Y/N),+, ACE (Contraindicated), ARB (Contraindicated)

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Date and value

+Date

The EMR is accessed in the exam room, although patient contact sheets (providing the registry information) can be printed for a paper-based approach. Much of the information needed for the registry – demographics, problem list, laboratory results, prescriptions—is available in the EMR. Additional information for the registry is requested on the registry screen.

## Workflow

Each clinic has implemented an appropriate workflow. At the Florence Clinic, two weeks ahead of scheduled diabetes wellness visits, the health assistant contacts the patient and orders appropriate tests using standing orders. During the visit, the health assistant enters blood pressure and other measurements into the registry screen, which is also displayed when the physician accesses the patient’s record in the EMR. The physician can review a diabetes flow sheet and any other information in the EMR and enters other diabetes-related information directly.

Periodically the medical director and diabetes coordinator print and review exception lists to identify patients due for a diabetes wellness visit. Annotated lists are forwarded to the scheduler who contacts patients. Physicians and others can also obtain exception lists on the intranet.

Each quarter the medical director prepares panel reports showing each physician how their patient management compares with that of peers (blinded). Initially the metric was rate of HbA1c testing; today the primary metric is patients with HbA1c <7.

## **Results**

Analysis of results in population management is planned.

## **Future Plans**

Work is already underway on congestive heart failure, which will be the next chronic disease program utilizing the registry.

## Physicians Medical Group of Santa Cruz

Physicians Medical Group (PMG) is a 200-physician IPA with 65 primary care physicians in Santa Cruz, California. Work on a population-based approach to diabetes care began in 2001, initially focusing on a formal education program for each patient. Interest and progress in adopting a new care model were spurred by involvement in the Diabetes CQI collaborative and a homegrown registry, which is currently in beta testing. The development cost of approximately \$100,000 was mostly covered by a grant from a pharmaceutical company.

“The cost of developing our registry was about the same as one unnecessary back surgery. A new care model supported by a registry is the only way an IPA can compete with an integrated group.”

Dr. Wells Shoemaker  
Medical Director

### Registry

Since 1994, PMG practice sites receive electronic patient information from area laboratories through the Elysium clinical messaging system. Laboratory test results transmitted via Elysium are now stored in a new registry data base with encounter data from practice management systems and pharmacy data from five of the six HMOs with which the IPA contracts. Much of the patient information comes from electronic sources.

Patient Data Tracked by Source*				
Disease	Manual Entry	Practice Management System	Laboratory Systems**	Health Plan Claims (Pharmacy)
All Patients	Patient Verification, Registry Status	Patient Identification Patient Demographics Past Encounters		
Diabetes	Diabetes Type, Year of Diagnosis Comorbidities, Complications, Blood Pressure, Smoking Status, Pregnancy Management Foot Exam, + Retinal Screening+ Aspirin Use, Contraindication to Medications Self Management Training (type), Patient Education, Physicians		HbA1c,** LDL,** Triglycerides,** Microalbuminuria**	Medications dispensed, strength, quantity, fill date, gap

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test result and date

+Test date

The registry application is maintained at the IPA central offices and accessed electronically in physician practices via the network supporting Elysium. Although the registry can be viewed online, care providers typically use a printed copy of the patient diabetes profile at the point of care. Patient lists were reviewed and scrubbed as the registry was set up, and practice sites can submit changes electronically or via fax.

## **Workflow**

When a registry patient checks in for a visit, the receptionist is alerted to print a copy of the patient diabetes profile either because of a flag in the patient record in the EMR or via a chart sticker. During the visit, the care team consults the patient information summarized, reviews recommended interventions based on logic in the registry application and information about the patient, and notes updates, as appropriate. Care teams can access a display of the clinical algorithms for any of the “actions needed” messages incorporated in the profile, as well as send a copy to any referral physician identified in the registry.

Five nurse case managers work with groups of primary care physicians, assisting with care coordination for patients requiring assistance. Once the registry is in more widespread use, care teams will be encouraged to use patient exception lists, with nurse case managers assisting with patients that fall outside targeted values.

