62 Future Models of Diabetes Care

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Keypoints

- Future diabetes care will continue to be delivered mainly in the primary care setting.
- Efforts must continue to bridge the gap between evidence-based recommendations and the current outcomes of patients with diabetes.
- The Chronic Care Model (CCM) provides the best evidence-based framework for organizing and improving chronic care delivery to ensure productive interactions between an informed activated patient and a proactive prepared practice team.
- The CCM defines six domains that require attention to optimize outcomes: delivery system design, self-management support, clinical information systems, decision support, community and health system-related issues.
- The most robust results are obtained when multiple elements of the CCM are incorporated together.
- Team-based care is a particularly effective strategy to improve diabetes outcomes.
- Future models for diabetes care need to continue to involve patients in designing the experience of the visit and various aspects of care improvement.

Introduction

The future of diabetes care will be shaped by the projections of increased incidence, producing more devastating complications and higher costs of care. Projections suggest that the worldwide prevalence of 6.6% in 2010 will increase to 7.8% in 2030. This translates into an increase in the number of individuals with diabetes from 285 million in 2010 to 435 million in 2030 [1]. Increased efforts to prevent the development of diabetes will be necessitated by current predictions that one out of three babies born in the USA will develop diabetes in their lifetime [2]. There is expected to be a dramatic increase in incidence of diabetes in low and middle income countries. Current health care costs associated with diabetes and its complications total more than $174 billion in the USA, and worldwide estimates are considerably higher. Despite the necessary efforts towards diabetes prevention, it is clear that with spiraling health care costs the millions of patients with diabetes will require better care models.

Many drivers for new care models are already in place, foremost of which appears to be financial. This is true whether the payer is a government authority, private insurer or purchaser of health care. Nearly a decade after the Institute of Medicine's report describing *Crossing the Quality Chasm* [3], momentum continues to build for an implementation of better models of chronic illness care and diabetes is at the forefront of these efforts. In many ways, diabetes is the hallmark disease for studying quality improvement because of the prevalence, cost and strong evidence-base for specific quality goals. The challenge remains that despite strong agreement about minimum goals for $HbA_{1c} < 7\%$ (53 mmol/mol), low density lipoprotein (LDL) cholesterol <100 mg/dL (26 mmol/L) and blood pressure (BP) < 130/80 mmHg, fewer than 7% of Americans with diabetes are currently achieving these goals [4]. Key barriers to achieving these evidence-based patient goals are insufficient patient self-management support to facilitate adherence and clinical inertia. It has become increasingly clear that the systems of care are more responsible for these poorer outcomes than are either providers or patients.

Diabetes is one of the most psychologically and behaviorally challenging chronic illnesses to manage because as much as 95% of the management relies on the patients' self-care efforts [5]. Despite this, the current health care system often does not have in place appropriate resources to foster patient self-management. Limitations in the availability of self-management education and the lack of ongoing self-management support impair patient adherence to self-care. Clinical inertia is defined as the clinician's "recognition of the problem but failure to act" [6]. This refers to the situation where physicians fail to intensify therapy when faced with patients who are not meeting target goals for clinical variables. This inertia certainly has many components including

decreased provider visit time, lack of timely appropriate data, inadequate provider attention to patient adherence and financial barriers. More information is ultimately needed on the basic epidemiology of clinical inertia including a careful analysis of associated patient, physician and clinic characteristics.

Compounding these challenges of self-management and clinical inertia is the plethora of new diabetes management data that is becoming available to the provider. The expanding use of continuous glucose monitoring, personal health records and shared web-based patient portals presents the risk of overwhelming diabetes care providers. Better management systems with appropriate filters and alerts are needed to analyze all these data and to present them in a usable format for providers.

Primary care is an important foundation of care in any health system. Starfield et al. [7,8] have shown that residents of countries with strong primary care foundations have improved outcomes and lower mortality, with lower costs and with fewer health disparities. Despite the highest cost expenditure ($7000 per capita versus less than $3500 for Australia, Canada France, Germany, The Netherlands, New Zealand, and the UK), the USA has a weak primary care base and approximately 50 million uninsured citizens. It comes as no surprise that in a comparison of these eight developed Western nations, the USA had the most negative ratings for access, coordination and safety experiences [9]. What characterized all countries was the need for improved care systems.

For patients with type 2 diabetes mellitus (T2DM) and those at risk for developing the disease, primary care physicians are a critical foundation of the health care delivery system. In the USA, patients with T2DM consulting a primary care physician outnumber those consulting an endocrinologist by almost 10 to 1 [10]. In general, patients at risk for T2DM are seen by primary care physicians and not by endocrinologists. Therefore, any reorganization of care will need to focus on the primary care settings.

