

Improving Primary Care for Patients With Chronic Illness

Thomas Bodenheimer, MD

Edward H. Wagner, MD, MPH

Kevin Grumbach, MD

MR SUGARMAN, A 64-YEAR-old patient with diabetes, comes for his 15-minute visit with Dr Madden. After evaluating Mr Sugarman's acutely painful knee and treating his gastroesophageal reflux disease, Dr Madden has 3 minutes left to assess diabetic control. Having fruitlessly searched through Mr Sugarman's medical records to find the last eye examination results and hemoglobin A_{1c} (HbA_{1c}) and lipid levels, Dr Madden gives up in frustration and schedules another visit during her day off to manage Mr Sugarman's diabetes. Mr Sugarman does not keep a log of his home glucose determinations.

Ms Feliz arrives for her planned diabetes-management visit. At a previous acute care visit, she discussed her knee pain and gastroesophageal reflux with Dr Newman. Ms Feliz, as taught in her self-management class, hands her home glucose record to the medical assistant, who scans it into the electronic medical record, reviews with Ms Feliz the reminder pop-up message, refers her for an eye examination and test of urine microalbumin levels, and prints for Ms Feliz and Dr Newman a graph showing the last 2 years of her HbA_{1c} (normal) and low-density lipoprotein cholesterol (LDL-C) (elevated) results. Dr Newman briefly discusses with Ms Feliz an action plan to address hyperlipidemia and arranges 2 visits: 1 to the pharmacist, who adjusts Ms Feliz's medication doses according to a practice guideline-based protocol, and 1 to the nutritionist to discuss low-fat diet options.

The chronic care model is a guide to higher-quality chronic illness management within primary care. The model predicts that improvement in its 6 interrelated components—self-management support, clinical information systems, delivery system redesign, decision support, health care organization, and community resources—can produce system reform in which informed, activated patients interact with prepared, proactive practice teams. Case studies are provided describing how components of the chronic care model have been implemented in the primary care practices of 4 health care organizations.

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One hundred million persons in the United States have at least 1 chronic condition. Half of these individuals have more than 1 chronic illness. Eighty-eight percent of people aged 65 years or older have 1 or more chronic illnesses, and one quarter of these have 4 or more conditions. Chronic illness accounts for three quarters of total national health care expenditures.^{1,2}

This article is the second in the series *Innovations in Primary Care*. The initial article³ summarized disturbing data on chronic illness care. The majority of patients with hypertension,⁴ diabetes,⁵ tobacco addiction,⁶ hyperlipidemia,⁷ congestive heart failure,⁸ chronic atrial fibrillation,⁹ asthma,¹⁰ and depression¹¹ are inadequately treated. Redesign of primary care has been proposed to close the quality chasm between current practices and optimal standards.¹² How such a redesign might be accomplished is the subject of this 2-part article.

Tyranny of the Urgent

What is behind the deficiencies in chronic disease care? Frequently, the acute symptoms and concerns of the patient crowd out the less urgent need to bring chronic illness under optimal management. Clinicians—as in the vi-

gnette describing Dr Madden—routinely experience this tyranny of the urgent.¹³

Under a system designed for acute rather than chronic care, patients are not adequately taught to care for their own illnesses. Visits are brief and little planning takes place to ensure that acute and chronic needs are addressed. Lacking is a division of labor that would allow non-physician personnel to take greater responsibility in chronic care management. Too often, caring for chronic illness features an uninformed passive patient interacting with an unprepared practice team, resulting in frustrating, inadequate encounters.¹³

Chronic Care Model

One of us (E.H.W.) has developed a model for primary care of patients with chronic illness—a guide to be used in

Author Affiliations: Family and Community Medicine, University of California, San Francisco (Drs Bodenheimer and Grumbach); and MacColl Institute for Healthcare Innovation, Center for Health Studies, Group Health Cooperative of Puget Sound, Wash (Dr Wagner).

Corresponding Author: Thomas Bodenheimer, MD, San Francisco General Hospital, Ward 83, 1001 Potrero Ave, San Francisco, CA 94110 (e-mail: tbodie@earthlink.net).