Following wider rollout of the registry, population reports will also be distributed and discussed at medical staff meetings to gauge progress and plot next steps to improve care management.

## **Results**

The program is still being rolled-out.

## **Future Plans**

Immediate plans are to roll out the care model and registry beyond the beta site. Eventually the registry will be used to support management of other chronic conditions.

## Prairie Community Health, Inc.

Prairie Community Health includes five small clinics in southwest South Dakota. Interest in new care models for chronic disease and patient registries began in 2000 when a care team participated in an IHI collaborative on asthma care. The registry is currently used in two of the clinics to track patients with diabetes, cardiovascular disease, and asthma.

“After some initial work on chronic care models, we realized we had to have an integrated, multi-condition disease registry because so many of our patients have more than one chronic condition and we have to manage the patient, not the condition.”

David Rollason, PA-C

## Registry

A homegrown disease registry has now been replaced with the Patient Electronic Care System (PECS), a registry developed by the Aristos Group and the Bureau of Primary Health Care, HHS. The registry is located on a local network at each site. PECS is delivered to Community Health Centers, preconfigured to capture the data elements for each of the Bureau’s Collaboratives – Asthma, CVD, Depression, Diabetes and Cancer. All registry data are currently entered manually.

Patient Data Tracked by Source*	
Disease	Manual Entry
All Conditions	Demographics, Registry Status Vital Signs**: <i>Weight, Height, Pulse, Resp. Rate, Temp. BMI, Blood Pressure</i>
Diabetes and Cardiovascular Disease	Conditions: disease-specific list Vaccinations+: <i>Flu, Pneumococcal</i>
Diabetes	Medications: (ACE Inhibitor, Statins, <i>Others</i> ) Laboratory test results**: <i>ALT, Cholesterol, Creatinine, Creatinine Clearance, HDL, HbA1c, LDL, Microalbumin Creatinine Ratio, Potassium, Triglycerides</i> Other Tests: <i>Cardiac Stress, EKG</i> Risk Factors: <i>Family History, Glucose Self-Monitoring, Smoking</i> Other Measures: <i>Exercise, LEAP score</i> Consults and Education+: <i>Self-Management Goal Setting, Annual Foot Exam, Dental Exam, Depression Screening, DM Education, Hospitalization, Nutritional Education, Retinal Exam, Smoking Cessation</i> Other Notes: <i>Diabetes Meter Type, Encounter Note</i> Charts: <i>HbA1c, LDL</i>
Cardiovascular disease	Medications: (Aspirin, <i>Others</i> ) Other Tests**: <i>Cardiac Catheter, Cardiac Stress, Echocardiogram, Oral Glucose Tolerance, Revascularization</i> Labs**: <i>ALT, Cholesterol, Creatinine, Fasting Glucose, HDL, LDL, LVEF, Potassium, Triglycerides</i> Risk Factors: <i>Daily Weighing, Family CHD and Diabetes History, Smoking</i> Other Measures: <i>NYHA Class, Exercise</i> Consults and Education+: <i>CVD, Dental Exam, Depression Screening, Hospitalization, Nutritional Education, Post-MI Rehabilitation, Self-Management Goal Setting</i> Other Notes: <i>Encounter note, Self-Management Goal</i> Charts: <i>Cholesterol, HDL, LDL, Triglycerides</i>

Patient Data Tracked by Source*	
Disease	Manual Entry
Asthma	Vital Signs**: <i>Office PEFr, Pulse Oximetry</i> Medications: <i>Beta Blocker, Inhaled Corticosteroids, Loukotriene inhibitor, Long-Acting Beta Agonist, Mast Cell Stabilizers</i> Other Tests**: <i>Allergy Skin Test, Asthma Current Control, Asthma Underlying Severity</i> Vaccinations: <i>Flu+</i> Risk Factors: <i>Asthma Triggers, Environmental Triggers, Monitoring Peak Flow, Smoke in Household, Smoking, Use of MDI</i> Other Measures: <i>Best PEFr, ED Visits in 6 Months, FEV1/FVC%, Symptom Free Days Last 14</i> Consults and Education+: <i>Asthma Action Plan, Asthma Episode Education, Depression Screening, Self-Management Goal Setting, Spirometry Test+</i> Other Notes: <i>Encounter Note, Self-Management Goal, Written Action Plan</i> Charts: <i>Symptom-Free Days (14), Office PEFr</i>

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table. Core data are in plain text, optional and other in italics.