Overall, the solutions to these issues will require reorganizing and reinventing diabetes care from a systems approach. In the cross-national Diabetes Attitudes Wishes and Needs (DAWN) study, attitudes towards diabetes care were assessed across 13 countries from Asia, Australia, Europe and North America [11,12]. Although variation existed among countries in terms of both provider and patient perspectives of diabetes care, all respondents (primary care physicians, nurses and specialists) noted lack of care coordination and implementation of chronic disease strategies as an area in need of improvement worldwide. The payment system was also identified as a barrier in most of the countries surveyed, with the USA, Germany and Japan leading the way. Patients reported high ease of access to providers, but patients' ratings of team collaboration among their providers were relatively low. By the same token, primary care physicians noted a lack of multidisciplinary care and a need for more coordination of care. This chapter focuses on the most promising models for diabetes care, provides current examples and attempts to project into the future how these systems will evolve.

The Chronic Care Model

Although several approaches have been utilized to translate evidence-based recommendations into clinical practice, the Chronic Care Model (CCM) has been the most effective model that has been implemented in a variety of clinical settings in the USA and internationally, often with diabetes as the focus disease [13]. The CCM proposes that the productive interactions of a prepared proactive practice team and an informed empowered patient and family will lead to improved outcomes (Figure 62.1). This provides a conceptual framework and roadmap for redesigning care from the typical acute reactive system to one transformed to population-based proactively planned care of individuals with chronic diseases such as diabetes. Mounting evidence from comparison of high and lower performing practices, evaluation of large-scale quality improvement efforts and randomized intervention trials have demonstrated that the implementation of the CCM is feasible by busy practices with resultant improved disease outcomes [14].

The CCM has been employed for diabetes in a number of health care settings and has demonstrated improvement in cardiovascular risk factors [15,16] and reductions in HbA_{1c} [16], along with improvements in complication screening. Although simpler interventions would be attractive, the evidence suggests that high performing practices do best when they incorporate multiple elements of the CCM [17–21].

The CCM focuses on six elements:

1 *Delivery system design.* One of the most critical elements of transforming care relates to the systems for delivery of care. Planned visits are focused to meet the needs of the patient in terms of disease complexity, cognition, social needs, learning style and degree of support needed from providers and staff. Team-based care distributes tasks among the members of the health care
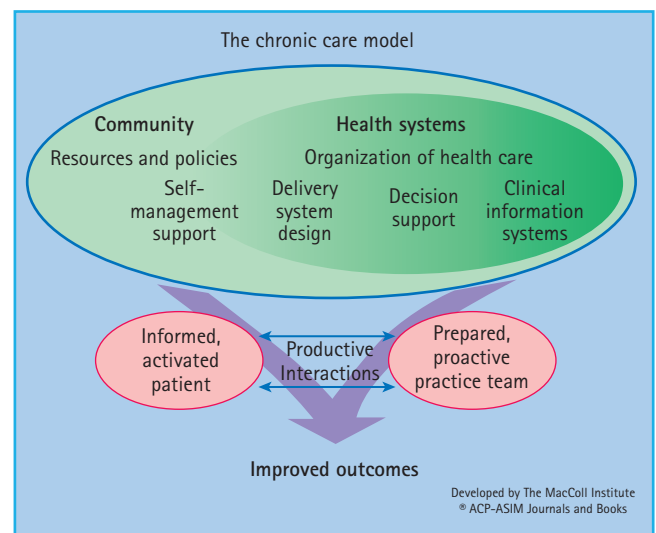

Figure 62.1 The Chronic Care Model. Reproduced from www.improvingchroniccare.org with permission from Group Health Research Institute.

team to optimize care. Reorienting care towards team-based care delivery includes elements such as clinical case management for complex patients, defining and distributing roles amongst team members (nurses, physician assistants, diabetes educators, dietitians, pharmacists and non-medically trained office staff), ensuring follow-up care and identifying patients who "fall between the cracks."

2 *Self-management support.* Self-management support is focused on providing the knowledge needed by the patient to manage their own disease successfully. It also acknowledges patients' central role in their care. This helps to foster the incorporation of effective strategies for living with diabetes and emphasizes the individuals' responsibility for their own health. Although diabetes education has long been recognized as a crucial part of diabetes management, there is increased recognition for the need for ongoing support.

3 *Clinical information systems.* These systems leverage information technology to provide timely reminders to both providers and patients and to identify high-risk subpopulations for proactive care. Diabetes registries that provide searchable information on diabetes populations have proliferated in many health care settings [22].

4 *Decision support.* Embedding evidence-based guidelines into daily clinical practice and sharing those guidelines and information with patients to encourage their participation are the keys to decision support. Guidelines are best integrated through reminder systems that can be embedded into daily care; periodic feedback and standing orders can be used to empower other pratice staff to ensure that evidence-based guidelines are implemented. Although much attention has been given to provider education, better models are needed to integrate specialist expertise and primary care. Innovative approaches that incorporate real-time specialist-based decision support are needed.

5 *Community.* Patients should be encouraged to participate in effective community programs, and this highlights the need of providers to partner with those within the community to fill gaps of care. Partnering becomes even more critical in limited resource environments where extending care beyond the confines of the clinic is essential.