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developing effective chronic care. The chronic care model was derived from efforts to improve chronic illness management at Group Health Cooperative of Puget Sound in Washington, from literature reviews, and from suggestions of an advisory panel to Group Health's MacColl Institute for Healthcare Innovation. The model does not offer a quick and easy fix; it is a multidimensional solution to a complex problem.

Because the majority of chronic illness care is performed within the primary care setting³ and because primary care physicians spend a considerable amount of their time treating chronic illness, the chronic care model constitutes a major rethinking of primary care practice, as pictured in the opening vignette about Dr Newman.

Chronic care takes place within 3 overlapping galaxies: (1) the entire community, with its myriad resources and numerous public and private policies; (2) the health care system, including its payment structures; and (3) the provider organization, whether an integrated delivery system, a small clinic, or a loose network of physician practices.

Within this trigalactic universe, the workings of which may help or hinder optimal chronic care, the chronic care model identifies 6 essential elements: community resources and policies, health care organization, self-management support, delivery system design, decision support, and clinical information systems.^{14,15} What are these 6 pillars of the chronic care edifice?

Community Resources and Policies

To improve chronic care, provider organizations need linkages with community-based resources, eg, exercise programs, senior centers, and self-help groups. Community linkages—for example, with hospitals offering patient education classes or home care agencies providing case managers—are especially helpful for small physician offices with limited resources.

Health Care Organization

The structure, goals, and values of a provider organization and its relation-

ships with purchasers, insurers, and other providers form the foundation upon which the remaining 4 components of the chronic care model rest. If an organization's goals and leaders do not view chronic care as a priority, innovation will not take place. The reimbursement environment of a provider organization has a major impact on chronic care improvements, which are more likely to survive throughout the long term if they increase revenues or reduce expenses. If purchasers and insurers fail to reward chronic care quality, improvements are difficult to sustain.

Self-management Support

For chronic conditions, patients themselves become the principal caregivers.¹⁶ People live with chronic illness for many years; management of these illnesses can be taught to most patients, and substantial segments of that management—diet, exercise, self-measurement (eg, using glucometers or bathroom scales), and medication use—are under the direct control of the patient. Self-management support involves collaboratively helping patients and their families acquire the skills and confidence to manage their chronic illness, providing self-management tools (eg, blood pressure cuffs, glucometers, diets, and referrals to community resources), and routinely assessing problems and accomplishments.

Delivery System Design

The structure of medical practice must be altered, creating practice teams with a clear division of labor and separating acute care from the planned management of chronic conditions. Physicians treat patients with acute problems, intervene in stubbornly difficult chronic cases, and train team members. Non-physician personnel are trained to support patient self-management, arrange for routine periodic tasks (eg, laboratory tests for diabetic patients, eye examinations, and foot examinations), and ensure appropriate follow-up. Planned visits are an important feature of practice redesign.

Decision Support

Evidence-based clinical practice guidelines provide standards for optimal chronic care and should be integrated into daily practice through reminders. Ideally, specialist expertise is a mere telephone call away and does not always require full specialty referral. Guidelines are reinforced by physician “champions” leading educational sessions for practice teams.

Clinical Information Systems

Computerized information has 3 important roles: (1) as reminder systems that help primary care teams comply with practice guidelines; (2) as feedback to physicians, showing how each is performing on chronic illness measures such as HbA_{1c} and lipid levels; and (3) as registries for planning individual patient care and conducting population-based care.

Registries, a central feature of the chronic care model, are lists of all patients with a particular chronic condition on an organization's or physician's panel. Take diabetes, for example. Data for patients with a diabetes-related *International Classification of Diseases, Ninth Revision (ICD-9)* code, diabetic prescription, or laboratory test result indicating diabetes are entered electronically into the diabetic registry. Laboratory values—HbA_{1c}, LDL-C, and urine microalbumin—automatically flow to the registry. Ideally, eye and foot examinations and blood pressure measurements are also entered. The registry may feed into a reminder pop-up message on the electronic medical record, which flags laboratory work or examinations not performed according to schedule. With paper charts, reminder sheets can be printed for each visit by the diabetic patient. As a population tool, registry data can be electronically sorted to identify and contact patients with elevated HbA_{1c} levels or those lacking up-to-date eye examination results.