\*\*Date and Result

+Date

## Workflow

A stamp on the inner seam of every registry patient’s chart alerts the clinic receptionist to print the registry encounter form when the patient checks in for a visit. The presence of the encounter form serves as a cue for the nurse in the delivery area to give the patient a self-assessment form, which patients complete before seeing the provider. Providers use the information on these documents as they assess patient status and develop the care plan. Providers document visit activity on the encounter form for batch entry by someone designated in each clinic for this task. Data entry is simplified by the alignment of the encounter form with the data entry screens, resulting in little ambiguity about which medication or procedure a patient receives.

Because of the design of the registry, the encounter forms provide an integrated view of information for patients with multiple conditions and display rules-based recommendations (“prompts”) based on information about patient status, severity of disease, and previous care delivered. For example, prompts disappear after a diabetic patient receives an HbA1c and then reappear 3-6 months later depending on the test report value.

Care teams in each clinic run registry summary reports monthly and adjust the delivery system to improve care. Outlier reports are run periodically to identify patients who need specific follow-up. While reviewing these, care teams sometimes pull charts to check on other information or verify registry information, updating any erroneous information and entering missing information. Integrated with Microsoft Word and Excel, the registry can produce labels and letters for mail merge; this feature has been useful for contacting patients about flu vaccinations.

## **Results**

The registry and its summary reports have facilitated measurable improvement. All asthma patients with persistent asthma have been on anti-inflammatory medications for years. Severity assessment and self-management goal setting occur in 80 to 90 percent of patients.

## **Future Plans**

An imminent goal is to implement the registry to track asthma, depression, diabetes and hypertension at all five clinics.

## Primary Care Networks of Premier Health Partners

Primary Care Networks (PCN) operates 36 primary care practices (100 physicians) owned by Premier Health Partners, a hospital collaboration in Dayton, Ohio. PCN started a diabetes management program in 1996; participation in the first IHI Chronic Conditions Collaborative in 1998 occasioned a “quest” for a practical registry solution to support both disease and wellness management.

“In a fee-for-service environment like ours, the registry has to be simple to implement and provide useful, actionable information at the lowest possible cost.”

Evan Steffens, RN, MS  
Quality Manager

## Registry

After unsuccessful experiments with scan forms and a homegrown registry data base, PCN adapted a registry add-on product, PreCare, of the Vitalworks system used for registration, billing, and appointments. The registry now supports management of preventive care, diabetes, hypertension, and heart disease.

Patient Data Tracked by Source*		
Disease	Manual Entry	Practice Management System
All Patients	Corrections to PCP and Diagnosis Coding, Held Code (patient refused procedure, contraindicated)	
Diabetes		HbA1c,** LDL,** UA Protein,** Creatinine,** Urine Albumin,** Eye Exam,** Foot Exam**
Hypertension		Visit (?)**
Heart Disease		Lipid panel,** EKG**
Preventive Services		Mammogram,** Pap Smear,** OB/Gyn Care,** PSA,** Hemocult,** Colon Cancer Screen,** Adult and Pediatric Immunizations**

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test or procedure date.

Patients are identified from billing codes and dummy billing codes (e.g., for “foot exam” or services delivered elsewhere), which supplement patient demographic information, diagnosis and service codes, and service dates in Vitalworks to provide the data for the registry. Care teams receive ticklers from the registry regarding interventions due for patients via a printed registry sheet.