6 *Health systems.* The diabetes care culture must promote effective improvement strategies and support optimal diabetes care. This can include better reimbursement models to encourage optimal care and leadership that stresses the importance of such care.

Delivery system design

Although the best results are obtained when multiple facets of the CCM are implemented together, probably the single most effective quality improvement intervention in diabetes care involves delivery system design to incorporate a team-based approach [23]. Other key elements of delivery system design are case management and shared care.

Realistically, primary care providers have reached their limit in terms of additional tasks that they can undertake, and therefore it is inevitable that the care team needs to be expanded. In many ways, team management has been considered a central feature of superior diabetes care. Diabetes educators and dietitians have long been part of standard diabetes care and the expansion of the roles of these and other individuals within the health care system will likely continue.

Team-based care allows task distribution which includes indentifying team members to:

1 Track longitudinal information through flowsheets or registry data;

2 Perform BP and foot exams; and

3 Ask patients about self-care goals and care barriers prior to the primary health care provider entering the room.

Standing orders can be used to empower office staff to order overdue laboratory screening and eye exam referral, and can even extend to algorithms for medication intensification. Appropriate communication between team members is the key, and the incorporation of clinic "huddles" at the beginning of the day can ensure that appropriately planned care is delivered to all individuals with diabetes.

Diabetes has been a fertile testing ground for case management approaches in which usually either a nurse or pharmacist meets regularly with high-risk patients to provide intensified care [23,24]. Care populations are segmented based on needs to ensure that appropriate care intensity is provided. Key elements of care management include:

1 Defining and identifying high-risk patients;

2 Case assessment;

3 Individualized care plans; and

4 Development, implementation and monitoring of outcomes.

Diabetes registries are an ideal source for identifying high-risk patients either based on clinical measurements (e.g. HbA_{1c} levels), low self-management skills or overdue visits. Intensification of therapy can be facilitated by empowering other health care providers through standing orders to implement changes, and by clearly assessing health management needs and support. Care management is most effective when incorporated within the primary care clinic as opposed to "carve out" models where an outside entity provides telephonic care management for patients and which subsequently leads to ineffective communication with the primary health care provider. Integration of care management with the primary care practice is needed to ensure appropriate information exchange, shared goals and coordination of care.

Diabetes nurses are eager to increase their involvement and take on more responsibility for diabetes care, as recently surveyed internationally through the DAWN study [11]. Pharmacists have also been utilized to work in conjunction with primary care physicians in a case management role. Recent reimbursement changes within the US Medicare system have facilitated billing for these services based on non-randomized trials in which this care has been found to be cost-effective [25].

Care management approaches have been effective at improving glucose control, BP and lipid control in many different settings

in the USA and elsewhere [23,24]. One controversy has been the extent to which case management permits medication titration. Two models have been used: one in which the case manager advises the primary care physician who then makes the medication change versus the second in which a standing order algorithm enables a case manager to intensify treatment without routinely checking with the primary care provider. Although studies suggest that standing order algorithms are more effective in lowering HbA$_{1c}$ levels [23,24], some physicians have concerns about nurses or pharmacists making these changes without routine provider input. As more studies and appropriate training programs are developed to allow other health professionals to assist in medication titration, this approach will continue to show promise in improving clinical outcomes while not overburdening the already overtaxed primary care system.

Shared care is defined as "the joint participation of primary care physicians and specialty care physicians in the planned delivery of care, informed by an enhanced information exchange over and above routine discharge and referral notices as the co-management of patients by primary care and subspecialty specialists" [26]. Currently, when most patients are referred to endocrinologists, care is subsumed by the specialists and true co-management is rare. In a recent Cochrane review which examined shared care across multiple chronic illnesses, limited data were available on effective models [27].

Self-management support

A distinction needs to be made between self-management support and self-management education. Self-management education is quite familiar in the diabetes community and encompasses the traditional role of the diabetes educator providing knowledge and skills to patients with diabetes. Self-management support, however, needs not be performed by a diabetes educator and, in fact, peer coaches have been utilized to foster self-management support. Self-management support involves the ongoing collaborative approach between coach and patients to define problems, set priorities, establish goals and create treatment plans. Resources offered to problem solve can include community-based organizations, peer support programs and other groups. Individualized approaches that address the major concerns defined by the patient typically involve a strong element of coaching with the goal of educating and empowering the patient. The challenge for the future is to make self-management support more widely available. Innovative approaches that leverage information technology to provide patient coaching are possible solutions [28].

Self-management has long been recognized as a key determinant of disease outcome. Traditional diabetes education programs have focused on knowledge and specific skills training. It has become increasingly clear, however, that knowledge is necessary but not sufficient to influence behavior. This has led to increased attention to determinants of patient behavior change. In this regard, importance and confidence for a behavior change are key determinants [29].