The 6 components of the chronic care model are interdependent, building upon one another. Community resources—for example, exercise pro-

grams and peer support groups—help patients acquire self-management skills. Delivery system redesign, the formation of primary care teams with a division of labor, is essential to teach self-management because physicians do not have the time and may not be properly trained for this activity. For chronic disease registries to be successful, redesigning delivery systems is necessary so that 1 member of a primary care team is responsible for working the registry. Clinical practice guidelines, a key decision-support tool, provide the evidence upon which physician feedback data and reminder systems are based. Chronic care model elements are unlikely to be introduced or maintained without an organizational environment featuring innovative leadership and favorable finances.

As its ultimate goal, the chronic care model envisions an informed, activated patient interacting with a prepared, proactive practice team, resulting in high-quality, satisfying encounters and improved outcomes.¹⁷

Is the model a utopian concept, impossible to implement in the rough-and-tumble world of primary care? A number of organizations have attempted to introduce the chronic care model. Some have enjoyed success. Others succeeded but were unable to sustain the improvements. The chronic care model began at a handful of integrated delivery systems, most notably Lovelace Health Systems in Albuquerque and Group Health Cooperative of Puget Sound in Seattle.¹⁸⁻²⁰ Projects to spread the model to other provider organizations are under way, with the support of the Robert Wood Johnson Foundation's project Improving Chronic Illness Care (ICIC)²¹ and the Institute for Healthcare Improvement (IHI).

Implementing the Chronic Care Model

The chronic care model is not an abstract theory but a concrete guide to improving practice. The case studies presented here were chosen because they involve private medical practices, 2 integrated delivery systems, and a com-

Table. Case Studies of Chronic Care Model Implementation

Name	Type of Organization	Main Chronic Care Model Components Introduced
Premier Health Partners	Network of private practices	Decision-support tools and physician performance feedback
HealthPartners Medical Group	Integrated delivery system	Disease registry, case management of high-risk patients, primary care teams
Clinica Campesina	Community health center	Self-management training, disease registry with reminder system, primary care teams
Kaiser-Permanente Northern California	Integrated delivery system	Intensive treatment of high-risk patients

munity health center and because each organization has implemented a mixture of chronic care model elements (TABLE). In each case, the organization's own evaluation suggests that implementation of the model improved patient care. Although these internal measurements do not meet rigorous standards of evidence, part 2 of this article describes published evidence on the effectiveness of chronic care model components.

Premier Health Partners

In 1998, Premier Health Partners joined the diabetes collaborative, a joint effort of ICIC and the IHI. Located in Dayton, Ohio, Premier Health Partners is a health system based on the traditional private practice model. One hundred physicians working in 36 private offices make up Premier's primary physician network. Starting with one physician and gradually adding all primary care practices, Premier used the chronic care model to improve diabetes care. By 2001, for the entire primary care network, the proportion of diabetic patients with HbA_{1c} levels below 7% had risen from 42% to 70%. Similar improvements were recorded for foot examination results, urine microalbumin levels, and use of angiotensin-converting enzyme inhibitors.

Decision support is provided through practice guidelines, academic detailing, and a toolkit of printed materials that incorporate practice guidelines into the day-to-day care of diabetic patients. Self-management support includes individual and group classes and flowcharts on which patients record

their own laboratory test results. Delivery-system redesign began with the development of practice teams in which physicians and nurses work together to monitor diabetes flow sheets. Premier Health Partners has achieved its improved diabetes care with a rudimentary but effective information system: medical-record reviews in each primary care practice generate physician-specific data on diabetes measures that are circulated unblinded to all physicians. Over time, these data have stimulated physicians with poor performance to improve. The information system will soon be generating physician and patient reminders.

The diabetes program is financially supported by Premier Health Partners. One insurer has agreed to reimburse office-based diabetes education, and another is making a yearly bonus payment if diabetes performance exceeds an agreed-upon benchmark. Premier is planning to extend its chronic illness improvement program to cardiac disease and asthma and to develop an active chronic disease registry.