## Workflow

Practices are encouraged to incorporate teamwork into their workflow, which begins at patient check-in when the system automatically prints both a fee ticket *and* registry sheet,



which are placed on the patient's chart. Medical assistants typically review information on the registry sheet with patients, noting any updates, and can initiate some services from protocol-based standing orders. Physicians can also note any updates as they see the patient and review the recommended care interventions. Billing clerks enter registry updates, including dummy codes, from the registry sheet at the same time as they process billing information from the fee ticket.

Periodically the Quality Manager for PCN prints Exception Reports for each physician listing patients with apparent gaps in care (e.g., >65 years of age without pneumovax, or diabetic due for follow-up). The report is distributed to physicians as an aid to responding to a current quality initiative focused on some aspect of care. Another use of the reporting feature of the registry is patient panel lists (e.g., all patients with diabetes), which are used in the practices to select samples for quarterly chart reviews.

## **Results**

PCN has seen steady increases in compliance with registry-supported care guidelines in the five years the registry has been in use.

## **Future Plans**

Adding depression management to the registry is under consideration.

## Quello Clinic

Quello Clinic is an independent medical group providing family practice and urgent care services in six clinic locations around the Twin Cities in Minnesota. Since 1994, Quello Clinic has been one of the provider organizations working collaboratively on care guidelines and new care models at the Institute for Clinical Systems Integration. Diabetes, one of numerous ICSI disease and wellness guidelines, is the program that originally led to the development of a diabetes registry.

“If you can organize key patient information quickly enough, you can manage chronic disease. It is the single most powerful innovation we have made.”

Terry Murray

Diabetes, one of numerous ICSI disease and wellness guidelines, is the program that originally led to the development of a diabetes registry.

## Registry

Years ago the staff person who oversees guidelines programs developed a diabetes registry in an electronic spreadsheet application when it became apparent that patient tracking using index cards would never work. The Clinic now uses a second generation registry in Microsoft Access to track information for patients with coronary artery disease, congestive heart failure, and hypertension, as well as diabetes.

New patients are identified by the care team and when the program manager reviews laboratory results reported back by a commercial laboratory. The program manager reviews additional information in medication lists in paper medical records, discharge summaries, and/or coding in claims to verify patients before they are entered into the registry. This prevents including inappropriate patients such as any with gestational diabetes or some other condition that is elevating blood glucose levels or another indicator.

Patient Data Tracked by Source*		
Disease	Manual Entry	Laboratory System
All Conditions	Demographic Information, Diagnoses, Home Chart Location, Smoking Status, BMI, Advanced Directive, Pneumovax, Last Date of Service, Text Comment	
Coronary Artery Disease	Aspirin	Lipid Profile, ** LDL, ** Creatinine**
Congestive Heart Failure	Statin, Left Ventricular Function, Ejection Fraction	
Hypertension	Blood Pressure, ** Control Medication	
Diabetes	Eye Clinic, + Eye Exam, + Foot Exam, + Glycemic Control Agent	Current HbA1c, ** Previous HbA1c, Current Level, Previous Level, Microalbumin

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test date and value.

+Date of service.

The registry is maintained on a server at the central office and can be accessed at each clinic site from one or two PCs over the intranet.

## **Workflow**

When a registry patient checks in for a visit, the receptionist knows to print a registry visit planner either after reviewing the problem list in the medical record or because of the presence of a chronic disease flow sheet. The medical assistant consults the visit planner, adding assessment information for the current visit and obtained from interviewing the patient and initiating protocol-based standing orders. Physicians likewise consult the registry for information about patient status and history and refer to the guideline-based recommendations incorporated in the document as they develop the care plan and counsel the patient, recording updates on the sheet as well. Visit planners are collected and forwarded to a designated person in each clinic for data entry.