Importance and confidence

The overall importance of a behavior change is judged by the patients based on their values. Knowledge and education can clearly influence importance by providing the rationale for health improvement. Confidence, also referred to as self-efficacy, is the inherent confidence that a patient can be successful in making the behavior change. This can be augmented through problem-solving and discussion of alternative strategies. Adherence to diet, exercise, monitoring and medication are required for optimal diabetes outcomes. Although many social and societal factors influence patient adherence, clinician counseling style has a profound impact on potential behavior change. Providers can either increase resistance to change or help to facilitate readiness to change on the part of the patient. Patient empowerment and increased self-efficacy are key factors in enabling patients to feel confident in making necessary changes. Recent years have brought to the forefront behavior change approaches from the psychologic literature to be applied to diabetes. One of the most promising approaches is motivational interviewing [29,30].

Motivational interviewing is a directive patient-centered counseling style for eliciting behavior change by helping patients to explore and resolve ambivalence. It is a collaborative patient-provider model that stresses that motivation must come from the patient, not the provider, and honours and respects the patient's autonomy. Initially utilized in the addiction field, it is now being applied to a number of chronic diseases including diabetes [31]. It is a teachable evidence-based approach that holds significant promise to improve patient adherence. Part of the attractiveness of motivational interviewing has been the well-defined set of skills that can be taught to different individuals. Certified trainers are available worldwide [32]. Brief motivational interviewing has adapted many of the skills of traditional motivational interviewing, as used by psychologists, for use in the busy time-pressured health care environment. Meta-analyses have shown this to be a powerful approach which can be learned by people with varying backgrounds and applied to multiple chronic illnesses [31]. Early studies in diabetes are promising [33,34] and larger scale trials are currently underway [35].

Several other behavior change models/theories, which can either explain or help practitioners conceptualize behavior change, have been identified. They include the health belief model, theory of reasoned action or theory of planned behavior, stages of change or transtheoretical model, social cognitive or social learning theory, community organization/building, and social marketing [36].

Clinical information systems

Clinical information systems help to organize patient and population data to facilitate effective and efficient care delivery. Diabetes registries are being adopted in a variety of health care settings involving municipalities, academic health centers, third-party payers, the US Veterans Affairs Health System and international registries in Europe, Canada and elsewhere [37]. A registry is a searchable list of all patients with a particular chronic disease.

The well-designed registry lists all members of the patients' health team and provides key information for patients and providers. The critical impact of the registry is that it can allow timely identification of high-risk subpopulations, permitting the health care team to intensify treatment. A registry can also provide snapshots of care that can collate the many data elements needed for optimal care (e.g. last eye exam, foot exam, nephropathy screen, HbA_{1c}, cholesterol, BP) and can include prompts for care (decision support) as seen in Figure 62.2.

The primary challenges to further adoption of diabetes registries are cost and interoperability issues between different electronic health record systems. Information technology-related issues often receive the most attention by practices in the USA [19]; however, even non-technologic approaches such as incorporation of paper flowsheets can be an effective start. Furthermore, caution is needed to avoid wasting time and resources on implementing information technology solutions to diabetes care without attending to some of the more fundamental practice redesign issues. More robust results are often seen when team-based care and care management are in place.

A new challenge of information overload is entering into diabetes care. The widespread availability of the Internet makes it an attractive communication tool among patients and providers. It has been useful in multiple areas ranging from videoconferencing for diabetes education to tele-ophthalmology to patient support and education websites. Patients desire an effective tool to communicate with their providers in order to receive responsive feedback and advice in a timely manner. Web-based management of diabetes through patient-initiated glucometer uploads can facilitate provider treatment intensification and has demonstrated mixed results in different patient populations [38]. Glucometer uploading is undoubtedly more accurate than patient recorded values. A potential advantage of between visit care offered by this type of telemedicine approach is an improvement in the "velocity to goal" (i.e. how fast the patient reaches good diabetes control). This is particularly important because studies suggest that the average time between treatment intensification in some cases may be as long as 27–35 months [39]. Telemedicine provides a significant opportunity to give providers updated clinical data for more appropriate medication adjustments; however, enthusiasm is tempered by the data burden presented by the frequent communication between patients and providers related to blood glucose values. Reimbursement could facilitate greater adoption of this approach, and future advances could provide clinicians with treatment algorithms that can assist clinical decisions by interpreting data from these glucometer downloads.

The use of computerized glucose predicting engines shows promise in optimizing insulin management [40]. Albisser *et al.* [41] have demonstrated that utilizing a shared central database allowing for patient input of glucose self-monitoring values as well as medication, diet and exercise data, analyzed with a glucose predicting algorithm, enabled providers to reduce iatrogenic hypoglycemic events ninefold compared to that of baseline. The reduction in hypoglycemic events was accomplished without

change in HbA_{1c}. Thus, the ability to predict future blood glucose levels improves glycemic stability and may also prove useful in patient self-management. Current research on closed-loop artificial pancreas systems are expected to provide more robust algorithms that will become available to guide patient self-titration of insulin and/or streamline provider titration decisions.