HealthPartners Medical Group

Like Premier Health Partners, HealthPartners Medical Group (HPMG) joined the ICIC-IHI diabetes collaborative in 1998. An integrated delivery system based in Minneapolis, HPMG implemented 4 components of the chronic care model. Patient self-management training is performed by diabetes resource nurses at each clinic. Decision support includes practice guidelines, diabetes update conferences, and a diabetes support team. The information sys-

tem has created a diabetes registry used to risk-stratify patients, create reminder prompts, and generate physician-specific performance reports. The registry provides each physician with a quarterly at-risk list that prioritizes patients according to HbA_{1c} and LDL-C levels and presence of coronary artery disease. These quarterly reports also provide graphs showing physician and clinic performance on HbA_{1c} and LDL-C measures. Delivery system redesign involves primary care teams, group diabetes visits, and case management for patients designated by the at-risk list to require more intensive management.²²

From January to December 1999, the percentage of HPMG diabetic patients with HbA_{1c} levels below 8% increased from 60.5% to 68.3%, and the percentage with HbA_{1c} levels of 10% or higher fell from 10.3% to 7.2%. Mean HbA_{1c} dropped from 7.86% to 7.47% ($P<.001$). Similar improvements were seen in LDL-C levels.²²

Clinica Campesina

More than 700 community health centers operate in the United States, serving 9.6 million patients at thousands of sites. Community health centers operate with funds from the federal Bureau of Primary Health Care, Medicare, Medicaid, and state health departments. Eighty-six percent of community health center patients live below 200% of the federal poverty line, 40% are uninsured, and 64% are ethnic minorities who experience higher-than-average rates of chronic illness.²³

In 1998, the Bureau of Primary Health Care joined the diabetes collaborative of ICIC and IHI as part of its Health Disparities Initiative, a concerted program aimed at eliminating racial, ethnic, and socioeconomic disparities.²⁴ The bureau funded a full-time coordinator in each of 5 geographic clusters, and 1 community health center from each cluster was picked as the lead organization. The 5 coordinators and a team from each of the 5 lead community health centers attended ICIC-IHI's training sessions on organizational change and care of chronic illness. By 2001, diabetes improvement

programs had spread from 5 to 200 clinical sites; in 2002, 371 community health centers had chronic care projects in diabetes, cardiovascular disease, asthma, depression, or all 4. A leader in the initial diabetes collaborative was Clinica Campesina Family Health Services.

Clinica Campesina provides care to a largely uninsured Hispanic population around Denver, Colo. Assisted by the diabetes collaborative, Clinica Campesina implemented most components of the chronic care model, including primary care teams with a division of labor, a diabetes registry (using a rudimentary information system requiring clinic staff to input data), physician reminders, diabetes group visits (delivery system redesign), and activation of patients to manage their illness through diabetes education and collaborative setting of diabetes treatment goals during each clinic visit. Patients are provided with self-management plans allowing them to choose self-improvement goals such as walking a mile each day or stopping tobacco use. Monthly printouts of the registry are distributed to all physicians, and, to relieve physicians' workload, medical assistants read patients' flow sheets and make appropriate preparations for needed examinations or tests. Outreach is provided to patients on the registry who have poorly controlled illness or difficulty coming to the clinic.

Clinica Campesina's self-reported data show that the average HbA_{1c} level of its diabetic population dropped from 10.5% in October 1998 to 8.6% in March 2000. The percentage of diabetic patients with at least 2 HbA_{1c} tests within a year rose from 11% in October 1998 to 71% in June 2000. The percentage of diabetic patients with self-management goals jumped from 3% in February 1999 to 65% in March 2000. The percentage of those having eye examinations climbed from 7% to 51%, and the percentage having foot examinations rose from 15% to 76% in the same period.