Logic in the registry application stratifies patients according to level of management (e.g., HbA1c>8.5, LDL>130) and generates patient lists and displays for diabetes nurse educators and primary care teams that sort problem patients, in effect assigning the ones requiring closer management and support to the nurse specialists. This ensures that one point of contact is responsible for follow-up. Diabetes educators provide patient education and mid-level providers provide follow-up with telephone outreach to check on patient status, reinforce education about self-management, and schedule education visits or classes, as appropriate. A disease management specialist in each clinic meets with primary care teams to determine follow-up strategies and helps with telephone outreach in many cases.

Population reports generated by the registry are distributed to care teams, lead physicians at each clinic, the medical director, and a physician champion for each guideline. Results and the process changes for further improving results are discussed at staff and quality management meetings.

## **Results**

- Average HbA1c values for Quello Clinic have dropped from 9 to 7.
- Last year Quello Clinic ranked 4th out of 40 medical groups in Minnesota in a public reporting of performance by a number of health plans. The measure used was percent of patients with diabetes meeting all of a set of nine intervention goals.

## **Future Plans**

A goal for the future is to populate the registry with information on medications via an electronic feed.

## Redwood Community Health Coalition

Redwood Community Health Coalition, a membership organization representing four counties in northern CA (Sonoma, Napa, Yolo, Marin), supports a number of grant-funded initiatives in which member clinics collaborate in quality improvement. One current effort that includes a disease registry aims to implement the BPHC Health Disparities Chronic Care Model for

“Resources are so constrained in community health centers that the registry has to be easy to use and provide great value for the time invested.”

Adrienne Bowes  
Director of QI Programs

diabetes management in 12 community health centers. The program includes no- or low-cost laboratory testing and supplies resources to sites such as self management assessment tools, best practice guidelines, and in some sites group medical appointments. Program staff at the Coalition provide group and individual training and technical assistance to the staff at participating health centers.

## Registry

Staff at each of the 12 participating health centers downloaded the Cardiovascular and Diabetes Electronic Management System (CVDEMS) registry application and have implemented it on a local PC. CVDEMS is “freeware” developed for organizations participating in chronic disease management programs of the Bureau of Primary Health Care, HHS. The registry provides four different formats for visit notes for use at the point of care and many different reports and patient lists. Sites in the diabetes management collaborative are manually entering all patient data.

Patient Data Tracked by Source*	
Disease	Manual Entry
All Patients	Demographics, Registry Status, Text Note, Next Visit Date
Diabetes	Vital Signs: Weight,** Pulse,** BMI,** Blood Pressure** Health Profile: Diabetes Type, Hypertension, Post-MI, CHF, CVA, PVD, Hyperlipidemia, Nephropathy, Family History CHD, Retinopathy, Depression, Renal Failure Medications [ <b>Select from List</b> ] Tests**+: HbA1c, Alb/Cr, Creatinine, Total Cholesterol, Triglycerides, HDL, LDL, 24-hr UP, ALT, AST, Potassium, ECG, ECHO, LVEF, Exercise Stress Test, Cardiac Catheterization, Revascularization Other Health Issues: Self-monitors Blood Glucose, Exercise x/week, Smoking Status, Foot Risk (0-3), Daily Weighing, NYHA Classification (1-4) Referrals/Education+: DM Education, CVD Education, Self-Mgmt Goal, Nutrition Education, Dental Exam, Retinal Exam, Smoking Cessation, Foot Check, Depression Screening, Substance Abuse Screening, Medication Self-Management Training, Hospitalization, Post-MI Rehab, Pneumovax, Flu Vaccine

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Test date and value

+Referral and service dates

All sites agreed to track demographics and four additional key measures: HbA1c, foot exams, eye exams, and self management goal setting. Some sites collect more information as shown above.

## **Workflow**

Health center staff work out their own models for incorporating the registry into routine workflow, assisted by information about options in the CVDEMS User Manual and technical assistance and cross-learning through the collaborative. Ideally, one individual in each health center manages data entry, though schedule changes can lead to a delay of entry if no back-up person has been trained.