Decision support

The approach frequently used as decision support involves embedding evidence-based guidelines into daily practice to obtain clinical improvement. A number of organizations provide evidence-based clinical guidelines. Although there can be some discrepancies among them, most are generally disagreements on how low goals should be brought down. While these debates are important, overriding evidence suggests that the vast majority of patients are not at minimum clinical care goals. Establishing clinical goals is a first step; however, the best practices to achieve those goals are critically important to ensure positive clinical outcomes. The American Diabetes Association (ADA) and national bodies such as the National Institute for Clinical Excellence (NICE) provide detailed guidelines [42]. This is a necessary first step, but decision support goes beyond the acceptance of consensus guidelines and focuses on the implementation of those guidelines in everyday practice. Although provider education regarding guidelines is important, these interventions typically have had limited impact beyond processes of care (i.e. ensuring that more patients are screened for complications). Effective multifaceted interventions most often include academic detailing, physician reminders, and audit and feedback to improve diabetes outcomes. Patient tracking systems (patient registries) and nurse-led interventions are also effective [43].

Examples of guideline implementation can include incorporating decision support into electronic health records or reviewing the chart prior to a planned visit to identify gaps in care and strategies to intensify treatment plan. Although provider knowledge of guidelines is critical, these guidelines need to be shared with patients to encourage their participation. Empowering patients to "know their numbers" provides the basis for a negotiated treatment plan to achieve those goals.

Given the evidence that BP control can reduce both microvascular and macrovascular complications, future efforts will clearly focus on identifying better approaches for monitoring this outcome. Self or automated BP monitoring offers many of the same advantages as glucose monitoring. An increased number of BP recordings increases the accuracy of the measurement. It may also empower patients to discuss their BP with their physician [44]. Home monitoring, in conjunction with other interventions such as patient education, Internet communication, nurse or pharmacist follow-up, does lead to improved BP control [45,46]. Telemonitoring of BP may lead to reductions in both systolic and diastolic BP [47].

The initial disadvantage of self or automated blood glucose or BP monitorings is that clinicians continue to be bombarded by

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Patient Profile – Confidential

Patient Name: John Doe

Chart Number: 155, 5489

Type of Diabetes: 1

Last Visit: 05/13/2009

Clinic: Palmyra

Provider: Peter Lewis

Printed By: AVIGNATI

Date of Birth: 11/18/1958

Year Diagnosed: 1998

Primary Provider: Dr Unknown

Last Dietitian Visit: *Unknown*

Last Education Visit: 09/17/2008

Flu Status: Refused - 02/22/2008

ACE/ARB Use: *Unknown*

Aspirin Use: Contraindicated

Statin Use: Contraindicated

Weight: 235

BMI: 33 – 05/13/2009

Smoker: No

Pneumovax Status: Vaccinated – 2005

Complications:

___Amputee	___CVA/TIAs	___Erectile Dysfunction	___Hypoglycemia Unaware	___Retinopathy
___Autonomic Neuropathy	___Cataracts	___Gastroparesis	___Hypothyroidism	
■ Blind	___Charcot Foot	___Hx Foot Ulcer	■ Nephropathy	
___CAD/MI	___Depression	___Hyperlipidemia	___PAD (PVD)	
___CHF	___Dialysis	___Hypertension	___Peripheral Neuropathy	

HDL: 54 03/16/2006
ALT: 111 03/16/2006
TSH: *Unknown*

Triglycerides: *Unknown*
Microalbumin: 111.00 03/16/2006
Micro/Cr Ratio: 29 05/24/2009

Creatinine: 2.1 06/10/2008
Foot Exam: 05/01/2007 – Sensate
Eye Exam: 11/30/2006 – *Results Unknown*

*********** THIS PATIENT IS DUE FOR THE FOLLOWING EXAM(S)/LAB(S): ***********
Foot Exam, Creatinine
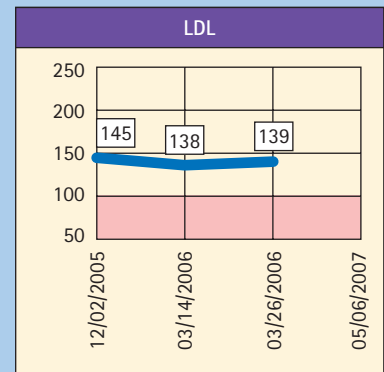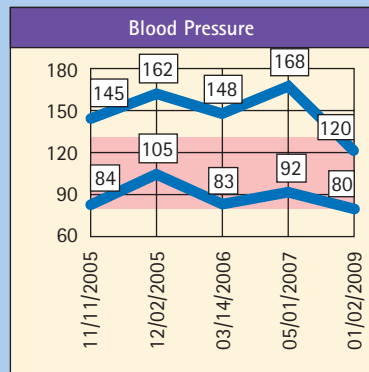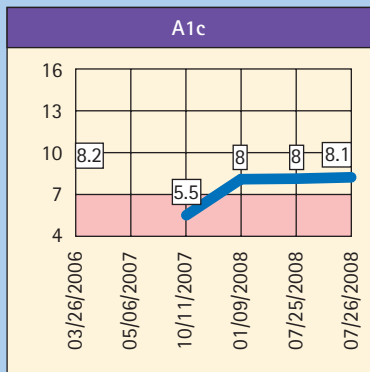
Visit Date: _____