Kaiser-Permanente Northern California

Kaiser Health Plan and the associated Permanente Medical Group serve 3 mil-

lion people in the northern California region. Within Kaiser-Permanente Northern California (KP-NC), 22% of adult enrollees, mainly those with chronic conditions, generate 47% of adult ambulatory visits and 74% of non-obstetric hospital days. By 1999, KP-NC had launched Chronic Care Management programs targeting diabetes, coronary artery disease, hyperlipidemia, asthma, and congestive heart failure. Kaiser-Permanente Northern California invested millions of dollars in these programs, hoping to improve health outcomes and thereby create savings through fewer hospitalizations and emergency department visits.

Chronic Care Management divides KP-NC's chronic condition population of 400 000 into 3 levels. Patients at level 1 have their chronic condition under reasonable control and receive care through their primary care team. Patients at level 2 have poorly controlled conditions; for example, diabetic patients with HbA_{1c} levels above 10% qualify for level 2. Level 3 is composed of patients with complex multid diagnoses, high-use patients, or both who receive case management by registered nurses or medical social workers within the primary care team; because patients have multiple diagnoses, level 3 case management is not disease-specific.

The most far-reaching delivery system redesign involves level 2 patients, who are referred to disease-specific care managers who may be attached to a primary care team. Care managers—nurses, health educators, pharmacists, respiratory therapists, or dietitians—exist for management of diabetes, hyperlipidemia, asthma, and congestive heart failure. They are responsible for a list of patients with whom they work intensively for a 6- to 15-month period, after which, if the illness is better controlled, the patient returns to level 1. Care managers, who attend training programs, update seminars, and peer group meetings, are mentored by disease-specific physician champions.

Adult asthma provides an example of how KP-NC's Chronic Care Management programs operate. Data for asth-

matic adults are electronically entered into the asthma registry according to diagnosis code or use of asthma medications. Patients with an asthma-related emergency department visit, hospitalization, or pharmacy data revealing 2 prednisone bursts or an excess of asthma inhalers are designated as level 2 or high risk and referred to an asthma care manager. Care managers—nurses, respiratory therapists, or pharmacists—arrange a personal visit, including patient self-management support with training on use of inhalers, spacers, and peak flow meters. Care managers can change medications according to clinical protocols. Patients are taught about triggers and environmental controls and how to stage the severity of their illness. Care managers help patients set specific monthly goals; for example, regular use of steroid inhalers or keeping the cat off the bed at night. Smokers are referred to smoking cessation classes.

Chronic Care Management leaders are concerned about level 1, which handles 85% to 90% of KP-NC's chronic care patients (only 12% of asthmatic patients are in level 2 at any given time). Even if level 2 is working well, failure to improve level 1 care threatens population-

wide improvement in performance measures. To remedy this problem, the asthma program is planning training sessions for health educators on primary care teams, physician-specific feedback, and prompts reminding physicians to check peak flows, assess asthma symptoms, review self-management care plans, and improve medication use.

The clinical information system tracks the asthma inhaled medication ratio (anti-inflammatory canisters divided by anti-inflammatory plus bronchodilator canisters). The long-term goal (benchmark) for this ratio is for 95% of primary care physicians to have a ratio higher than 0.3. From 1998 to early 2001, according to KP-NC's own data, the percentage exceeding 0.3 increased from 52% to 79% (32% have a ratio >0.5).

The information system also tracks the percentage of asthma patients at high risk of an acute event (those with a recent emergency department visit, hospitalization, or high volume of asthma-related prescriptions). This measure dropped from 13.5% in 1998 to 9.1% in early 2001, with the best medical center reporting a rate of 6.5%. The long-term benchmark is 8%. From

1996 to 2000, the emergency department visit rate declined from 10 per 100 persistent asthmatic patients to 4. Through registry-generated data, KP-NC determines which of its 17 medical centers are performing well and can provide assistance to centers with less adequate performance.

CONCLUSION

These case studies illustrate how a broad variety of practice organizations have implemented the chronic care model at the primary care level. In each case, the organizations are attempting to transform primary care practice from the untenable situation faced by Dr Madden in the opening vignette to the idealized world inhabited by Dr Newman. None of the organizations has achieved full implementation of the chronic care model, but all have made important strides toward that goal.

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