Each health center has also developed a process for regular review of lists of patients with gaps in care or who are not meeting management goals. Population reports are discussed at collaborative learning sessions, as well as at a quarterly coalition-wide CQI meeting. Registry reports are also used to assemble information for regular reports to grant sponsors.

## **Results**

- Average HbA1c results for a 50-plus patient cohort from each center was 7.5 in June 2003, down from a baseline value of 8.9 in June 2001
- Progress is also being made on other goals including that 90 percent of enrolled patients receive yearly foot and eye exams and 70 percent participate in structured diabetes education programs

## **Future Plans**

A separate initiative of the Redwood Community Health Coalition uses a registry developed by the CIO as part of a program to prevent chronic disease in at-risk patients. The coalition will continue work on organized approaches to chronic disease prevention and management, incorporating technology such as registries as a critical enabler.

## Thedacare

Thedacare is an integrated health system in northeast Wisconsin that employs more than 100 physicians and delivers primary care in 21 practice sites. The health system co-owns the Touchpoint health plan with another health system. Members of the health plan represent about 40 percent of the patients managed by Thedacare physicians.

Work on the registry began in 1997 when a team from Thedacare participated in the IHI Chronic Care collaborative. The objective was to enable improved performance in delivering chronic disease and wellness care, while at the same time documenting performance for NCQA. Under the Touchpoint Quality Program, physicians receive annual bonuses for their performance in delivering the recommended care.

## Registry

The registry, programmed at Thedacare, tracks NCQA-recommended preventive services and interventions for diabetes and coronary artery disease management. The registry data base is populated with patient information from claims processed at Touchpoint and a laboratory system. New patients identified from coding in claims or medications used to manage diabetes are automatically added to the registry. Clinical teams have 3 months to verify new registry patients, which are otherwise inactivated. Enrollment information from Touchpoint is used each month to verify patient member status and primary care physician (PCP).

<b>Patient Data Tracked by Source*</b>			
<b>Disease</b>	<b>Manual Entry</b>	<b>Health Plan Claims</b>	<b>Laboratory System</b>
All Conditions	Verification of new panel patient identified in claims	Demographics, Disease(s), PCP	
Diabetes	Smoking Status, Eye Exam (optional)	Office visit,** Eye Exam**	HbA1c,+ LDL, Nephropathy+
Coronary Artery Disease	Smoking Status, Management by PCP or Cardiologist, Cardiologist	Office visit,** Medications	Total Cholesterol, + LDL,+ HDL,+ Triglycerides+
Preventive Services	Mammography,** immunization		

\* The universe of possible sources includes manual entry and a number of electronic systems including laboratory, hospital information system, practice management, health plan claims, and pharmacy claims. Only those sources used by this organization are included in the table.

\*\*Date

+Date and value

The registry is hosted on a central server and accessed in Thedacare physician practices over the health system intranet.

## Workflow

Each practice and care team is responsible for integrating the registry into routine workflow, assisted by clinical consultants from Thedacare Physician Services and twice-a-year user group meetings, where implementation strategies and lessons learned are shared.

To identify patients and provide reminders about recommended services, providers in some practices file a patient snapshot from the registry in the patient's medical record or use a flow sheet. Other models include chart stickers and post-it notes with reminders. Each month one designated person in each practice prints and distributes patient lists to care teams and then assists with follow-up via telephone calls or letters.

“We encourage care teams to adopt protocols for patient follow-up to minimize the time required for physicians.”

Sherry Clarke  
Clinical Quality Consultant  
Disease Management and Prevention

Quarterly data packets are also distributed to care teams summarizing performance to date. In online displays, care team members or the coordinator can view aggregate results for the practice and for individual teams, drill down to view registry information for registry patients with care deficiencies, and enter information updates.

## Results

- In 1997, 43 percent of Touchpoint patients with diabetes had HbA1c results  $\leq 8.0$ . In 2002, 75 percent were at goal of  $\leq 8.0$ . Average HbA1c results for the population dropped from 8.6 to 7.3 over the same period. Thedacare set the national benchmark of 95 percent in 2002 for HEDIS results for eye exams!
- For patients with coronary artery disease, the percentage with LDL  $\leq 100$  was 33 percent in 1997, but rose to 60 percent in 2002. Average LDL values for the population dropped from 113.8 to 95 over the same period.