Blood Pressure: _____ / _____

Foot Exam: _____ Sensate   _____ Insensate
_____ Not Done

Provider: _____

Weight: _____

Eye Exam: Date _____
_____ Retinopathy   _____ No Retinopathy
_____ Results Unknown   _____ Refused

Self Care Goals:

___ Diet	___ Footcare	___ Medication	___ Stress Management	___ Other
■ Exercise	___ Maintain	___ Monitoring	___ Tobacco	

Figure 62.2 An example of an electronic registry flowsheet. A1c, glycated hemoglobin; LDL, low density lipoprotein cholesterol.

more and more data. The increasing availability of continuous glucose monitoring data, routine self glucose monitoring results that can be shared through web portals, ambulatory BP monitoring and personal health records are all at the expense of potentially overburdening the already busy clinician with too much information. There will clearly be a need to develop more robust data filtering methodologies to analyze and package this information in clear concise summaries that can lead to appropriate clinician and patient action. Some evidence of this is already apparent in software for many of the self glucose monitoring devices that provide ready access to glucose averages, standard deviations and other simple data analytical features. Merging this information with evidence-based decision support tools for providers is likely to increase their overall value to improve quality of care.

Health systems

The overall health care system is an important factor. In suggesting solutions to improving the US health care system, Berwick *et al.* [48] provide insight into important aspects of the health care delivery system that translate into improved outcomes. They propose that an effective health care system that produces outstanding health outcomes pursues three primary goals:

1 Improving the patient's experience of health;
2 Improving the health of a defined population; and
3 Reducing the costs of care for populations.

They refer to this as the Triple Aim. In order to accomplish these goals, Berwick *et al.* define three preconditions. First, the health care system must be focused and responsible for the health of a defined population. Second, monetary and related constraints are placed on the system. The system does not have unlimited resources. The USA has experienced unrestrained health care costs and spends far more than any other developed country's health system, yet its health outcomes lag behind other countries [49]. Third, there is an over-arching entity that is responsible for the health of the population and pursues the goals of the Triple Aim. Health systems such as those in Canada and the UK already embody these principles. There are also several examples in the USA such as Kaiser Permanente and Health Partners in Minneapolis, both closed-panel health maintenance organizations.

Several approaches have been utilized from perspectives to improve clinical outcomes for patients with diabetes. Disease management programs have proliferated in the USA, and worldwide there has been enthusiasm for pay-for-performance (P4P) models that alter reimbursement based on achievement of quality goals.

"Disease management" has been defined by the Disease Management Association of America as "a system of coordinated health care interventions and communications for populations with conditions in which patient self-care efforts are significant" [50]. In the USA, this is a one billion dollar industry that usually is managed by a private company working with a health insurance plan or state health program. Mattke *et al.* [51] question the

effectiveness of these programs. They did find that these programs can lower hospitalization rates for patients with congestive heart failure and increase outpatient care and prescriptions for patients with depression and these programs have also lead to improvements in process of care, but it is uncertain if they lead to reduced costs [50]. Linden and Adams [52] found a slight cost savings but cautioned that study design had an influence on the findings. Randomized clinical trials showed a net loss while pre-/post-comparisons and case–control studies demonstrated cost savings. Typically, the severity of illness and intervention intensity varied greatly, and these disease management programs were not fully integrated into the patient's care.

Reimbursement of providers of care may be a mechanism for improving health outcomes of individuals with diabetes. Recently, P4P has been touted as a way of incentivizing clinicians to improve the quality of care that they deliver. Two recent reviews point out that P4P programs may have both benefits and adverse effects [53,54]. Adverse effects include a focusing on only those elements measured and avoiding severely ill patients who may adversely affect performance measures [53]. In a study of the effects of P4P on intermediate outcomes for patients with diabetes in the UK, Millett *et al.* [55] found that while improvements were made, the magnitude of improvements differed according to ethnic group. Comparing P4P between primary care practices in the USA and UK, McDonald and Roland [56] reported that there were unintended consequences resulting from the implementation of P4P. Physicians in the USA were more likely to report that P4P had little impact on their office and voiced feelings of resentment, lack of understanding of the program, loss of autonomy and less satisfaction than their UK counterparts. Design elements such as who is incentivized (individual clinicians, medical groups or hospitals) and what is incentivized (documentation of process of care measures or outcome measures) may be important.