## Future Plans

Plans for enhancing the registry for diabetes include adding nephropathy results and patient risk factors. Modifications to the registry and operational model are also being piloted to include the patients of other payers. As an EMR from Epic is rolled out to Thedacare practices, additional data elements from clinical documentation (such as blood pressure) are starting to be fed into the registry. Eventually when EpicCare is capturing clinical documentation throughout Thedacare ambulatory care sites, registry functions will be assumed by the EMR.

# Appendix

**Table 1. Objectives for Physician Practice EMRs and Related Requirements**

Objectives	EMR Requirements	Description
<b>1. Improved clinical quality and safety</b>	Disease registry	<ul style="list-style-type: none"> <li>Identifies and tracks subgroups of patients targeted for disease management</li> </ul>
	Prescription management	<ul style="list-style-type: none"> <li>Supports entry of prescriptions and checking for interactions (allergies and drug-drug interactions) and formulary compliance</li> </ul>
	Point-of-care decision support	<ul style="list-style-type: none"> <li>Provides prompts to physicians on guideline-based interventions</li> </ul>
	Outreach reports	<ul style="list-style-type: none"> <li>Permits retrospective analysis of practice patterns and clinical outcomes</li> </ul>
	Practice analysis reporting tools	<ul style="list-style-type: none"> <li>Analyzes and reports on care delivered to groups of patients</li> </ul>
<b>2. Improved operating efficiency</b>	Replacement of transcription	<ul style="list-style-type: none"> <li>Direct capture of notes through templates, scanning, voice recognition</li> </ul>
	Prescription renewal processing	<ul style="list-style-type: none"> <li>Automating renewal requests for internal routing and approval</li> </ul>
	Team messaging	<ul style="list-style-type: none"> <li>Facilitates internal, inter-staff communication</li> </ul>
<b>3. Increased revenue generation and reimbursement</b>	Clinical coding integrated with encounter notes	<ul style="list-style-type: none"> <li>Derives codes for billing from documentation</li> </ul>
	E&M coding advisor	<ul style="list-style-type: none"> <li>Assists physician in assigning appropriate level of visit for billing</li> </ul>
	Referral management	<ul style="list-style-type: none"> <li>Tracking of open referrals and authorization status</li> </ul>
<b>4. Improved access to patient information/reduced medical records costs</b>	Basic charting capabilities	<ul style="list-style-type: none"> <li>Design easily accommodates problem lists, medications, and physician notes</li> </ul>
	Interface with lab systems	<ul style="list-style-type: none"> <li>Automatically incorporates laboratory data in the EMR</li> </ul>
	Flexible display, graphing, and query capabilities	<ul style="list-style-type: none"> <li>Multiple methods for displaying integrated patient data for review (flowsheets, patient summary screens)</li> </ul>
<b>5. Support of paperless environment</b>	Document scanning	<ul style="list-style-type: none"> <li>Captures paper-based documents for review online</li> </ul>
	Improved access to data	<ul style="list-style-type: none"> <li>As described in (4) above</li> </ul>



Objectives	EMR Requirements	Description
<b>6. Patient interaction and empowerment</b>	Clinical e-mail	<ul style="list-style-type: none"> <li>Allows secure patient electronic communication with physician and practice and documents in EMR</li> </ul>
	Access to knowledge/tools for collaborative decision making	<ul style="list-style-type: none"> <li>Provides displays and content knowledge to enhance discussions during encounters</li> </ul>
	Access to knowledge/tools for self-management	<ul style="list-style-type: none"> <li>Printed education materials, Summary of Visit or Self-Management Plan increases patient recall and compliance</li> </ul>

Note: Patient registries typically include the shaded functions, but only for chronic care management of enrolled patients.