Others suggested models of payment to improve quality of care including non-payment for avoidable complications, case-management fees, primary care capitation, episode-based payment and shared savings [57]. Non-payment models and episode-based payment models usually focus on care provided to inpatients. For example, non-payment models do not pay the provider and/or hospital for removing the wrong body part or preventable inpatient complications (urinary tract infections). Episode-based payment models define a global rate for a specific condition such as diabetes or myocardial infarction and the meeting of pre-defined process standards such as achieving best practice standards. Case management fees and primary care capitation to primary care physicians have been proposed to coordinate ambulatory care better, particularly in patients with chronic diseases such as diabetes. Lastly, shared savings payment models involve sharing savings from providing improved quality of care with large groups or individual practitioners. Many of these payment models may be specific in the attempt to "fix" the fragmented US health system. Elements of these payment models may already be incorporated into the more integrated single-payor systems of other developed countries.

Another reimbursement model being explored is providing patients with monetary incentives to engage in appropriate self-care and/or removing financial barriers to care. A municipality in the USA (Asheville, North Carolina) eliminated pharmaceutical costs for patients with diabetes in return for mandated regular pharmacist visits and noted significant savings in health care costs [58–60]. Large corporations in the USA have been examining other models whereby patients are incentivized to engage in various programs or activities. To date, there are limited data regarding the efficacy of these initiatives despite their potential promise.

Community

Community resources are often overlooked and not integrated into care for patients with diabetes. Providers can become more familiar with these resources and work collaboratively to make patients aware of opportunities. These can include safe exercise opportunities, healthy food availability, social programs and support services that are available through non-governmental organizations. Communities can partner with health care organizations and governments to improve public awareness about diabetes. For example, recent efforts in the USA between the ADA and the American Heart Association (AHA) publicizing the link between diabetes and heart disease have raised better awareness. Overall, as prevention of diabetes and its complications becomes an increasing public focus, public awareness efforts to empower patients to engage in appropriate diet and exercise will be needed. Social marketing provides a rationale for how this approach can be effective, and an excellent example of success is the change in tobacco use in the USA over the last three decades. Similar public health initiatives are needed to stem the epidemic of obesity that is fueling the rise in diabetes.

Overwhelming evidence now suggests that the simultaneous incorporation of multiple components of the CCM is synergistic and more effective than traditional single intervention approaches [19,23]. Too much past research focused on only a single intervention and therefore missed the potential value of the concurrent implementation of multiple interventions for true "transformation of care."

Transformation of care, according to the CCM, has often been accomplished through "learning collaboratives" either through the Breakthrough Series Collaborative [61,62] or through other similar experiences. Widespread implementation in the USA has generally occurred in large organizations, in part based on supportive reimbursement systems. Nevertheless, external support for practice transformation is being explored in several regional improvement programs [62,63]. Recent position statements from many professional societies have come in strong support for the CCM [64]. Alternatives to the time-consuming learning collaborative model such as practice coaching and web-based learning networks are being developed and tested [65–67].

Another initiative to improve chronic disease management in the USA has focused on the patient-centered medical home. The patient-centered medical home is a concept being developed by the major primary care societies in the USA. It combines the principles of primary care (continuity of care, whole person orientation, quality/safety, prevention, timely access to care) with many of the elements of the CCM (coordinated/integrated care, teams, population health). One of the driving forces behind this concept is to revitalize primary care in the USA.

Although the concept of patient medical home has been attractive and a certification program has been established in the USA, there are concerns that this model may have limited application outside the country. In particular, many of the elements described for the National Center for Quality Assurance certification process require advanced information technology capabilities that generally necessitate an electronic health record. Despite the value of electronic health records, the mere availability of these tools is often insufficient to transform care. Often, practices and health systems can get sidetracked with the formidable information technology and interoperability challenges, losing sight of the overall goal of transforming health care. In comparison, the CCM elements are more easily translatable in low technology environments within the developing world.

In the USA, several states have explored integrated approaches to adopt the CCM. The foremost of these has been initial experience in Pennsylvania where insurers have agreed to provide significant reimbursement and incentives for primary care adoption of the CCM to improve diabetes care. Learning collaboratives are conducted across the state to teach clinicians and office staff the implementation aspects of the CCM. These efforts are supported by practice coaches who meet with practices individually to problem-solve implementation efforts. Clinics are required to report on clinical outcomes and care changes on a monthly basis, and payers have agreed to provide funding for needed practice changes such as case management in the hopes of containing spiraling health care costs [62]. A national initiative is currently underway in Australia to implement the CCM through the Australian National Primary Care Collaboratives [68], and similar initiatives are being explored in Canada, Denmark, Netherlands, New Zealand and elsewhere.

Ideal appointment of the future

One informative exercise is to solicit from patients and providers what the ideal appointment of the future will look like. Certainly, many challenges face health care, but returning the focus to be more patient-centered is a universally adopted goal for patient care. The classic clinical visit can be modified in a variety of ways.

As care moves to be more patient-centered, a key need is to involve patients in designing the type of care and how it could be implemented. This can be rather enlightening to those in the medical community by stretching the medical model in ways not previously considered. The patient's perspective is needed because: "without the inclusion of the affected individual's perspective, it is possible that the information, from the provider's perspective, is incomplete or misleading" [69].

Significant opportunities exist to improve the pre-arrival visit so that patients could spend quality time speaking with their provider, as opposed to providing data. To accomplish this, patients could utilize kiosks in waiting rooms to search for specific disease conditions and receive tailored messages about their health that prompt questions they may want to ask their provider during the visit. Creating such opportunities for "patient activation," which enables patients to become collaborative partners in managing their healths, have had some promising results [40,70,71]. Where kiosks are not feasible, even low-tech (paper) methods to capture current medical histories, patient concerns and symptom screening (e.g. depression) would give patients more time with the provider to focus on the issues they want to address. During the appointment, less time would be spent talking about factual information that could be captured electronically (medications, insurance information, address changes, phone numbers) and more time talking about what matters most to the patient.

A warm inviting environment can have a positive impact on the "ideal" patient appointment [72]. The use of art, particularly art that holds meaning for the patient, is one method to enhance the office environment. Studies have also looked at the creation of art by patients to express their thoughts about having a chronic illness [73,74], which could then be shown to others. The use of art in waiting rooms is an effective way to create an environment that allows for reflection and discussion [75,76]. In fact, the overall patient experience could be improved through providing a service that resembles check-in at a hotel or restaurant. [The word "hospital" comes from Latin *hospes* (host), which is also the root for the English words "hotel," "hostel" and "hospitality".] Imagine being greeted by a concierge, who offers to take the "guest's" coat and find a seat. The guest has the option of reviewing medical information and providing corrected data (phone/address) through either the concierge or a computer station at the concierge's desk. The concierge asks what the main concern of the appointment is today, and makes a note that is forwarded to the provider electronically. Instead of thinking about the patient experience in a clinical way, the model of hospital hospitality opens up the doors for true customer service delivery.

Some may argue that at the core of the issue is how the patient appointment itself should be changed so that patients are treated more like people and less like walking diseases. Contrary to many preconceptions, the clinician may actually gain time by altering current practices, rather than lose time at each appointment [77]. Time is always limited and clinicians can find ways to use interventions or strategies to make most efficient use of the time. Thus, identifying one focused question that connects to the heart of the issue, rather than a dozen that do not, can save time and introduce important matters that otherwise would take years to disclose [78]. The question should be open-ended, not closed, to generate a discussion. If a patient does not have ideal self-management, the clinician could ask a question such as: "Tell me about your struggles (difficulties) with having diabetes?" and then make notes of the patient's response. In turn, the clinician would repeat back the response, and ask, "Did I get it right?" This is a narrative enquiry technique used in medical settings to assist clinicians in understanding the patient's situations, thus being able to offer better suggestions or assist the patient in problem solving on what could be done to overcome those struggles [79]. Other examples of questions used in narrative inquiries include: "How does diabetes impact your life, both negatively and positively?" "What is important to you in your life, besides diabetes?" and "What could I do differently as a provider to help you?" Asking questions such as these often encourages dialogue and deepens the sense of mutual commitment and investment in the learning experience.

In the ideal future appointment, we want to examine critically those things which inhibit our practice from being successful. By asking patients what they want and need from us will improve upon the productive interaction between patients and providers, which is the ultimate goal of the CCM. We want to ask ourselves and our patients "What are the barriers that prevent us from achieving success?" and take action based upon those recommendations. Then we go back to our patients and ask "Did we get it right?" This process will help us redesign our practice to meet needs and provide self-management improvement for patients.

Overall, the future models of diabetes care are in many ways available today. The CCM has been implemented in a number of practice settings with improvements in diabetes quality of care. The model provides a conceptual framework to attend to the many aspects of care required to ensure that productive interactions are achieved between a proactive prepared practice team and an informed activated patient. The assignments of this model to different practice settings and further dissemination of the model are the near-term challenges. Care will inevitably become more patient-centered. Collaboration between patients and practice teams will be required to improve clinical outcomes and subsequently costs. Understanding the needs of patients, creating the ideal environment for their care and using system-based approaches to optimize their care will converge to improve the lives of those with diabetes in the future. Supporting self-management will be critical to achieving these outcomes.

In many ways, the future lies in developing integrated systems of care that are responsible for the outcomes and in getting individuals to take more responsibility to manage their own disease. Diabetes has led the way in many CCM studies and included elements, in part because it represents a costly disease reaching epidemic proportions. Nevertheless, this disease is also blessed with many evidence-based goals of care that can prevent long-term complications, which are the source of most of the overall costs of diabetes.

Acknowledgments

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